Bus Concession Contracts and Tariff Policy: Lessons from the Bogotá and Colombia Experience

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This paper presents a critical analysis of two key features of Colombia’s new public transport system: tariff policy and incentive structures in bus concession contracts. It primarily focuses on the continuum of reforms in Bogotá, targeted high capacity BRT corridors followed by the ongoing citywide transformation of public transport—since other Colombian cities are modeling their reform process by looking at this experience. In terms of tariff polices set at “cost recovery” levels, the experience notes the importance of openly competing and stripping down to the operating essentials each element of the tariff, so as not to have the users pay for societal benefits. In terms of incentive structures, the experience calls for different demand risk profiles and penalty and reward system for operators, given the type of reform. Furthermore, the paper argues that contractual terms become critical in the initial stages of the reform and should not be unreasonably long, so that subsequent phases can incorporate the lessons learnt.

Keywords: tariff policy, bus concession contracts, Bus Rapid Transit, Bogota, Colombia
INTRODUCTION

Bogotá has developed a tradition of innovation and excellence in the provision of public transport. Numerous cities throughout the world have modeled their Bus Rapid Transit (BRT) systems after Transmilenio’s experience. In Colombia, a national urban transport program was conceived based on Bogotá’s public transport reform, with the aim to support the roll-out of BRTs in Colombia’s largest cities. After more than a decade since Transmilenio’s inception, Bogotá is now embarking on a citywide reform of its public transport, named the Integrated Public Transport System (SITP); other Colombian cities have also followed suit.

One of the prominent features of the reform has been the profound change in the business model and incentive structure for public transport service provision. These new incentives are embedded in the concession contracts for service provision, and are also linked to the underlying concept of a tariff policy set at “cost recovery”. In this respect, cities in Colombia are building from each other, many times using the “first generation” bus concession contracts from Transmilenio or the SITP as models for their own reform process. Hence, it is important to compile the information and experience thus far so that the lessons learnt are disseminated in a timely manner.

This paper presents a critical analysis of bus concession contracts and tariff policy in the context of the ongoing reform process in Colombia. It primarily focuses in Bogotá but also draws on the authors’ experience with other Colombian cities. The paper builds on a body of work primarily undertaken over the past three years, including work with cities to assess and understand their bus concession contracts and incentives structures, and the intricacies behind the tariff policies in the new transport system. In Bogotá, this includes support to the authorities to assess alternative tariff schemes to respond to the city’s evolving needs and an examination of the financial, contractual and operational underpinnings of the SITP to propose alternative strategies to shore up implementation. Knowledge based on the World Bank’s initial support to the implementation of the Transmilenio system and subsequently the implementation of BRTs in secondary Colombian cities, are also key inputs to this paper.

The paper is organized as follows. The first section describes the transformation of the public transport business model in Colombia. The second section introduces the concept of tariff policy set at “cost recovery” levels, and explains how a structured process that incorporates incentives for efficiency via concession arrangements for service provision was developed. The experience so far, and lessons learnt in several Colombian cities is described. The next section looks at the key incentive structure in bus concession contracts, namely the payment structure and penalty and reward system, by focusing primarily in the continuum of reforms in Bogotá, as several cities are modeling their public transportation reform based on this contract design. The paper concludes with some recommendations in terms of tariff policy and bus concession contract design.

THE CONTEXT & HISTORY – TRANSFORMATION OF A BUSINESS MODEL

Until the development of the Transmilenio system in 2000, all public transportation in Colombia was operated under a system characterized by a perverse incentive scheme that led to an oversupply of buses, congestion, reduced vehicle safety and low-quality service. In this traditional scheme, bus companies obtain route “permits” from the local transit authority to provide transit services. In turn, bus companies own the routes granted to them by the city government but are not required to own the bus fleet. Individual investors own buses, and bus companies rent out to bus owners the right to operate a certain route. Responsibility for service
provision, therefore, rests with the bus owners—and even the driver hired by the owner—and not the bus companies. The arrangement induces bus owners to compete in the streets against other buses, irrespective of demand patterns, as their revenue and the wage of the bus driver is directly related to the number of passengers carried. Bus companies’ main assets are their routes as they rent them out to bus owners, so they have the incentive to lure as many buses as possible to operate their routes. The incorporation of a number of buses beyond those required to serve the market has led to excessive competition, locally known as “the penny war” (guerra del centavo) because drivers literally fight for each prospective passenger (World Bank 2011).

The situation was exacerbated by a weak institutional, technical and regulatory framework. Institutional capacity was lacking both at the national and local level to formulate and coordinate policies aimed at improving transport planning and traffic management. Local transport authorities did not have the technical capacity to regulate and supervise the traditional bus companies. In general terms, operating licenses for bus companies were given without technical criteria, and political interests and corruption prevailed. The situation was made worse by the poor (or none existent) infrastructure and facilities for public transportation.

In response to these shortcomings, by the end of the 1990s, the government of Bogotá began to explore alternative ownership models and incentive structures that maintained the benefits of privatization but improved service provision. One such ownership model was concession contracts for service provision. In this system, a competitive bidding process is used to determine which bus operators will have the right to operate a route or a number of buses. The concession is for a limited period of time, which ideally coincides with the useful lifespan of the fleet, as opposed to the lifetime permits offered in the traditional model. Bus operators, in turn, need to own the bus fleet and operate it under close supervision and regulation from the public sector, which determines whether operators supply the scheduled service. On the infrastructure side, the system uses exclusive bus ways, high-capacity buses, a centralized fare collection system based on the use of smartcards and a fleet control system (World Bank 2011).

Transmilenio launched operations in December 2000, with the objective of implementing a BRT system that covered the city’s highest demand corridors. To date the system has approximately 107 km of trunk corridors and carries nearly 2 million passengers per weekday. Transmilenio trunk lines currently operate alongside Bogota’s traditional bus system that is gradually being upgraded and replaced by the SITP, as will be further described below.

The Transmilenio experience served as a model for the formulation of a National Urban Transport Program and the roll-out of BRTs throughout Colombia’s largest secondary cities. To date, six BRTs are operating in Colombia (Bogotá, Barranquilla, Bucaramanga Cali, Medellin and Pereira), and most still coexist with the traditional bus system. The BRT system in Cartagena has yet to launch operations, and it is intended that the reform will tackle all of the city’s public transit services. Bogotá and Cali have moved forward with a city-wide reform of its public transit system, and Pereira is currently undertaking the feasibility studies to take this step.

THE BASICS OF TARIFF POLICY

There are several features of the basic tariff model developed in the context of Transmilenio and used subsequently in all of the other Colombian systems that are worth highlighting. The systems were designed to be operationally self-sufficient with fares set at “cost recovery” levels. At present, Colombian law (Law 86 of 1989, Article 14) requires that public transport systems operate in this manner and that city government does not subsidize the system. In fact, the law mandates that fares charged should be sufficient to cover the costs of
operation, management, maintenance and replacement of the bus fleet. A structured process that incorporates incentives for efficiency was developed in order to determine the appropriate cost-recovery fare. First, the public sector administrator designs the system and the operating plan and is responsible for developing and maintaining the system infrastructure. All of the cost elements of the system—usually the costs associated with bus operations, fare collection and management, and system administration—are organized by specific entities managing the associated functions: bus operators, fare collectors, a trust agent—that collects the system’s revenues in a fiduciary arrangement and then distributes payment to all agents—and a public sector system administrator in charge of planning and managing the system. Each of these elements (except the public sector administrator costs which are estimated and added to the other costs) is then bid out separately.

In the case of bus operations, there is a strong focus on keeping in the new system as far as possible, drivers and operators who were participating in the old traditional system. As such owners and drivers are encouraged to organize into formal companies that then bid against each other (often with partners that could include operators from outside the city) for a share of the service. Lastly, a notional “technical tariff” is then estimated by summing up the winning-low bids for each cost element (plus the per ticket costs estimated for the administrator) and dividing that by the expected ridership. In other words, the “technical tariff” is an indicative tariff that captures the required average revenue per ticket sold that is needed to guarantee that the remuneration of all of the system’s service providers (bus operators, fare collectors, trust agent, planning agency) is covered, given a predetermined level of service.

Four features of this structure and the experience with this system are worth highlighting.

- First, in general, the creation of the notional “technical tariff” needed to operate the system at cost-recovery levels, constructed in a manner that incorporates incentives for efficiency for different stakeholders has been a useful and important development. While the user tariff needs to closely track the technical tariff, the city Mayor (who determines the user tariff) has some discretion on timing and level of adjustments. The result has been a system whereby (i) the need and level of user tariff adjustment needed has been important public information making at least somewhat easier the Mayor’s task of adjusting fares; (ii) in Bogotá the system has gone through periods when the user tariff has been higher than the technical tariff—creating a surplus that has helped finance deficits in periods (like the present) where adjustments in the user tariff have lagged changes in the technical tariff.

- Second, the ridership estimates play a critical role in determining the initial technical tariff. In the case of the initial Transmilenio corridors, demand exceeded estimates, thus providing the system with surpluses in initial stages. In the case of the secondary cities systems where actual ridership levels have been significantly lower than expected, this process has led to important deficits for the systems in initial stages. The experience clearly reinforces the need for high quality demand forecasts as an input into project structure.

- Third, it is the bidding process that guarantees efficiency in costs, and as such the level of efficiency obtained depends on the competitiveness of the bidding process. In the case of the fare collection and fare management functions—this has been quite successful with open and competitive bidding being the norm. However, as Table 1 illustrates, bus operating costs constitute the bulk of the technical tariff, and as described above the initial bidding process, while competitive is not truly open. To safeguard the interest and livelihood of the traditional and largely informal public transport sector, the tendering
process includes prerequisites that protect sector incumbents. On one hand, given the complex social environment characterizing the traditional bus system, the ability to create some competitive dynamic is itself both difficult and commendable: in a similar environment in Mexico, the practice is to negotiate with no elements of a competitive dynamic. Compared to that, the Colombian practice provides an important incentive for efficiency in bus operating costs. However, a truly “competitive” and open tendering process is ultimately the best guarantor of efficiency. This suggests the need to ensure that initial contracts are of a reasonable duration and that once they expire they are followed by open competitive bidding processes. In reality, the initial contracts for Bogota had a duration of 12 to 14 years, but were extended by Transmilenio as a result of a recent renegotiation. In the medium and long term, moving towards a system of re-competing concessions openly would be important to ensure system efficiency.

Table 1. Composition of the Technical Tariff

<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>Bus Operators (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>Fare Collection</td>
<td>8%</td>
<td>6.0%</td>
<td>13.5%</td>
<td>13.0%</td>
<td>9.1%</td>
</tr>
<tr>
<td>BRT Agency</td>
<td>4%</td>
<td>7.0%</td>
<td>6.85%</td>
<td>7.0%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Bus Scrapping (2)</td>
<td>--</td>
<td>9.4%</td>
<td>--</td>
<td>3.0%</td>
<td>--</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>--</td>
<td>9.0%</td>
<td>11.75%</td>
<td>3.0%</td>
<td>--</td>
</tr>
<tr>
<td>Trust Agent (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>Transport Authority</td>
<td>--</td>
<td>--</td>
<td>0.27%</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Contingency Fund</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>6.0%</td>
<td>--</td>
</tr>
<tr>
<td>Total</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 Internal Brief (2013), based on information provided by the Ministry of Transport or BRT Agencies in each city.

(1) Includes both trunk and feeder services. In Bogotá reflects the technical tariff composition after the bidding process for the SITP.

(2) A separate fund for bus scrapping has been established in these cities. In the other cities, bus scrapping is part of the bus operating costs.

(3) Remuneration to trust agent is usually less than 0.03%. N/A reflects the fact that actual figure is not available.

A fourth element of the tariff system, also illustrated by Table 1 is “scope creep”: more and more cost elements not directly related to operations have been loaded on the tariffs. As seen from Table 1, the tariff is also paying for planning and supervision of the systems (by way of financing the BRT agencies or in the case of Bucaramanga its Transport Authority), bus scrapping costs (directly in cities like Barranquilla, and Cali, or indirectly as part of bus operating costs in the other cities) or infrastructure provision (mainly concession for bus depots in Barranquilla, Bucaramanga and Cali). Many of these elements of the reform process—bus scrapping, fleet renewal, formal employment for bus drivers and maintenance personnel—bring benefits not just to users but to society as a whole—pollution and GHG emission reduction, road safety—and it is not clear that public transit users should have to pay for enhanced societal welfare. In other cases, the tariff has been used to build key system infrastructure that is contrary to the principle of operational cost recovery embodied in the Colombian Law. As a result of lower than projected demand, cities such as Barranquilla and Bucaramanga are now sorting costly legal battles with the private sector (concessionaries) to terminate these contracts. All in all, the fact is that for lack of more sustainable and secure sources of funding, the tariff has been used sometimes arbitrarily to finance a number of elements that are not direct “operating costs” and are placing tremendous strains on the financial equilibrium of the systems.
Tariff issues from a user perspective

As in many cities globally, Colombian cities undertaking public transit reforms are constantly trying to meet the sometimes incompatible goals of providing high quality public transport that is both financially sustainable as well as affordable, particularly for the poorest. In this context, Bogota has made two recent innovations that while not a primary focus of this paper are worth mentioning.

First is the use of targeted subsidies, in the form of a “pro-poor” transport subsidy program rolled-out in early 2014 that build on the country’s broader poverty targeting system and database (the Sistema Nacional de Selección de Beneficiarios or SISBEN). Beneficiaries, defined as “SISBEN 1 and 2 users” can now receive a public transit subsidy effectively amounting to a 40 percent 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 (Mehndiratta et al. 2014).

The second is an experiment with differential tariff policies to deal with a crush level peak-load problem. In 2012 Transmilenio implemented a differential fare scheme for peak/off-peak trips: in peak hours—the system had a flat fare since launching operations in 2001. The fare was set at COP1,700 (USD$0.95), and in off-peak hours at COP1,400 (USD$0.81). The objective of the differential tariff scheme was to relieve excessive overcrowding in the system during rush hours, smooth out demand, and thus improve the operating conditions of Transmilenio. However, in reality demand for Transmilenio turned out to be relatively inelastic (price elasticity was estimated to be 0.18), and hence the tariff reduction during off-peak hours brought in very small changes in either peaking patterns or total ridership.

KEY ELEMENTS OF THE CONCESSION CONTRACT

Along with the tariff model, the bus concession contract frames the institutional framework for the ‘new’ bus systems in Colombia. This analysis focuses primarily on the financial incentives embedded in the contracts, which in broad terms are determined by the payment mechanism and the penalty and reward system. These two incentive structures also influence the operator’s performance in the following manner. The payment mechanism embedded in the contractual arrangement will determine the operator’s behavior, in as much as he will try to maximize his profitability either by increasing income or decreasing operational costs (Gomez-Lobo & Briones, 2014). For bus concession contracts, this payment mechanism has most commonly included payment based on some type of operational variable (ranging from kilometers logged, to fleet effectively being used in the operation) or payment dependent on the number of passengers transported. These two types of contractual arrangements have also been termed in the literature gross cost contracts and net cost contract. As has been widely discussed in the literature (Gomez-Lobo & Briones, 2014; Gomez-Lobo & Briones, 2013), each of these payment schemes can lead to different outcomes depending on the nature of the reform process, and a misalignment between this variable and the intended service objectives of the authorities can dampen the reform. The system of penalties and fines is the second financial incentive by which the authorities tend to influence operator’s behavior. Operators’ performance standards, most notably frequency and regularity (although other service obligations are also included), are monitored by the authorities, and is linked to a system of penalties and rewards that influence the operator’s revenues. In the following section we will review the characteristics of Bogota’s bus concession contracts particularly along these contractual parameters and in light of the continuum of reforms implemented (starting with targeted BRT corridors, and moving towards a city-wide reform).
Bogotá’s Transmilenio Phase I & II

Bogotá initially tendered two sets of bus concession contracts for Transmilenio—Phase I (2000) and Phase II (2003) contracts—which have similar features. Herein, we will focus on the contractual arrangements for trunk operators. The payment scheme to the trunk operator is based on a cost/km logged (gross cost contract), and this parameter is also the tariff bid by the operator in the tendering process. The concession is designed such that its duration is determined by the kilometers logged by the vehicle fleet, and terminates when the average mileage of each of the concessionaries’ total fleet reaches 850,000 kilometers, which corresponds more or less with a 12 to 14 year period.

Although the payment scheme in Transmilenio’s initial contracts is largely dependent on the number of kilometers logged, operators do face some demand risk in two ways: First, as operating income is ‘pooled’ and then distributed among all service providers, trunk operators get paid last and in a residual manner after accounting for payment to other providers. This effect can be easily observed in the following formula:

$$ ROT_i = \frac{C_t \times Km_i \times Av_i}{\sum_{i} C_t \times Km_i \times Av_i} \times (IngresosOperadoresTroncales + C) $$

Siendo

$$ IngresosOperadoresTroncales = PP \times T_{t\text{ajustada}} - RA - RT - RG - RF $$

Where $C_t$ is the cost/km tariff bid out by each operator, $kmt$ are the kilometers logged by each operator, and $Avt$ is a factor of adjustment for service speed. Note that the $C_t$ cost factor covers both variable & fixed costs (O&M inputs and labor, and capital costs related to fleet renewal and RoI). The $Ingresos Operadores Troncales$ is basically determines the fact that the operators get paid in a residual manner, and is estimated as the available funds (passenger times the adjusted technical tariff) for trunk operators, after deducting payments to the other system agents (feeder operator, trust, fare collection, planning entity).

The second way by which operators face demand risk, is by contractually linking operator remuneration to a ridership indicator: the passenger per km index or the IPK. The contract is structured such that while the operator is insulated from demand risk within certain predefined bounds, the operator shares the downside loss if demand falls under a floor, and conversely shares the upside if the demand is over a predefined ceiling. This is depicted by the following formula:

$$ \Delta IT = \%T \times \frac{\Delta C_t}{\Delta IPK} + \%A \times (\Delta C_a + \Delta %A) + \%R \times \Delta CR - 1 $$

Donde:

- $\Delta TT$ = Cambio porcentual en la tarifa técnica
- $\%T$ = Peso relativo del costo troncal
- $\Delta C_t$ = Ajuste en el costo por kilómetro de la Troncal
- $\Delta IPK$ = Ajuste en el Indice Pasajeros - Kilómetro de la Troncal
- $\%A$ = Peso relativo del costo de alimentación
- $\Delta C_a$ = Ajuste en la remuneración otorgada por pasajero transportado en alimentación
- $\Delta %A$ = Ajuste en el porcentaje de pasajeros pagos que ingresan por alimentación
- $\%R$ = Peso relativo del costo de recaudo
- $\Delta CR$ = Ajuste en el costo de recaudo
that shows an inverse relationship between the changes in the technical tariff and the IPK. Note that this formula affects the system’s available funds (Ingresos Operadores Troncales), since system’s total income depends on this adjusted technical tariff. In general there is an inverse relationship between the IPK and the technical tariff: if the IPK increases (i.e. ridership increases), then the technical tariff (i.e. the cost per ticket sold) would decrease, and conversely if the IPK decreases, the technical tariff must increase. In a way this relationship ultimately transfers demand risk to the end user via higher user fares, but contractually affects the remuneration of the operator by incorporating a floor and ceiling that limit the potential effect of changes in the IPK on the technical tariff (and end user) and transfer some demand risk to the operator. For instance, if the IPK is below a lower bound (This lower bound was contractually set at an IPK of 4.75), the operator assumes the demand risk and the associated revenue loss; for an IPK that is beyond the upper limit (calculated as the moving average of the last six months, which by December 2013 was at 5.5 according to Transmilenio), the technical tariff will remain unchanged, and the operator will reap the surplus generated by higher ridership. Note that delta TT, is also a factor of the changes in costs of the different service providers, and a couple of operational variables (passenger per kilometer index, and % of passenger using feeder services). In the case of trunk operators, this monthly adjustment in the cost/km factor derives from changes in basic input costs and salaries (CPI, PPI, minimum salary, price of gasoline, maintenance, etc.), which are stipulated in the contract, as well as the relative weight they represent in the cost/km parameter.

In general, the perception is that this payment mechanism has been a success in the case of the Transmilenio system appropriately aligning operator and public interest. In the high demand corridors in which Transmilenio was implemented, the gross cost element of the contract effectively broke the on-street competition that characterized the earlier penny-war system. That said, as the system has become mature and authorities have looked for ways to optimize system costs this payment mechanism has limited the possibilities. Two particular scenarios are worth highlighting:

- At the very basic level, while this mechanism protects users from tariff increases linked to large demand decreases (which have not happened), the introduction of the IPK as a variable of adjustment of the technical tariff, coupled with the fact that the cost/km remuneration does not differentiate between variable (O&M costs and labor) and fixed cost (fleet, plus ROI), has limited Transmilenio’s ability to reap the benefits of economies of scale and greater operational efficiencies generated by the higher than expected demand in Bogotá that could have potentially have been transferred to end users as lower fares. For instance, there comes a point in the lifetime of the concession where the fixed assets may have fully depreciated but the payment mechanism is still compensating the operator for said asset (i.e. fleet).

- In 2012 Transmilenio implemented a differential fare scheme for peak/off-peak trips: in peak hours the fare was set at COP1,700 (USD$0.95), and in off-peak hours at COP1,400 (USD$0.81). Though the differential fare was designed principally to shift crush level crowding in the peak; there was some potential that lower levels of peaking could generate cost efficiencies resulting from higher levels of asset utilization associated with lower levels of peaking. However, the potential for the system to realize savings from this are limited by the contract structure that does not differentiate between variable and fixed/capital costs. In particular, since trunk operators get paid the same cost/km
regardless of the fleet utilization rate, any reduction in peaking could only translate to savings in a new contract; not in the midst of a contract under implementation.

**Bogotá’s city-wide reform process—SITP**

Bogotá launched implementation of the Integrated Public Transport System (SITP) in August of 2013. The SITP is meant to integrate all of Transmilenio’s BRT corridors with the traditional bus system, the bike network and, in the future, Bogotá’s first subway line. The SITP will move towards full fare integration (centralized collection system) of public transit services in Bogotá, with hierarchical and streamlined routes, elimination of oversupply through scrapping of almost 9,000 old buses, and promotion of early retirement of vehicles, all under the same type of competitive concession arrangements for service provision that were implemented under Transmilenio, but are now being extended to cover the whole public transit system. The government in Bogotá also opted for a gradual implementation of the SITP, as opposed to the “Big Bang” approach followed in cities like Santiago, with the TranSantiago system. Although this gradual adoption should have been completed by mid-2014, implementation was met by numerous challenges, and by June 2014 only 60% of the system had been implemented.

The competitive concession arrangements for service provision in Transmilenio’s Phase 1 and 2 and the SITP share a common structure, although important changes reflect the evolution of the system and the fact that the reform process is now tackling the whole city. The SITP introduces a more complex fare scheme and a new formula by which truck operators are paid, on the basis of number of fleet in operation and cost/kms logged, and eliminates the IPK factor, largely to address the challenges described above. For zonal service, the city was divided in 13 zones, and 9 operators, 2 of which represent small bus owners, participated. Zonal services are paid on the basis of number of fleet in operation, cost/kms logged and passengers carried. The discussion in this section will focus on the latter, to delve on the incentive structure that is required when undertaking a city-wide reform.

The payment remuneration for zonal services in the SITP does include some payment linked to passengers transported, as a way to better incentivize operators to cater to demand and assume some risk. This is consistent with the literature that suggests that in the case of a ‘city-wide’ reform, incentives for buses that operate in mixed traffic outside of segregated corridors and pre-paid boarding stations need to be introduced, since it becomes increasingly difficult and costly for the authority to monitor and control this system that is much larger in scope (Briones & Gómez-Lobo, 2014). Yet, the operator’s incentive to cater to demand will largely depend on their risk uptake. In the case of Bogotá’s SITP, the zonal operator’s income linked to demand (i.e. passengers carried) is approximately 20%, while the remainder is associated with the cost/kms logged (represents the bulk of the payment at approximately 60%), and number of buses in operation (at approximately 20% of total payment). Although it may be too early to tell if this demand risk uptake is adequate, the authorities in Bogotá already perceive that there may be a need to increase the operator’s income tied to passengers carried to actually motivate operators to stop at bus stops and pick up passengers as opposed to focus on offering seat kilometers. The story in TranSantiago also sheds some light in this respect. The original contracts linked operator’s payment to passengers transported in a similar magnitude as those in the SITP, but the risk uptake had to increase by as much as 70% of total remuneration to further concentrate operator’s efforts on catering to demand (Briones & Gómez-Lobo, 2014). However, note that in Santiago operators cannot compete in similar service zones, thus minimizing the risks of competing for passengers on the street—competition in the market. In Bogotá, the SITP
divides the city in 13 zones, and there are 9 operators, and several operators can service one zone.

The following formula presents the payment scheme used for zonal buses in Bogotá’s SITP:

\[
f(Q)_{\text{zonal}} = \sum_k \left[ (CV_{i,k} \times V_{i,k}) + (CK_{i,k} \times KM_{i,k}) + (CP_{i} \times Pax_{i}) \right]
\]

As previously noted, each zonal operator \( i \) in the SITP is paid by the number of vehicles in operation \( (CV_{i,k} \times V_{i,k}) \); the number of kilometers logged \( (CK_{i,k} \times KM_{i,k}) \); and the number of passengers transported represents \( (CP_{i} \times Pax_{i}) \). \( f(Q)_{\text{zonal}} \) is a service function that depends on the operator’s performance on service standards, and affects their overall income, in the following manner:

\[
f(Q) = \text{Max}(0.40 \times IR + 0.60 \times IP, 0.97)
\]

IR and IP are indexes that measures compliance with frequency and punctuality requirements, according to the operational plan. Notice that at most, the penalty for non-compliance in the SITP is capped at 3% of the operator’s total income in a given period. In reality, this system of penalties is almost negligible, and the operator may be better-off (maximize their income) reducing operating costs by lowering service standards (regularity and punctuality), since their income is largely unaffected. This point to the fact that the financial incentives tied to operator’s performance on service standards should include significant penalties and rewards; yet, it should also be credible and enforceable. For instance, including penalty and reward system that calls for contract termination is rarely a credible and enforceable threat for the operator. Contract termination, even of a small area concession, can be extremely difficult for the authorities (the transition from one concessionaire to the other requires several months, and during the interim period the quality of service continually suffers) and extremely disruptive for the end-user. Lastly, enforceability of the incentive structure will largely depend on the planning but more importantly, on the capacity of the authority and systems in place (fleet control system/ real-time data on bus location, etc.) that allow monitoring compliance of the operator against a service plan. This aspect is substantially more important in a city-wide reform than a targeted BRT corridor approach.

The contractual challenges that are arising in the SITP may indicate that there is a need to renegotiate the contracts to better align operator’s incentives. This was done in TranSantiago, and several rounds of renegotiation were needed to fine-tune the contractual arrangements to allocated demand risk and adequately rewarded service performance. In the case of TranSantiago, all contract renegotiations were started by the authorities and the danger of collapse of the system, provided authorities with a strong bargaining position to impose new contractual conditions upon the operators (Briones & Gómez-Lobo, 2014). Another alternative would be to let this “first-generation” contracts expire, and retendering services under a new contractual design. Unfortunately, the SITP contracts have contract durations of 24 years that make it extremely difficult for the authorities to modify the contractual terms. As previously discussed, this points once again to the need for contractual terms that are not too long in the “first generation” of the reform, since there is a steep learning curve in the initial years that can be used to better inform future generation of contracts.

Lastly, Bogotá’s implementation of the SITP and to a similar extent Colombia’s experience with the implementation of BRT’s in its largest cities, is urgently shedding light on
the need to refocus public transit reform around the user’s perspective. Although Transmilenio’s
value proposition for the user was very clear—better speed and lower travel times, despite less
comfort—the value proposition for the user in the SITP is not obvious. By design, the system is
adding a lot of perceived discomforts for the user—no cash handling (smart card only), longer
waiting times at bus stops, no bus hailing or un-boarding at their discretion—and is not meant to
improve their generalized cost of travel. In fact, the conceptual design of the SITP contemplates
increased average travel times (from 38 to 42 min) and average connections per commuting legs per trip
(1.27 versus 1.57 legs per trip). Furthermore, although the SITP envisions an integrated tariff and
was structured to maintain the user tariff at the level of the traditional bus system when it was
launched, it did not account for the fact that users can currently ‘negotiate’ discounts with bus
drivers in the traditional system. This was recently highlighted in research by Kash & Hidalgo
(2014), were 8.7% of surveyed people that use the traditional bus system report always paying
COP$1,000, and 32% of surveyed people report sometimes paying COP$1,000. The actual user
fare in the traditional bus system is COP$1,400.

CONCLUSIONS

This paper presented a critical analysis of two key features of Colombia’s new public
transit system: tariff policy and incentive structures in bus concession contracts. In terms of tariff
policies, the experience in Colombia suggests that tariffs set at “cost recovery” should be
stripped down to the operating essentials, so as not to have the users pay for societal benefits.
Furthermore, it becomes increasingly important, particularly after the initial stages of the reform,
that each element or service competent included in the tariff is openly tendered to ensure
efficiency. Tariffs set at “cost recovery” levels are critical in many parts of the world, either for
reasons of law or because money from the public coffers is not available. Hence, to deal with
political pressures, it is recommended that (i) there is some assurance of cost efficiency; (ii) there
are schemes in place, such as targeted subsidies, to deal with the poor; and (iii) high quality
demand forecasts are done, to aim for realistic system equilibrium. In terms of incentive
structures in bus concession contracts, the experience has noted that different reforms calls for
different demand risk uptake from operators. Furthermore, as there are steep learning curves in
the initial years of the reforms, it becomes critical that contractual terms are not unreasonably
long, so that subsequent phases can incorporate the lessons learnt.


