

Expanding the Urban Transportation Infrastructure Through Concession Agreements

Lessons from Latin America

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Driven by fiscal constraints and disappointment with the performance of state-provided services, national and subnational governments have turned to the private sector for solutions in financing, constructing, and providing transportation services. Key concession package features and their effect on reaching closure in urban transportation agreements are analyzed. Case studies drawn from the major attempts to develop urban transportation infrastructures in Latin America through concession agreements are considered. Results indicate that features common to large infrastructure projects (e.g., high capital costs and asset indivisibility), urban transportation (e.g., high intermodal competition and the uncertainty of accurate demand forecasts), and developing countries (e.g., incipient financial markets) are negatively associated with reaching successful financial closure of the agreements. These results suggest that governments should pay close attention to risk allocation in a concession plan. By illustrating the intricate interdependencies among package features and how complex and tailored to a specific context successful concession agreements must be, it is concluded that governments face more rather than fewer decisions when developing an infrastructure through concession agreements.

In recent years, several countries in Latin America have met the challenges of developing and expanding critical infrastructures by promoting private-sector participation. Recognizing the relevance of the infrastructure to economic development, and given increasingly constrained public budgets to finance these impending needs, governments have sought to shift part of the infrastructure investment burden to the private sector.

Concession agreements are an instrument for facilitating the participation of the private sector in infrastructure development. A concession agreement for urban transportation infrastructure refers to an arrangement in which a national or subnational government transfers the right to construction, operation, and maintenance of transportation assets to a private entity. In particular, such agreements usually include infrastructure related to passenger rail systems, busways, and motorways in urban areas. There are, however, other ways to bring the private sector to the transportation infrastructure market: outsourcing, management contracts, and divestiture by license or sale. For purposes of this paper, these arrangements are not counted as concessions. Other arrangements, such as the right to operate in a given market, are commonly called "concessions" but also fall outside of the scope of this study.

The poor performance record of state-owned monopolies in the construction and operation of infrastructure projects is a primary motivation for seeking private-sector participation. Supporters of

concession agreements cite additional financial and economic reasons. Specifically, most arguments in favor of concession agreements can be summarized as follows:

- Potential increases in economic efficiency (1-2);
- Apparent improvement in government's fiscal burden;
- Availability of an expanded pool of capital that would otherwise not have existed; and
- Improvement in the image of the delivery of public services (3).

Critics of concession agreements argue that debates about finance and construction costs tend to involve transfer payments from one group (e.g., road users or traditional road contractors) to other groups (e.g., taxpayers), which by itself may not constitute gains in economic efficiency. Another drawback commonly cited is that the total cost of infrastructure construction and operation may be higher with a concession than with a conventional construction approach. This may be due to higher transaction costs (4), the cost of higher risks entailed by the private sector, the lender's perception of lower creditworthiness of the project promoter, and the risk aversion of investors beyond what a government considers legitimate. The last two costs can be avoided under a conventional public tendering approach (5).

SCOPE OF THIS STUDY

Under a profit-maximizing framework, investors are expected to make bidding decisions for concession projects based on the expected returns on the project and the expected returns on other alternatives (6). This entails determining the project's profitability and risk in addition to the profitability and risk of the alternatives. However, little is known empirically about the role of project risk and profitability in determining the likelihood of reaching financial closure on the project.

To illuminate this discussion, this paper analyzes key features of several urban transportation concession packages and how these features are associated with reaching financial closure. It is argued that package features such as the capital investment needed from the concessionaire, the duration of the concession period, the degree of user captivity, allocation of fare-setting authority, and specific government policies are key to determining the risk level of the project. High risk-level, in turn, constrains the ability of a government to find private-sector financial support for a project.

Due to constraints in accessing pertinent information, bidders' expected profitability is not included in this study. Among others, the bidder's production efficiency, the existence of government guarantees, and the level of transaction costs affect the profitability of the concession and the future concessionaire's decision to place a bid. In addition, there is inadequate information about competing alternatives for project bidders. More information on profitability and competing alternatives would complement this analysis.

The next sections are organized as follows:

1. Five features of urban transportation concession agreements are presented in the first section. Hypotheses about the package's influence on project financial closure are provided.
2. The second section describes the latest attempts to develop urban transportation infrastructure via concession agreements in Latin America. These cases include rail and highway projects in Buenos Aires, and rail and busway projects in São Paulo and Bogotá.
3. The third section discusses the cases' empirical evidence.
4. Conclusions and questions for further research are given in the last section.

KEY FEATURES IN URBAN TRANSPORTATION CONCESSION AGREEMENTS

The way in which elements of a concession are combined is critical, since it determines the allocation of risks between the government and concessionaires. Clearly, trade-offs are required in combining the elements into a single package. Addressing, to the greatest extent possible, the concerns of the parties and reaching an appropriate trade-off of risk and return is the ultimate goal of designing the concession. This section introduces key characteristics that can play a significant role in determining the likelihood of finding financial support.

Concessionaire's Capital Investment

Urban infrastructure projects tend to have high up-front capital costs due to the magnitude of the public works involved. The risks entailed by the lumpiness of the capital investment for infrastructure are compounded by concession schemes in which ownership reverts to the government at the end of the concession period (7). As a result, when significant concessionaire investments are needed, capital investors

will seek to cover their risks by requiring either a higher return or an earlier return on their investment. In addition, highways, busways, and railways have high location specificity; the assets involved have little alternative value. Therefore, investors have little comfort in what can be realized if the project fails (8). The assets of rail and bus operations, in contrast, are mobile (e.g., vehicles) or can have different uses (e.g., stations). It is therefore hypothesized that, all other things being equal, the higher the concessionaire's capital investment, the lower the project's probability of success, if the concession was awarded, financed, and undertaken without regard to the economic, financial, or operational consequences it entailed.

Concession Period

A private firm must ensure that its capital investments can be recouped in a concession. The nature of the investment and the degree to which it is sunk into the current use are important criteria. Concession contracts come with widely varying terms of duration. The terms of several concession projects are presented in Table 1. These durations reflect in part the government's a priori judgment of the projects' expected return, and hence, of an appropriate payback period (9). The concession period also can be considered as endogenous to the concession package. Governments can arrange for a shorter concession by providing incentives—such as tax credits—that may make the investment viable (7).

Exclusivity

Exclusivity is the degree of inter- and intramodal user captivity. In most urban transportation systems the degree of exclusivity of a given mode (e.g., rail) is limited by competition from other modes (e.g., private automobile, bus, jitney, and walking). Low exclusivity is critical in determining the profitability and risk of the investment because it is harder to estimate future demand accurately in scenarios of low exclusivity than in scenarios of high exclusivity. In addition, governments are limited in their ability to award high exclusivity to a concessionaire (and therefore reduce risk), as this would amount to restraining mobility for individuals using modes other than the concession mode. Therefore, all other things being equal, it is hypothesized that urban transportation infrastructure projects with low exclusivity tend to entail higher commercial risk than urban and nonurban projects with high exclusivity.

TABLE 1 Concession Duration for Selected Urban Transportation Projects

| Project | City | Type of Facility | Duration (yr.) |
|-----------------------------|--------------|------------------|----------------|
| Suburban Railways | London | Railway | 5-15 |
| Municipality Busway Program | São Paulo | Busways | 8 |
| State Busway Program | São Paulo | Busways | 20 |
| Suburban Railways | Buenos Aires | Railway | 10 |
| Buenos Aires Subway System | Buenos Aires | Subway | 20 |
| Buenos Aires Access Roads | Buenos Aires | Motorways | 22.75 |
| Bogotá Busway Program | Bogotá | Busway | 23 |
| ORLYVAL | Paris | VAL to Airport | 30 |
| Don Muang Tollway | Bangkok | Motorway | 30 |
| Melbourne City Link | Melbourne | Motorway | 34 |
| Putra LRT II | Kuala Lumpur | LRT | 60 |
| Croydon Tramlink | Croydon (UK) | Tramway | 99 |

Fare-Setting Authority

The degree of monopoly power of the concessionaire, the government objectives, and the level of public (or other stakeholder) interest in the particular mode may determine where the responsibility for setting fares lies. Fares are a critical component because they directly influence travel demand and mode choice (7). The low exclusivity of urban transportation suggests that concessionaires should have some scope in setting fares, subject to rate regulations. But because fares are such a politically sensitive issue, this has been the case only rarely. Governments have tended to determine the structure and level of fares without regard to the financial and economic returns of projects. It is hypothesized that a government's control over fare-setting is negatively associated with a concession success.

Country Policy Risks

In addition to the package features already described, concessionaires face a set of risks that are difficult to control and that affect the viability of the projects. These risks can include policy risks, currency and financial fluctuation risks, and technology risks, among others (4,6). These risks are difficult to manage or control because they either depend on the government (e.g., policy risk) or arise from uncertainty and lack of information (e.g., technology risks).

Policy risks are related to the use of the government's policy-making powers to respond to market conditions or to advance social or political goals (8). Actions at different levels of government may affect the viability of the concessions. For example, changes outside the scope of the contract, or in the legal and political regime, may affect the concession project. A negative association is hypothesized between these risks and the likelihood of reaching financial closure.

CASE STUDIES

The previous discussion suggested that a concession's successful closure may be influenced by investments that are large relative to the size of the market, long-term, indivisible, and location-specific. In addition, it argued that availability of modal substitutes in urban areas can exacerbate the uncertainty associated with future demand estimates. To test the validity of the hypotheses on package features, five attempts to develop concession agreements in Latin America in recent years were selected. Argentina, the only prominent success story, has awarded subway, commuter rail, and a few urban road concessions in Buenos Aires. Brazil and Colombia, in contrast, reached advanced stages in awarding concessions for urban busways in São Paulo and Bogotá, respectively, but the concessions failed to materialize. The state of São Paulo succeeded in awarding one busway concession.

Published reports and individual interviews with key decision makers constitute the main sources of information for the cases analyzed. There were high variations in the quantity and quality of information available for each case. In cases where secondary information about the features of interest was unavailable, direct attempts were made to contact key individuals. In the Buenos Aires cases, the initial success with the concession agreements resulted in abundant information about the process and outcomes. Colombia's and Brazil's lack of success with urban transportation concessions may explain the inadequate information available on the process and features of each agreement. The next sections provide

a broad overview of the major urban transportation concessions attempted in each country.

Buenos Aires Passenger Rail Concessions

Since the early 1960s, passenger rail services in the Buenos Aires metropolitan region have been the responsibility of Ferrocarriles Argentinos (FA). Under this arrangement, each of the six commuter rail divisions that converged on Buenos Aires provided freight and passenger services. Increases in income and the subsequent effects on motorization levels caused an increase in the demand for road space and a decrease in rail use. Simultaneously, service delivery problems developed during the 1970s. Contributing factors leading to the service decline included a production-oriented culture with little regard for customers, increased competition from bus transportation and private automobiles, and a management structure that executed poor railway investments. In spite of a population increase of 120 percent during FA's existence, railway traffic decreased to half of its original level. In 1990 FA was the state institution responsible for the largest drain on the national treasury—about \$1.4 billion annually (1990 U.S. dollars), about 25 percent of which was incurred by the suburban rail network.

The government's objective for involving the private sector through concession agreements was to reduce the federal subsidies financing passenger train operations. To this end, the government agreed to fund fully the capital improvement program specified in the call for bids. What was sought from bidders was the ability to implement a prescribed set of capital improvements efficiently rather than to provide private financing. That the overall level of private capital at risk was low may have proved critical to the success of this concession.

The subway and suburban railway services were grouped into seven bundles to be awarded independently. Concessionaires assumed the risks inherent in most business activities; however, since the system was functional, bidders had some indication of minimum expected usage. Bidding documents defined minimum service standards in terms of coaches per hour, frequency, travel times, percentage of on-time performance, and percentage of cancelled trains. Also, maximum fares for standard service and fare increases as a premium for performance were established. Concessionaires had an incentive to exceed the standards set by the government because only then could they claim a fare increase. The duration of the concession was set at 10 years for the six commuter rail bundles and 20 years for the subway and the remaining commuter rail line.

Concessions were awarded in late 1992 and early 1993, after implementation of a major voluntary retirement program (10). Contracts were signed shortly afterward and concessionaires took over operations of the lines during 1994 and 1995. Based on ridership, service supplied, and on-time performance criteria, the passenger rail concessions have succeeded in their stated goals. Table 2 shows changes in a few basic performance indicators for all the rail bundles given as concession. Part of the increase in passengers registered is due to the strategies implemented by concessionaires to fight fare evasion. However, even in the case of the subway, where fare evasion was deemed low before the concession, ridership between 1993 (the last year before the concession) and 1996 increased from 145.3 million to 198.9 million passenger trips. This represents a 37 percent increase in 3 years. By the end of 1996, year 3 of the concession, subway traffic had surpassed the forecasts for year 8 as stated in the bidding documents.

TABLE 2 Operational Performance of Passenger Railway Concessions

| | Passengers (million) | | | Capacity (million car-km) | | | On-time performance* | | |
|--------------------------|-------------------------|-------|------|------------------------------|------|------|----------------------|-------|------|
| | 1993 | 1996 | Δ % | 1993 | 1996 | Δ % | 1993 | 1996 | Δ % |
| <i>Suburban Railways</i> | | | | | | | | | |
| Mitre | 34.4 | 69.8 | 103% | 16.3 | 21.7 | 33% | 76 | 96 | 26% |
| Sarmiento | 60.5 | 99.3 | 64% | 20.3 | 23.7 | 17% | 73 | 95 | 30% |
| Roca | 64.9 | 136.0 | 110% | 26 | 43.1 | 66% | 81 | 96 | 2% |
| San Martin | 21.7 | 43.5 | 101% | 13.5 | 15.6 | 16% | 83 | 90 | 8% |
| Belgrano South | 2 | 11.1 | 462% | 2.1 | 6.4 | 206% | 46 | 95 | 107% |
| Belgrano North | 11.8 | 28.8 | 144% | 8.5 | 10.5 | 24% | 85 | 85 | 0% |
| Urquiza | 16.8 | 24.7 | 47% | 8.5 | 9.7 | 15% | 92 | 94 | 2% |
| <i>Subway*</i> | 145.3 | 198.9 | 37% | 20.1 | 26.8 | 33% | 23,165 | 9,013 | -61% |

*On-time performance for the subway is measured in minutes, representing the minutes of service disruption.

Buenos Aires Roadway Concessions

Plans called for the main access roads to Buenos Aires to be awarded as a concession concurrently with passenger rail concessions, but these were administered through a different office within the Ministry of Economy and Public Works. The government's aim was to rehabilitate, upgrade, and expand the road system in and around Buenos Aires with a minimum of government expenditures. To this end, the government concentrated on achieving full recovery of the reconstruction costs from users (7).

Four main roads have been awarded by concession so far: Acceso Norte, Acceso Oeste, Acceso Ricchieri, and Autopista La Plata-Buenos Aires. With the exception of the latter, all were existing routes. Therefore, bidders had important information available regarding current demand levels. Selection of the preferred bidder was based on the lowest toll proposed—the government set a cap on the minimum feasible toll.

Bidders reviewed a comprehensive concession contract detailing the amount and schedule of required investments, the required service level, and the desired risk arrangements. The contract allocated the bulk of the risk to the concessionaire by precluding any guarantees or financial support from the government (11). The concessionaire was not allowed to charge tolls until the public works were completed. Though collected in pesos, tolls were set in U.S. constant dollar terms (adjusted annually). Similarly, toll levels were recalculated monthly to reflect changes in the exchange rate. The bid parameter was the lowest toll; the government allocated the bulk of the revenue and operating risk to the private sector by requiring substantial performance bonds in its favor (12). The average length of the concessions was 22 years 8 months.

All contracts except Acceso Norte have been renegotiated either to allow toll collection before the works are completed (Acceso Oeste) or to maintain a bilaterally negotiated "economic equilibrium" (Acceso Ricchieri). Construction on the Autopista La Plata-Buenos Aires is ongoing. Acceso Norte has been a commercial success, although there was only one bidder. The concessionaire priced the toll at \$1.30 per ride, slightly under the government-determined cap.

Municipality of São Paulo's Busway Concession

With 15 million residents, the São Paulo Metropolitan Area (SPMA) is the most complex and fragmented of the cities studied. The region has a well-developed bus-and-rail system owned and operated by different government units. The bus system is operated by a municipally owned company; the subway system and its associated bus network

are operated by state agencies; two other public agencies provide suburban rail service to the region on a different rail network. For the most part, coordination among these institutions has been unsuccessful in planning transportation services. As a result, two initiatives for strengthening the transportation infrastructure through concession agreements were spearheaded by different governmental institutions. The municipal government awarded independent concessions for the creation of a network of integrated busways running on exclusive lanes. Lagging behind was the state's program of integrating municipal bus lines with its rail-based network, using exclusive trolley-bus corridors.

The municipality of São Paulo operates three busways constructed as part of an integrated rail-busway plan from the 1960s. The busway with highest demand carries 25,000 passengers per hour, while the busway with lowest demand carries 3,000 passengers per hour (13). These busways compete with a myriad of bus transportation service providers that include private owner-operators and lease-operators, informal operators with temporary permits, and informal operators without permits. As a result, the objective of the municipality's concession project was to rationalize the network of public and private bus providers by creating 15 exclusive busways totaling 241 km, including the 20 km of existing busways. The new busways would operate as trunk routes with biarticulated buses. Private and public operators outside each corridor provided feeder service. Fare integration was guaranteed.

Contracts with several consortia were signed for a period of 8 years. The selected consortia were asked to prepare the engineering and design works, as well as to maintain the roads, traffic lights, and bus stops. The municipality amortized the infrastructure investments and also provided compensation for the operating costs. A formula that took into account the fixed and variable cost components of the operator determined the amount covered by the municipality.

Seven different concessionaires were selected to operate nine trunk routes. After winning the concession, the selected consortium had to secure the funding. The consortium was led to believe that the National Economic and Social Development Bank of Brazil (BNDES) would finance all or most of the project (14). However, the consortium was unable to find funding for the project. Rebelo and Benvenuto (14) have provided a list of possible reasons why this innovative concession failed. Most of the reasons summarized by Rebelo and Benvenuto can be categorized as the result either of undesirable incentives built into the contract or of the risk-and-reward trade-off for the concessionaire. These reasons are covered in the discussion of results later in this paper. A striking third reason cited was the municipality's failure to undertake an economic

evaluation of the program. BNDES argued that the proposed project was financially viable for the concessionaire but not viable economically for the municipality (14). It argued that undesirable network effects of the investment (e.g., on other public transportation in the area) were unaccounted for, thereby decreasing the project's economic attractiveness. Similarly, it suggested that the level of latent demand for public transportation warranted investments in a mode with higher capacity.

State of São Paulo's Busway Concession

The São Mateus and Jabaquara project is a high-priority connection in the state's rail-and-bus integration attempt, also in the SPMA. In the late 1980s, the state public agency operating the bus network that fed the subway lines, the Empresa Municipal de Transportes Urbanos (EMTU), was made responsible for developing this corridor. EMTU was in charge of leading the intermodal integration. Due to cost overruns, the project was partially implemented. The segregated right-of-way was built, but the corridor was only partly electrified. In addition, diesel trolleybuses were selected as an alternative to electric trolleybuses. When this concession was being considered, a private company was operating the corridor under contract with the state (14).

By the mid-1990s, a concession agreement for the full electrification of the corridor, the conversion and expansion of the fleet to electric vehicles, and operation of the service found renewed interest. Bidding documents were prepared and a formal request for proposals was distributed. The concession period was 20 years, with the state specifying and enforcing minimum service levels. The state set the fare and reviewed it periodically "to ensure economic and financial equilibrium" (14); fare revenues accrued directly to the operator and no subsidy was directly provided by the state. The bid parameter was the highest percentage of gross revenues given to the state beyond a minimum 15 percent for contract management. In addition, the concessionaire had 5 years to convert the fleet to electric power. The concessionaire began operations in May 1997; data about the performance of the concession are not yet available.

Bogotá Busway Concession

Over the last two decades, despite having the largest bus fleet in the world, Bogotá has faced increasing problems in transporting its 6 million inhabitants. The city's high altitude exacerbates traffic pollution. Confronted with these problems, the local administration decided to invite proposals for a concession to build and operate a mass transit system for the city. The explicit objectives of the concession were to widen public transportation coverage by integrating the rail and bus modes, improve the environmental conditions, improve the level of service of transportation, and support the development of planned land uses (15). Implicitly, the local government wanted to minimize public outlays associated with the construction of a large system and shift as much of the cost escalation risk as possible to the private sector.

The terms of invitation were vague; the city wanted bidders to be creative. Neither specific modes, nor technologies, nor the scope of coverage of the system was prescribed. Bidders were left to conduct independent demand analyses according to the scope of the solution proposed. The maximum duration of the concession period was 30 years.

Four bids—two heavy rail, one rail-and-bus, and one busway proposal—reached the economic evaluation stage. An international consulting firm independently developed demand models to evaluate the bids. None of the bids achieved a positive net present value (NPV) in the evaluation (15). According to the evaluators, most of the proposals' deficiencies stemmed from unrealistic assumptions, overestimation of demand, and underestimation of costs. The busway proposal (which included four busways) was selected because it achieved the highest NPV. The selected consortium entered into negotiations with the government; substantial modifications to the original scheme were made. The duration of the contract was decreased to 23 years. Other specifications included a flat fare, which also would cover the feeder-distribution system.

The concessionaire carried all financing risks of the program. The government would not support any part of the investment. Cost evidence would be required to support any requests for fare changes. The basic structure of the financing package was detailed in the contract, including debt-to-equity ratios. The concessionaire also was asked to provide performance bonds to the capital district for contract compliance, quality of service, and payment of salaries. The total budget was \$400 million for the infrastructure and for 400 biarticulated buses (7).

The unavailability of funds, coupled with the unwillingness of existing transportation providers to collaborate with the busway consortium, halted the effort. By early 1996 the concessionaire had withdrawn its proposal, and the local authorities decided to develop segments of the busway using a conventional tendering approach.

DISCUSSION OF RESULTS

What made the Buenos Aires concessions and the São Paulo state busway concession agreements successful? Why did Bogotá's and São Paulo's municipal busway concession agreements fail? Clearly, there are factors beyond those considered in the paper that influenced the outcomes of the concession projects. It is important to know how the bidders perceived the profitability of each concession scheme and what alternative opportunities investors faced. Nevertheless, an analysis of each package's features can suggest the role each plays in determining the attractiveness of a concession package. Table 3 summarizes key features for each case.

Concessionaire's Capital Investment

As expected, the case studies suggest that the higher the concessionaire's financial commitment, the lower the chances of reaching financial success. Argentina's rail concessions entailed a high capital investment, but the government specified the investment schedule and provided the funds. Relatively small capital investments (compared with most road concessions) were required in the Buenos Aires road concessions, mostly due to the repair and maintenance work involved. In contrast, the concessionaire's expected investment in Bogotá's and São Paulo's municipality busways projects—the two unsuccessful concessions—were higher. São Paulo's project required the concessionaire to provide the buses, but the municipality financed the busway investments. Bogotá required fewer buses than São Paulo but a higher capital investment in the construction of exclusive rights-of-way—an indivisible and fixed investment with high up-front costs.

TABLE 3 Key Features of Concession Arrangements Studied (7,12,14)

| Project Name | Duration (yr.) | Exclusivity | Takeover or New System? | Government Policy Risk | Capital Investment Carried by Concessionaire (Million US \$) | Fare Authority | Cost Responsibility | Success |
|--------------------------------------|----------------|-------------|-------------------------|------------------------|--|----------------|-------------------------------------|---------|
| Buenos Aires Suburban Railways | 10 | Low | Takeover | Low | None | US CPI | Subsidy from (payment to) Authority | Yes |
| Buenos Aires Subway and Railway Line | 20 | Medium | Takeover | Low | None | US CPI | Subsidy from (payment to) Authority | Yes |
| Buenos Aires Access Roads | 22.6 | Low | Both | Low | \$60/500/250* | US CPI | Carried by concessionaire | Yes |
| São Paulo State Busway Program | 20 | Low | Both | Low | Electrification of 14 km; Acquisition of 22 trolley-buses & conversion of existing fleet | State | Carried by concessionaire | Yes |
| São Paulo Municipal Busway Program | 8 | Low | New | Low | 1000 buses | Bidder | Subsidy from Municipality | No |
| Bogotá Busway Program | 23 | Low | New | Low-Medium | \$400 | Negotiated | Carried by concessionaire | No |

* Acceso Ricchieri/Norte/Oeste, respectively. Data for La Plata-Buenos Aires not available

Concession Period

The cases of Bogotá's and São Paulo's municipal busway concessions suggest the effects of asset mobility on concession periods. São Paulo's program involved the purchase of buses, but Bogotá's project tied a large part of the capital to right-of-way construction. Similarly, a large part of the investment required for the Buenos Aires road concessions was fixed to the location. This helps explain why the concession periods differ. Argentina's passenger rail, nevertheless, involved relatively low investment risk, since the government was providing the capital; therefore the concession term is moderately short.

Governments in developing countries that are considering high levels of fixed concessionaire capital investment should pay close attention to the implications of concession duration on project financing. Capital financing of infrastructure projects is desirable for projects of long duration, because debt financing is more conservative (since it often requires collateral); moreover, debt financing tends to require a faster payback, and it imposes strenuous cash flow conditions to service the initial debt payments. However, due to market rigidities and structural deficiencies, capital markets in developing countries are inherently volatile, making capital financing a scarce resource.

Exclusivity

The degree of exclusivity observed in the case studies did not vary considerably, since all concessions were fundamentally urban transportation projects. On closer examination, the Buenos Aires road concessions might be considered the scheme with highest exclusivity, due to the market segment served—long suburb-to-city-center automobile trips. Within these trips, intermodal competition was generally limited, due to the low densities at the trip origin. This

may further clarify why, despite the relatively high concessionaire capital investment required, the Buenos Aires road concessions were successful.

Accuracy in forecasting future demand emerged as an important feature related to exclusivity. When project exclusivity is low, users have multiple substitutes, and the accuracy of future demand forecasts becomes more critical; however, no direct information was available about bidders' demand forecasts for each project. A different way of considering the importance of demand forecasting is to observe which projects involved a service takeover, a takeover and an expansion, or solely the development of a new system (see Table 3). The expectation is that the accuracy of the demand-forecasting task would be less critical for projects that involve a service takeover because current ridership information can be used as a base level for future demand. In other words, new projects involve more uncertainties that are hard to incorporate into accurate future demand estimates; therefore concessionaires are less inclined to invest in these projects. The cases are consistent with this hypothesis. The successful cases involved either service takeovers or takeovers and expansions; the completely new systems, on the other hand, were unsuccessful in reaching financial closure. This also appears consistent with other research suggesting that the extent to which a concession agreement depends on the attraction of new traffic—as opposed to providing an alternative to existing traffic—will introduce a greater element of uncertainty and count against it as a concession (16).

Fare-Setting Authority

Overall, the cases provided no clear indication of the consequences of fare-setting authority in reaching financial closure. For every concession project, the fare-setting authority was stipulated in the

project's terms of reference or in the final contract. The Argentine government negotiated a fixed fare in real terms for each project's duration. In other cases, such as with the São Paulo busway concession, the state government was responsible for setting and reviewing the fare to ensure "the economic and financial equilibrium of the system" (14). Requests for fare increases in Bogotá's concession required evidence of increases in the cost of service delivery.

Country Policy Risks

The government policy risk was similar for the three countries at the time these projects were promoted, as indicated in Table 3. First-hand information about the bidder's perception of risk would be required for an assessment of the technical risks involved. However, other analysts have attributed the lack of success of concessions to the overall risk package (including technical risks). For example, in the case of the São Paulo municipal busway, Rebelo and Benvenuto (14) have suggested that the market believed that the risks of building and operating the system outweighed the benefits, and that the Brazilian market was not yet prepared to accept such a challenge. This explanation is credible and consistent with other diagnoses of concession projects gone awry (17). In Brazil, legal and regulatory limitations—combined with poor macroeconomic performance—inhibited the capacity of local markets to provide long-term financing. Even though a concession agreement was signed, no financier approached by the concessionaires thought that the project was the best use of its capital. Bogotá's concession followed a similar development, with the concessionaire carrying most risks. Again, in both unsuccessful cases, the apparent overall risk level was exacerbated by the uncertainty of the estimated demand, and the amount of capital that the concessionaire (and its creditors) would have had at stake was much greater than in the two successful transit concessions.

CONCLUSIONS

Different degrees of association have been identified between elements of a concession package and the successful financial closure of the project. Results indicate that features of large infrastructure projects (e.g., high capital costs and asset indivisibility), urban transportation (e.g., high intermodal competition and the associated uncertainty of future demand forecasts), and developing countries (e.g., incipient financial markets) are negatively associated with successful financial closure of the concession agreements. However, the small number of cases and the lack of availability of key information do not allow stronger statements about the direction and strength of a causal mechanism, as originally hypothesized.

The concessionaire's required capital investment emerged as a salient feature associated with the success of the concession agreements studied. Specifically, projects involving considerable concessionaire investments, such as Bogotá's busway program, had less success in reaching financial closure than projects that required small concessionaire capital investments. Successful concessions reached a balance by having relatively low capital requirements for the concessionaire and a commensurate duration of concession, yet assigning some level of commercial risk to the concessionaire.

Similarly, high levels of uncertainty over future demand were associated with unsuccessful concessions. São Paulo's state busway not only was less capital-intensive than the other cases but also had

lower uncertainty in its predictions of future demand, because the concessionaire would take over an existing service. This not only reduced commercial risk but also allowed the winning consortium to generate revenues using the existing system, reducing the amount to be borrowed for the capital investments (or facilitating debt financing). The relative success of Argentina's railway concessions was due in part to a clever plan that leveraged existing demand on the corridors to decrease commercial risk from a low level of capital support. This reinforces the importance of reducing the level of uncertainty in estimates of future demand.

The third finding of this research is also associated with demand uncertainty, but in the context of urban and nonurban transportation concessions. The case studies suggest that a high degree of intermodal competition (e.g., foot, bus, jitney, and transit) is a fundamental disadvantage for new urban transportation concession projects. Even though many urban transportation projects can be made exclusive (e.g., with geographic considerations, such as the availability of river crossings or by explicitly targeting long trips), the majority of cases studied had relatively high intermodal competition. High competition in itself is desirable; if choices are priced correctly, they provide efficient outcomes. However, in the context of concession agreements for transportation infrastructure, high competition increases the uncertainty of future demand forecasts, and hence it significantly increases a project's risk level.

No conclusions could be drawn from the importance of government policy risks, because the cases did not vary considerably along this dimension. The findings are applicable to comparable countries with relatively stable macroeconomic policies. Until recently, most Latin American countries would be classified under a similar risk category, but as suggested by the transportation concession experiences in Indonesia and Malaysia, government policy risk remains an important variable that should not be overlooked.

Further Research

First, the most important shortcoming of the approach was to model the influence of risk on concession success independent of expected profitability. From the bidder's perspective, these two concepts are associated in a multidimensional way. An associated shortcoming of the approach followed is that the bidder's perception of the risk of several package features was not known; instead, assessments were made of what constitutes high- and low-risk factors. An ideal approach for future research would be to study the behavior of the decision makers in relation to package features and perceived profitability and then to extract conclusions from the resulting models. But the ideal approach also assumes a level of access to bidders and first-hand information that is rarely possible.

Second, it could be argued that local conditions have a greater influence on project outcomes than the current analysis suggests. Certainly the policy-making processes and conditions of countries and municipalities are not uniform; these differences would be reflected in the concession projects. The case analyses indicated that local conditions mattered significantly, and that the role of the government is key in the concession process. The analysis is built on the premise that risk contributes to the determination of the likelihood of success. Again, access to a bidder's perceptions of local conditions would improve understanding of how these perceptions influence decision making.

Third, it is plausible that the success of Argentina's and São Paulo's state concessions are a result of private-sector efficiencies in

operating public transportation and implementing capital projects, as well as their not being involved in substantial capital funding. In contrast, Bogotá's and São Paulo's municipal concessions—which were unsuccessful—simultaneously targeted private-sector (i.e., assumed) capital and operating efficiencies by requiring high levels of capital involvement and high levels of commercial risk from the concessionaire. It would be sound to explore further the realized benefits or costs of having private-sector funds in the development of public infrastructure, to test whether there is a distinction between private capital and private operating efficiencies.

Final Remarks

Taken together, the features discussed in this study constitute a concession package, which is ultimately what bidders observe and decide on. For example, high capital contributions required from the concessionaire, high demand uncertainty, and low concession duration can still result in a successful concession project if the government takes actions to increase the concession's attractiveness. These government actions include in-kind contributions (e.g., land, preferential tax treatment); up-front, subsidized construction or operations or both—as with São Paulo's municipal concessions and Argentina's railway concessions; and guarantees (e.g., to mitigate policy risk or demand risk).

The case studies suggest the intricate interdependencies of the capital investment required, the concession period, exclusivity, and other risks. The detailed information about the package features underscores a larger point. Because successful concession agreements must be complex and tailored to a specific context, it is concluded that governments have more rather than fewer decisions to make. The government's role in providing an adequate regulatory and policy framework is important for a concession's success.

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