# SOFT BUDGETS AND HIGHWAY FRANCHISING [1]

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**Abstract**

Latin American governments progressively substituted build–operate–and–transfer (BOT) contracts for government–provided highways during the nineties. Because under BOT a private franchise holder finances and operates the road in exchange for tolls, it is often claimed that BOT represents a privatization of highways. We argue that, as currently applied, the BOT model is an imperfect and incomplete privatization, because the franchise holders' budget constraint has been soft, with losses being shifted to tax payers via minimum income guarantees and contract renegotiations. Soft budget constraints are inconsistent with the standard arguments in favor of BOT contracts and call into question their avowed advantages. Moreover, both renegotiations and minimum income guarantees allow governments to finance current expenditures with future tax receipts, sidestepping the normal budgetary process.

We propose various changes to the current model aimed at correcting its defects. First, franchises should be awarded through Present-Value-of-Revenue auctions rather than fixed-term franchises. Second, the agency in charge of monitoring contract compliance and regulating franchises should differ from the agency that plans and auctions projects. Third, franchises should be subject to hard budget constraints, so that both profits and losses are privatized.

Key words: build-operate-and-transfer (BOT), concessions, cost-of-funds, franchising, government subsidies, present-value-of-revenue (PVR), regulation, renegotiation.
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# 1 Introduction

A revolution in the way highways are provided has taken place in Latin America. During the nineties the traditional approach of government–provided highways, was progressively substituted by so–called build–operate–and–transfer (BOT) concessions. Because under BOT a private franchise holder finances and operates the road in exchange for tolls, it is often claimed that highways have been privatized. Nevertheless, as currently applied, the BOT model is an imperfect and incomplete privatization because the franchise holders' budget constraint is soft: in practice, losses have been shifted to tax payers using minimum income guarantees and contract renegotiations. In this chapter we argue that soft budget constraints call into question the avowed advantages of the current model. They are inconsistent with the standard arguments in favor of BOT contracts, and call into question their avowed advantages. We also propose changes of the current model that, we argue, would go a long way toward correcting its defects.

It is useful to begin by clarifying what we mean both by the traditional approach and by the current model of highway franchising. Under the traditional approach, the government designs, finances, and operates the road. Private firms may participate in the construction stage and may be selected in competitive auctions. But once the road is built, the government operates and maintains it. Taxpayers finance the road and, even when users pay tolls, these are usually unrelated to construction costs.

By contrast, under the current model, a concessionaire finances, builds, operates and maintains the facility. In exchange she collects tolls for a time and when the franchise ends, the road reverts to the government. Thus, cost-based tolls substitute for general public funds as a means to finance the project. Franchises can be awarded either through direct negotiations between the government and a firm, or through a competitive auction of a well-defined project. In both cases the franchise usually lasts a fixed period, normally between 15 and 30 years. In addition, contracts typically include minimum income guarantees paid out by the government when toll revenue falls short of a predetermined target. Finally, franchise contracts are usually designed and monitored by the same agency that is in charge of building public works.

Why did so many countries adopt this model? The debt–ridden "lost decade" of the 1980's led to low investment and inadequate maintenance of infrastructure, and created a major highway deficit across Latin America. Combined with chronic budgetary problems, this led governments to embrace a scheme where the private sector would finance urgently needed infrastructure investments, freeing up public resources for projects in other priority areas.[3]

It was also argued that BOT contracts would deliver some of the standard advantages expected from privatization.[4] First, a firm that is responsible for construction and maintenance has the right incentives to invest

[3]Even though this is the main reason why roads were privatized, the economic validity of the argument is dubious if countries face an aggregate debt constraint. If the sum of a country's public and private debt must be lower than a given threshold, private investment in highways can crowd out investment (public or private) in other sectors.

[4]For example, an official 1999 document from ALIDE (Latin American Association of Financial Institutions for Development) states (translation by the authors from Spanish): *"The fiscal and financial crisis [...] of the eighties led to the end of the traditional model of infrastructure financing, that considered the state as the main investment agent, and opened space for important participation by the private sector [...] with the objective of not only bringing relief to the burden supported by public finances, but, more importantly, to improve the allocation of risk and improve the efficiency of management [...]"*

in road quality (Tirole, 1997). Second, private firms are better managers than governments. Third, the argument continued, BOT contracts are desirable on distributional grounds, since cost-based tolls are easier to justify politically when infrastructure providers are private.[5] Finally, in contrast to the traditional approach, under BOT only privately profitable roads are built because the market mechanism screens projects. This reduces the likelihood of building white elephants, as is common in Latin America (and other continents).[6] Were these arguments correct? What happened in practice?

The country evidence we present in this chapter suggests that private participation freed up fewer public funds than expected. In several cases, franchise holders in financial trouble were bailed out or received minimum income guarantees.[7] Making things worse, guarantees were paid out mainly during economic downturns, when government budgets were under pressure.[8] Thus, in practice BOT contracts have been a privatization of sorts, because franchise holders are routinely subsidized when projects turn out to be unprofitable—i.e. franchise holders enjoy a soft budget constraint.[9]

As many have pointed out, guarantees and renegotiations are troublesome beyond their fiscal impact. Both limit the risks of losses and, one suspects, reduce the incentives to be cautious in assessing project profitability. In addition, renegotiations probably favor firms with political connections and, apart from corruption concerns, it is doubtful whether such firms are better managers than the state. Moreover, because they are contingent subsidies, they are inconsistent with highway privatization. Indeed, we show formally that either privatization is optimal, in which case no subsidies of any kind should be granted and franchise holders should be subject to a hard budget constraint; or else, if the optimal contract involves government transfers, the project should be fully financed out of the general budget. That is, depending on the economic environment faced by a country either privatization with a hard budget constraint or no privatization at all may be optimal, but the current 'intermediate' version will never be.[10]

To understand the intuition underlying the above mentioned result, it is useful to begin by examining the 'cost-of-funds' argument that is often used to justify highway privatization. According to this argument, the traditional approach to infrastructure provision is inferior because highway franchising takes the project off the budget, thus reducing the need to levy distortionary taxes. Nevertheless, this argument ignores that the government relinquishes toll revenue when it privatizes the highway. Below we show that if the government and the private sector are equally efficient managers of resources, both effects cancel out exactly and the cost of funds argument is incorrect. Thus if privatization is better, it must be because the government is less efficient than the private sector —the standard argument for privatization in general!—, for then

[5]This is important if trucks are ever to pay tolls that compensate the road damage they cause.

[6]We define a white elephant as a project whose net (of costs) social value is negative. An example is the Túnel Las Raíces, still the longest tunnel in Latin America, built in the 1940s and never put to its intended use.

[7]For example, Mexican taxpayers spent more than US$8 billion to bail out both franchise owners and the banks that financed their projects.

[8]See for example, "World Bank warns of new debt dangers" *Financial Times*, May 30th, 1997.

[9]We do not claim that all renegotiations are bad—flexibility to alter the terms of the contract may be socially desirable. Our point is that it is difficult to write contracts that allow desirable renegotiations but prevent opportunistic ones. See Engel et al. (2003) for a formalization and analysis of desirable renegotiations.

[10]We should stress that, as discussed later in the chapter, our result is *not* an argument against subsidies that correct discrepancies between the social and private value of a highway.

the reduction in distortionary taxes is larger than the loss of toll revenue. In that case, the government should never subsidize projects in any form if private firms can collect toll revenue. On the contrary, if the government is more efficient, then the traditional approach is better. Again, there is no justification for subsidies in any form.

Why, then, do governments use guarantees and renegotiate contracts, in effect softening the franchise holders' budget constraint? One reason is that the current model uses fixed-term contracts, which distribute risk inefficiently, making it almost certain that firms will lose money in low-demand states.[11] This is bad contract design, because demand risk is large for highways and there is no point in having the franchise holder bear it because she has little control over it (see Engel et al. [2001]).

Nevertheless, risk alone is an unconvincing explanation for renegotiations and guarantees. After all, in many countries activities such as electricity generation and telecommunications, which are subject to considerable risk, have been privatized without income guarantees or renegotiations. It is even more puzzling that highway contract renegotiations have usually favored franchise holders, because they often occur after they have sunk their investments. If anything, one should expect governments to behave opportunistically and expropriate franchise holders, especially given that it is technically simple to operate and maintain a finished highway. While outright corruption or incompetence may be one reason behind many renegotiations, in Section 4 we offer a complementary explanation. We use a simple political economy model to argue that it is government's bias towards anticipating spending, so as to increase their chances of being reelected, that makes renegotiations and guarantees attractive for them.

The obvious means of substituting current for future expenditures is to issue debt. Nevertheless, debt issues normally have to be included in the budget approval process and must be negotiated with the opposition. Knowing that higher expenditures increase the chances of losing the next election, the opposition will attempt to check the tendency to overspend. On the contrary, neither guarantees nor franchise renegotiations need to be negotiated with the opposition, because —so far— they are not included in the budgetary process.[12] They allow the government to pay for new public works out of future government revenues, increasing its ability to spend in other areas. Hence, when the government renegotiates, it does not compensate franchise holders for old losses, but is instead funding new projects. The same argument explains why governments like minimum income guarantees: they also are a means to substitute current for future expenditures.

The remainder of the chapter is organized as follows. Section 2 discusses the experience with highway franchising in Argentina, Colombia and Chile, concentrating on the issues most relevant for policy.[13] Section 3 studies how franchises should be auctioned and when privatization should be preferred to the traditional

[11] Moreover, in the real world, the pressure for road expansion (and thus for highway franchise programs) usually occurs during upturns, making it likely that average conditions during the entire franchise are worse than those under which the program is conceived.

[12] Except for the case of Colombia, where an agreement with the World Bank was conditional on the valuation and inclusion in the budget of contingent guarantees for franchise projects.

[13] The Mexican experience, is also mentioned briefly in footnotes. This leaves out only the Brazilian experience among Latin American countries with major highway concession programs.

approach. Section 4 offers an explanation of renegotiation and guarantees. Section 5 concludes with a proposal of how to improve the current model.

# 2 Country studies

The so-called "lost decade" of the 1980's left several Latin American countries with severe infrastructure deficits. Lack of maintenance and increases in traffic flows meant that transportation bottlenecks were becoming costly, and could become a major obstacle for future growth. Governments in straightened conditions could not afford vast plans of public works, and lacked the human resources needed to undertake the major investments needed in transportation infrastructure. Highway franchising seemed to promise a solution to these problems, by allowing the private sector to complement the meager resources of the public sector. Moreover, if competition for the franchises worked, roads would be less expensive and would be well built.

In this section we examine the experience of highway franchises in Argentina, Colombia and Chile.[14] As these country studies suggest, there are many pitfalls that weaken the arguments for highway privatization. In Colombia, investment targets have not been met, some projects were awarded but never started, and the government has paid large sums in cost and traffic guarantees. In Argentina, the main problem has been that franchises have been expensive for the government and for highway users. There have been repeated contract renegotiations, which usually seem to favor franchise holders. It is conceivable that in some specific cases, most users ended up worse off. Chile seems to have been somewhat more successful at avoiding the major pitfalls of highway franchises, having completely renovated its road system in time at a reasonable cost. Nevertheless, contract renegotiations have been common, leading to an average increase of 15% in the budget of the projects when compared with their original estimates. The regulation of concessions contracts has been lax and there are signs of future renegotiations, to the detriment of users and taxpayers.

## 2.1 Argentina

The Argentine franchise program began in 1990 and was the second major franchise program in Latin America, after Mexico's.[15] In 1989-90, the first stage of franchises, the government auctioned twelve 12-year intercity franchises. Traffic levels on these roads were sufficiently high (2,000 to 2,500 vehicles/day) for the private viability of maintenance, rehabilitation and capacity improvements, but were not high enough

[14] The case studies that follow are far from exhaustive. Their objective is to provide some stylized facts about the Latin American experience, from which we draw observations and motivation for the models developed in Sections 3 and 4, and the conclusions and proposals we make in Section 5.

[15] At this time, highways franchises consist of 9,500 "equivalent km", a large fraction of Argentina's main highway system of 38,000 equivalent km. (see World Bank [1999]). An additional 12,000 km are managed by the private sector which takes care of maintenance and rehabilitation in exchange for toll revenue. Furthermore, 6,000 km are maintained privately, but funded by the state. In the initial stage, only financially viable intercity roads, that is, roads between major cities, were franchised. The access routes to Buenos Aires belonged to the second stage of franchises.

to build totally new roads (see Estache, 1999).[16] There was no toll revenue guarantee nor a profit sharing mechanism. Tolls were indexed to inflation to protect franchise holders. Service quality was measured by a quality index which was supposed to improve over the life of the concession. It was estimated that the service quality requirements would demand large investments in paving during the first few years of the franchise. Among other things, concessionaires were required to make the improvements before collecting tolls. This first round of auctions was very successful in attracting bidders, with more than a hundred bids for the simultaneous auction of the twelve franchises. The most important bidding variable in this first round of auctions was the rent (or *canon*) that would be paid to the government.[17] The total amount bid in canons was US$890 million a year in 1990 dollars.

However, in the first instance of a pattern that was to repeat itself regularly, after only five months the government decided to renegotiate the contracts.[18] The main reason was the new policy of *convertibilidad*, which declared illegal all indexing provisions in contracts. A further reason to renegotiate the contracts was that several concessionaires were collecting tolls before performing the investments required in their contracts. After the renegotiation, tolls were reduced by 50% and in exchange, the canon was eliminated. In fact the government granted subsidies totalling US$57 millions per year to the firms. The program of road improvements changed. Though the road franchises became less attractive as business propositions, firms were receiving money rather than making payments.

In 1995 another round of renegotiations began, because higher than expected traffic led to congestion and the need for new investments. The government threatened to auction the expansion projects in order to force the franchise holders to accept extensions of the franchise term in exchange for the required investment. The negotiations were direct.[19] Nevertheless, it appears that at least US$900 million in improvements agreed to in the 1995 renegotiations will not be built before the franchises end, in 2003.[20]

There was another renegotiation in December 2000, which specified additional government grants for the franchise holder, mainly because previous grants had not been paid. In exchange, the franchise holders agreed to more investment, but again, the grants were not paid consistently. It is interesting to note that contracts contained a *trigger clause* that limited the profit rate. When the target profit rate was reached, either tolls would have to fall or the franchisee would have to undertake additional investments. Since these investments were not auctioned competitively, franchisees—which frequently included construction firms—chose to make additional investments, so as to avoid sharing profits with the government, keeping the extra

[16] Tolls were set uniformly across all concessions on the basis of distance and type of vehicle. Tolls were set as multiples of the basic toll for cars of US$1.50/100km.

[17] Other variables like lowest toll, highest quality or investment were also used, but only occasionally.

[18] For details, see World Bank (1999).

[19] According to Estache (1999), who quotes the Public Works Secretary, the franchises were extremely profitable, at least until 1998, with rates of return between 26 and 38%.

[20] One of the reasons being that not all the government payments agreed upon in the last renegotiation were made.

revenue within the firm.[21]

In the second round of franchises, the government had learned from experience and set better rules for the Buenos Aires access road concessions. Franchises were awarded to the bidder that asked for the lowest toll, franchise terms were set at 22 years, and in general the contract was comprehensive and included no guarantees. The number of bidders was small, with at most two per franchise. As in the first-round franchises, contracts were amended frequently, five times since 1996, due to the trigger clause.

Clearly the quality of roads has improved as a result of the franchise program. Intercity traffic increased from 73 million to 106 million traffic equivalent units from 1991 to 1998 (see World Bank [1999]), though it remained approximately constant between 1996 and 1999 and has probably declined since due to Argentina's economic crisis. Intercity toll revenues were approximately US$300 million a year (pre-crisis), plus an additional promised US$75 million in grants from the central government. This is a large sum, considering that the franchises only had 821 km of two lane intercity highways. As a comparison, the budget for public expenditures in roads was only around US$500 million of which 35% went to pay interest. In the four Buenos Aires access routes, there were investments for $1.7 billion, and revenues that also came to US$300 million.

The Argentine experience also shows the social costs that may be caused by franchise contracts that overlook important issues. Indeed, since the location of the toll booths was not specified, the franchise holder placed them strategically so as to maximize revenue, by charging relatively high tolls to users of small sections of the franchised highway. This led to a much higher average cost per travelled kilometer than the originally anticipated rate of approximately 1.5 US cents/km, because the average trip is short but pays the full toll. In fact, it has been shown that for the average 25 km car trip, users are worse off than before the franchises.[22]

Another remarkable fact is that reported operating costs of the inter-urban franchises range between 45 and 60% of net-of-VAT revenues. What is most surprising is that a large fraction, which has been estimated at around 40% of expenditures, is spent on administration and collection, and that of this fraction, more than two-thirds is spent collecting tolls. In fact, 21% of gross toll revenues are spent on administration and collection, which is similar to expenditures on maintenance.[23] A possible explanation for these costs is that many intercity roads have low traffic densities, which means that collecting tolls can be expensive. An alternative explanation is that profits are being diverted in order to delay the application of the trigger clause that would have franchise holders share revenues with the government. This is consistent with the large gap that exists between profit rates estimated by the association of concessionaires (12.4%) and independent estimates (26–38%, see footnote 19).

[21] It is well known that trigger clauses like the one described above may lead to inefficiencies. On the one hand, if the road generates large revenues, it is probably close to congestion so lowering tolls may be inappropriate. On the other hand, unlimited expansion due to the trigger program may lead to overcapacity or congestion at the points at which the franchised highway interconnects with the rest of the road network, as there is no coordination with the rest of the highway network.

[22] See World Bank (1999).

[23] Recall that these franchises did not require new construction, but rather rehabilitation, maintenance and capacity improvements. An estimate cited in "Financing the Road Sector in Argentina: Lessons from the Past", claims that investment levels for the years 1-9 of the intercity franchises were US$1,448 million.

In October of 2003 the National Comptroller (*'Auditoría General de la Nación'*) published a lengthy report reviewing the main conclusions of its audits of franchised highways during the 1993-2003 period. The report provides further evidence on weak enforcement of franchise contracts. For example, the equipment needed to measure a highway's friction coefficient has been out-of-service since 1994, so that this index has not been measured for any of franchised highways since then (p. 34 of the report). More generally, highway quality immediately after construction has typically been considerably below specifications, and has often deteriorated faster than allowed by the contract specifications. Building delays have also been recurrent, while fines to which the government was entitled have seldom been collected.

Many of the Argentine concession contracts ended on October 31, 2003. A few days before this deadline, the government announced that in the future franchise holders would only be in charge of maintaining and operating highways, while the state would finance any new investment. It remains to be seen how this objective will be achieved given the major budgetary problems faced by the Argentine government.

Summing up, the Argentine concessions program has succeeded in providing a major upgrade to the country's highway network. Yet this upgrade appears to have been expensive, in particular because of the incentives to pad costs in maintenance, administration and collection, and the continuous process of renegotiations that have benefited concessionaires at the expense of toll users and tax payers. All of this has led the Kirchner administration to move toward a hybrid approach, where new projects and significant additions are financed directly by the government.

## 2.2 Colombia

The first generation of highway franchises, with investment of US$1,076 million in 13 projects, was awarded during the mid-nineties. It is clear in retrospect that this first wave of highway privatization had severe problems. Seven out of 13 projects were not awarded in an auction, but assigned in direct negotiations after no bidders showed up at the auction.[24] A partial list of the additional problems detected in the first round of franchises is as follows:[25]

1. Invías did not define the definite route of the roads in detail.[26] This meant that Invías was unable to expropriate the required land in time and led to construction delays.

2. The auction process was short and Invías had no international "road shows" to attract international bidders. This meant that most auctions had no bidders and most projects were handed to Colombian firms directly.

3. Projects were franchised on the basis of feasibility studies, before the final project was defined. Moreover, traffic studies were preliminary.

[24] In addition, many projects started out late due to lack of financing. In fact, by 1999, one project awarded in 1995 and one awarded in 1996 had still not obtained financing.

[25] From "Evaluación de las Concesiones Viales," Contraloría General de la República de Colombia, 2001.

[26] Invías is the Spanish acronym for Instituto Nacional de Vías, the government agency responsible for highways of national importance.

4. Invías did not assess the financial health of bidders. Some winners (or firms that negotiated directly with Invías) could not obtain financing, which led to delays.[27]

5. Contracts were incomplete: there were no conflict resolution mechanisms, nor rules for payment of guarantees, or *step-in* procedures for possession of the franchise by lenders.

Because of these mistakes, the first round of franchises was plagued by contract renegotiations, delays, large payments for traffic and cost guarantees, and cost overruns in plot expropriations. On average, traffic was 40% lower than predicted by Invías, while costs were 40% above their contracted values. More than 40% of cost overruns were due to higher expropriation costs.[28] A further 58% of cost overruns were due to design changes and the inclusion of additional features to the project.

The second round of franchises, which included only two projects, improved the design somewhat, but not enough: the first project was cancelled due to breach of contract, while the second was late and financially weak. It is interesting to note that, in contrast to the first round, variable franchise terms were used. The franchise ends when a predetermined level of accumulated revenue is collected. This is similar to the PVR mechanism considered later in this chapter, unfortunately without discounting revenue flows, which means that some of the incentives to renegotiate remain, since the franchise owner bears more risk than under a standard PVR franchise.[29]

Any evaluation of Colombian highway franchises, however, must consider that the benchmark should not be perfection but rather government-mandated construction. Even though contracts were renegotiated, and in many cases projects were delayed, the average delay was about two years less than before the program. Similarly, most contracts had cost overruns, yet they were about one third of the amounts under government mandated construction.

Summing up, the main shortcomings of the Colombian approach to highway franchising have two origins. First, lack of experience with auctions and undue haste in preparing the first round of auctions. Haste led to constant changes in the projects, which increased costs. The lack of experience shows in not having promoted competitive auctions via "road shows", which led to auctions with few bidders. Another facet of inexperience is the lack of concern for financial guarantees, with no penalties for firms that could not finance the project.

A second source of problems has been the inattention to incentives, which coupled with traffic and construction guarantees, meant large contingent claims on the Colombian government (we consider this issue in more detail in Section 3).[30]

[27] Despite this difficulty, the average delay of the first round franchises was 17 months, against the average of 3.5 years for similar government projects. Hidalgo, Darío. "Los impactos en las concesiones viales en Colombia: Vamos por buen camino?", *Estrategia*, June 30, 1997, cited in Pérez and Yovanovich, "Información Sectorial Sector Carreteras", Corporación Financiera del Valle S.A., February 1999.

[28] Note that there were construction cost guarantees offered by the government.

[29] The government is optimistic about the third round of franchises, which include redesigned contracts that attempt to deal with many of the problems they have encountered. However, there is no experience so far with these new projects.

[30] The Colombian government has put a lot of conceptual effort into valuing the contingent guarantees it offered in the franchises, but less effort has been spent improving incentives, and avoiding renegotiation of contracts and financial arrangements.

## 2.3 Chile

In 1991 congress passed a law that allows the government to franchise most public works, including roads, ports and airports.[31] Franchises must be awarded in competitive auctions open to any firm, national or foreign. The law is quite flexible, leaving ample room to adapt the franchise contract to the requirements of each project. In particular, the tendering variables can include user fees, subsidy from the state, duration of the concession, income guaranteed by the state, revenue paid by the franchise holder to the state for preexisting infrastructure, risk assumed by the bidder during the construction and/or operation stages, quality of the technical offer, fraction of revenue (beyond a certain threshold) shared with the state (or users), and total income from the concession. By the end of 2002, the most important highways, seaports and airports had been franchised, with cumulative investments of around US$5 billion.

The usual procedure to finance a highway franchise in Chile involves several stages:

- Bidders must offer call bonds (*bonos de garantía*) that can be called in by the government if the bidder cannot finance the project. Moreover, similar bonds are callable if construction targets are not achieved by predetermined dates or quality maintenance standards are not met.
- Banks lend money for construction of the road. The law stipulates that banks are the only financial institutions that may lend to finance construction.
- After the road is built, the franchise owner can issue bonds backed by toll revenues (securitization). These coupon bonds are usually bought by private pension funds and insurance companies.
- The law stipulates that the franchise owner cannot securitize more than 70% of the debt in order to induce good behavior in the maintenance and operational phase of the franchise.

The law states that the concessionaire must build the project within the time limits established in the contract, providing thereafter an uninterrupted service of a quality consistent with the terms of his bid. The Ministry of Public Works (MOP by its Spanish acronym) supervises the construction and operation of the project, and is allowed to fine, suspend or even terminate the concession should the franchise holder fail to meet his obligations. The law also establishes a dispute resolution mechanism to review conflicts between the state and franchise holders.

The original list of roads and timetable of auctions has been changed repeatedly. Nevertheless, the highway projects that have been put to tender or have already been built can be classified into four groups:

- The Pan-American Highway (Ruta 5) from La Serena in the north to Puerto Montt in the south, which was divided into 8 double lane segments and extends over approximately 1,500 kilometers (only two segments remain under construction);
- Several highways joining Santiago with nearby cities (Los Andes, San Antonio, Valparaíso);

[31] DFL 164 and DS 240, 1991.

- A number of local roads (e.g., Camino de la Madera, Nogales-Puchuncaví, Acceso Norte a Concepción);
- Four urban highways in Santiago: the Americo Vespucio Beltway, the Costanera Norte highway, the North-South General Velázquez axis and the Acceso Sur – Las Industrias highway.

The program was launched in 1993 with the 23-year long El Melón tunnel franchise. The auction was unnecessarily complex (see Box 2.1), but this can be forgiven as the initial test of a new system.

**Box 2.1 (The First Chilean Franchise)** *The auction mechanism used for El Melón tunnel was unnecessarily complex. Firms bid on a weighted average of seven variables: annual subsidy by or payment to the state, toll level and structure (composed by six different tolls, with different weights for different classes of vehicles), term of the franchise, minimum income guarantee, degree of construction risk borne by the franchise holder, score on the basis of additional services, and CPI adjustment formula. While only two of these variables (toll rate structure and payment to the state) were given weights that would have an effect on the final outcome, the result of the tender was unexpected. Four firms presented bids for the franchise and they all demanded the maximum toll and franchise term allowed by the auction. The selection was decided solely based upon the annual payment to the state. This outcome was inefficient, since a lower toll and a smaller annual payment to the state would have been better. Apparently, the weights on the toll rate variable were set incorrectly. Another surprise was that the winner outbid the second-highest bid by almost a factor of three.* ∎

Subsequently MOP experimented with other mechanisms. For example, the Acceso Norte to Concepción, the Nogales-Puchuncaví Road, and the Santiago-San Antonio (Ruta 78) highways were awarded to the firm bidding the lowest toll. On the other hand, since the government wanted similar tolls per kilometer in all of the Pan-American highway, most segments of this route were auctioned using a mechanism that made firms compete first on tolls and then, when a lower bound was reached, on either the shortest franchise term or a yearly payment to the state (which was described as a "payment for preexisting infrastructure"). Moreover, some segments, which were thought to be privately unprofitable, were awarded subsidies, which were supposed to be similar in volume to the amounts collected as payments for existing infrastructure.

**Box 2.2 (First PVR Auction)** *The Route 68 concession, joining Santiago with Valparaíso and Viña del Mar, was auctioned in February of 1998. It was the first road franchised with a PVR auction.*[32] *Under this scheme, the regulator fixes user fees and announces a discount rate,*[33] *and the franchise is awarded to the firm that bids the least present value of toll revenue. The franchise ends when the present value of toll*

[32] Even though firms did not bid on the present value of revenue, the franchise contract underlying the building of the Queen Elizabeth II bridge, tendered in 1987 in the UK, is similar to the PVR franchise. In a series of papers, beginning with Engel et al. (1996), we highlighted the advantages of this approach and formally derived many of its properties, including scenarios where it is the best possible auction mechanism (see Engel et al. [2001]).

[33] The discount rate should be a good estimate of the costs of funds faced by franchise holders and could be variable (such as LIBOR plus some fixed risk premium).

*revenue is equal to the winning bid. By letting the franchise length depend on demand realizations, PVR auctions reduce risk born by the franchise holder substantially.*[34] *This should lower the demand for traffic guarantees.*

*The Route 68 concession contemplated major improvements and extensions of the 130 kilometer highway and the construction of three new tunnels. Five firms presented bids, one of which was disqualified on technical grounds. For the first time in the Chilean concessions program, minimum traffic guarantees were not included for free, but instead were optional and at a cost. That the pricing of guarantees by the government was not way off the mark can be inferred from the fact that two of the bidders chose to buy a guarantee, while the winner declined. Bidders could choose between two rates to discount their annual incomes: either a fixed (real) rate of 6.5% or a variable (real) rate given by the average rate of the Chilean financial system for operations between 90 and 365 days. A 4% risk premium was added to both discount rates.*

*Three firms, including the winner, chose the option with a fixed discount rate. Somewhat surprisingly, the present value of revenue demanded by the winner turned out to be* below *construction and maintenance costs estimated by MOP.*[35] *One possible explanation for this outcome is that the regulator set a risk premium (and hence the discount rate) that was too high, neglecting the fact that PVR auctions substantially reduce risk faced by the franchise holder. A return on capital in the 10–20% range is obtained if a more reasonable risk premium (in the 1–2% range) is considered.*

*It is also interesting to mention that, apart from the pressure exerted by the Ministry of Finance (discussed later in this section), the main reason why MOP decided to use the PVR mechanism is that it facilitates defining a fair compensation should the ministry decide to terminate the franchise early. This feature of PVR is relevant in this case since MOP estimates that at some moment before the franchise ends, demand will have increased sufficiently to justify a substantial expansion. Thus, the contract of the Route 68 concession allows MOP to buy back the franchise at any moment after the twelfth year of the franchise, compensating the franchise holder with the difference between the winning bid and the revenue already cashed, minus a simple estimate of savings in maintenance and operational costs due to early termination. No such simple compensation is available if the franchise term is fixed.* ∎

Most tenders were reasonably competitive, because with few exceptions, the number of bidders was between three and six. One of the main virtues of the Chilean concessions program is that legislation has been effective at dispelling fears of expropriation, a key feature of any successful franchising program. An important part of the credit for this feature can be attributed to reforms implemented in Chile since the mid-seventies which considerably strengthened property rights. Perhaps the most evident indicator that there is little fear of expropriation among franchise holders is that they have been quite happy with the "build now, regulate later" approach followed by MOP (more on this shortly).

[34] Associated welfare gains can be considerable. Engel et al. (2001) show that with parameters typical for developing countries, welfare gains are of the order of 30% of the investment in the highway.

[35] The winner bid US$374 million while the MOP estimated costs to be US$379 million.

A second merit of the Concessions Law is that it specifies that all concessions must be awarded in competitive auctions, open to foreign firms. This proviso limits the scope for regulatory capture and outright corruption, making the process more transparent.

A third merit of the Chilean toll roads program is that there are no cost sharing agreements between the state and the franchise holder (though they were used early in the concessions program). Thus, in principle, though perhaps not in practice, cost overruns are paid in full by the franchise holder. There are limited exceptions in the cases of tunnels and bridges, where cost estimates are more uncertain.

One of the main shortcomings of the Chilean concessions program, however, is the lack of an external regulatory framework. MOP has been in charge of designing, implementing and supervising contracts. Each project has been designed independently and its rules are defined by the specific contract. The tension between the pressures for the success of a concessions program measured in terms of construction and the enforcement of contracts is evident. MOP, as most sectoral ministries under similar circumstances, has opted for development over regulation.

For example, after signing the concession contract for Route 78, MOP required additional works that were not included in the original contract. The franchise holder asked for a compensation for the additional construction and the ministry decided to increase tolls by 18.1% during a five year period. No further explanation was given (public opinion learned of the agreement only after it was signed), and the calculations that defined the compensation were not made public.[36] It is undesirable that the ministry renegotiates the contract in order to correct the deficiencies in its own projects, since MOP will be reluctant to expose its the mistakes it made when designing a concession contract. The public interest would be better served if an independent agency had determined fair compensation and publicized the social welfare computations.

There is growing evidence that MOP has been lax in enforcing concession contracts. For example, a report issued by the National Comptroller (*Contraloría General de la República'*) in October of 2002 concludes that the ministry relies solely on traffic data provided by franchise owners, having neglected to set up independent procedures to collect this information.[37] This is worrisome, since government guarantees are triggered by low traffic flows, so that firms have incentives to underreport traffic.[38]

It is also likely that MOP has developed projects with low social returns. Chile has had a social evaluation program of government financed projects for more than two decades. This procedure, which is performed by the Ministry of Planning, ranks projects according to their social return and screens projects with low returns. MOP seems to have subverted this procedure, by removing the least cost-effective parts of the projects submitted to the Planning Ministry. The omitted components were reincorporated after the approval and adjudication of the project, via so-called *complementary contracts* with the franchise holder, which are negotiated in private.[39] MOP has often mentioned that it has estimated the expected outlays generated by traffic guarantees, but these estimates have never been made public. In those cases in which subsidies have

[36] See "Estado compensará a privados por concesión", *El Mercurio*, July 15, 1997, page C8.

[37] "Contraloría critica sistema de control de concesiones", *La Tercera*, April 22, 2003.

[38] Moreover, in the case of Route 68, the concession length is inversely related to traffic flows.

[39] See "Informe de la U. de Chile revela suerte de embaucamiento del MOP a Mideplan," *La Segunda*, May 13, 2003.

been provided, the social project evaluations that justify the subsidies have not been made public either.

During the early years of the franchise program, the government avoided renegotiations even in those cases in which they would have increased welfare, as in the case of the El Melón Tunnel, so as to build a reputation for not renegotiating (see Box 2.1). More recently however, many highway projects have been renegotiated during the construction phase. Twelve out of the sixteen highway projects awarded by 1998 had been renegotiated by May 2002. There were 31 modifications to the original contracts, with total value of US$518 million. These projects were valued at US$3.4 billion, that is, there was an average cost increase of 15.4%.[40]

The aforementioned average hides significant variations: in some cases the renegotiations were negligible, while the budget for one franchise increased by 112.7%. Even now, the conditions under which the contracts were renegotiated are secret. Additional construction work or early completion of sections of the highways were repaid with extensions of the franchise length, direct payments from MOP, higher tolls, early operation of toll booths and reductions in other construction work. There was no external supervision to ensure that the renegotiation process was fair.

It has been fortunate that MOP's objective of attracting bidders conflicted with those of the Ministry of Finance, which is responsible for the budgetary process. This has forced a more independent evaluation of the toll road program. Indeed, press reports suggest that on more than one occasion the Ministry of Finance successfully stopped MOP from offering particularly generous government guarantees to franchise holders. The Ministry of Finance worries that the budget will be affected if guarantees become effective. More generally, however, MOP can transfer rents to franchise owners via favorable regulations. These transfers are unlikely to worry the Ministry of Finance if the budget is not affected.

There are signs that things will get worse with the Chilean concessions program. The first symptom was the case of Tribasa, a large infrastructure company from Mexico, which had been an important participant in the first stage in Mexico's franchise program. At the time, it was saved from bankruptcy by the Mexican government. Notwithstanding that experience, it became an important and aggressive participant in Chile's infrastructure program and was awarded three major franchises: Acceso Norte a Concepción, Chillán-Collipulli and Santiago-Los Vilos (which had complementary contracts worth almost 50% of the original project).

After completing the Acceso Norte a Concepción it ran into liquidity problems and sold Chillán-Collipulli in July 1999. Moreover, Acceso Norte a Concepción has been plagued by unconfirmed rumors of deficient construction and supervisors of the projects at MOP are under investigation. In the year 2000, Tribasa was late in completing the stages of the Santiago-Los Vilos section of the Pan American highway. MOP was surprisingly willing to allow the delays to accumulate without collecting the guarantees Tribasa had posted.[41] Eventually, public pressure forced MOP to acknowledge there was a breach of contract. The franchise was transferred from Tribasa to another concessionaire without a formal auction procedure.

[40] Needless to say, the cost increase during the entire franchise terms could be much higher, more than half of the franchise term remains to be completed in all cases.

[41] At the time Tribasa was filing for bankruptcy in Mexico, and later went bankrupt in Chile as well.

In recent months, the Chilean government has decided to provide the franchisees with an "ex post insurance contract". It has offered franchisees a contract by which it insures a traffic flows (higher than the minimum guaranteed traffic flow of the original contract) in exchange for additional works. MOP has argued that since it is more optimistic about future growth rates of the economy than are franchise holders, there is room for a mutually beneficial agreement. The problem with this argument, of course, is that by *believing* in a sufficiently high rate of growth, MOP can grant the franchise holders any subsidy they desire, i.e., there is no limit to (and no independent assessment of) the "space for a mutually beneficial agreements". A further problem is that the franchise holder pays for the insurance by building additional works which will probably not be assigned competitively. Hence the franchise owner may be receiving an additional subsidy from MOP.

## 2.4 Some conclusions from the country evidence

The sample of countries considered shows recurring problems in highway franchises. First, there have been pervasive renegotiations of contracts. This should not be surprising after all. As Williamson (1976) pointed out, franchise contracts are inherently incomplete. Moreover, by their nature, the possibility of open-ended renegotiations tend to attract bidders that specialize in negotiations rather than in the operation of the contract.

Second, the system has no governance structure: regulation and supervision has been entrusted to the same agency that designs the projects.

Third, fixed term franchises exacerbate the problems of long term contracts by needlessly increasing demand risk and by their lack of flexibility.

At the very least, the evidence casts doubts on the proposition that current model (BOT) is always better than the traditional approach. It seems clear that for privatization to succeed there should be a well-structured regulatory framework in place, and regulators should be independent of the agency in charge of promoting franchises.

In the next section we step back and ask two basic questions, when is privatization desirable and how should it be done? It turns out that if government subsidies and guarantees to the franchise holder are desirable on grounds other than externalities, then the traditional approach is unambiguously better. Alternatively, if they are not, then franchises should be privatized with neither subsidies nor guarantees and a hard budget constraint should be imposed.

# 3 When and how to franchise: a normative approach

## 3.1 Model

For simplicity assume that demand for the road is constant and completely inelastic.[42] Demand may be high ($Q_H$), with probability $\pi_H$ or low ($Q_L$), with probability $\pi_L$, where $\pi_L = 1 - \pi_H$ and $Q_H > Q_L$. The cost of building the highway is the same for all firms and equal to $I$. There are no maintenance or operation costs and the toll is equal to $P$, which is constant across demand states given our assumption of completely inelastic demand.[43] After the franchise ends, toll revenue goes to the government. All firms are identical, risk-averse expected utility maximizers, with preferences represented by the strictly concave utility function $u(\cdot)$.[44]

## 3.2 The planner's problem

We begin with the problem solved by a planner who knows $I$. Denote the present value of toll revenue received by the franchise-holder with high demand by $\text{PVR}_H$ and with low demand by $\text{PVR}_L$. Then

$$\text{PVR}_i \equiv \int_0^{T_i} PQ_i e^{-rt} dt = \frac{PQ_i(1-e^{-rT_i})}{r}, \qquad i = H, L; \tag{1}$$

where $r$ is the discount rate, common across firms and the planner, and $T_H$ and $T_L$ denote the length of the franchise when demand is, respectively, high or low.

The maximization problem assumes that the planner wants to transfer the fewest resources to the project.[45] It also assumes that the planner can collect toll revenues after the franchise ends, using this revenue to reduce taxes that generate distortions $\lambda_\tau > 1$ per dollar in the rest of the economy. Since private participation is voluntary, the planner solves the following problem:

$$\begin{aligned} \min_{\{T_H, T_L\}} \quad & \sum_{i=H,L} \pi_i \left[ \text{PVR}_i - (\lambda_\tau - 1) \left( \frac{PQ_i}{r} - \text{PVR}_i \right) \right] \\ \text{s.t.} \quad & \sum_{i=H,L} \pi_i u_i(\text{PVR}_i - I) = u(0), \end{aligned} \tag{2}$$

[42] This follows Engel et al. (1997). The results that follow can be extended to the more realistic case of relatively inelastic demand. Thus all the results that we present carry through in a model where highways are optimally tolled subject to a self–financing constraint. See Engel et al. (2001) for the results in Sections 3.2–3.3, and Engel et al. (2003) for those in Sections 3.4 and 3.5.

[43] There are two reasons why ignoring maintenance and operations costs is not a serious limitation. First, these costs are usually smaller than the cost of building the highway. Second, and more important, if maintenance and operations are proportional to road usage, which often is a good approximation, then our framework extends trivially to the case with maintenance and operations costs, as follows: The regulator estimates per-user maintenance and firms bid on the PVR of toll revenue, net of maintenance costs. Since maintenance costs are proportional to road usage, the only residual source of risk will be errors in the estimates of maintenance costs and operational costs, both of which are minor.

[44] This should be interpreted as a reduced form for an agency problem that prevents the franchise-holder from diversifying risk. See Appendix D in Engel et al. (2001) for a model along these lines.

[45] A more general objective function results when demand is not infinitely inelastic, see Engel et al. (2001).

where $u(0)$ is the level of utility attained by a firm not undertaking the project.

It is easy to see that $\text{PVR}_L = \text{PVR}_H = I$ solves the planner's problem. Since the franchise-holder is risk-averse, it is efficient to insure her completely. To do so the planner fixes any toll that ensures that the franchise-holder loses no money when demand is low (that is $P \geq rI/Q_L$). Since $Q_H > Q_L$, it follows from (1) that the planner chooses $T_H < T_L$, so that the term of the franchise is shorter when demand is high. Note that users pay the same amount in both states of nature and thus face no risk.[46]

Would these results change had we modeled congestion, assumed an elastic demand and set optimal tolls? In Engel et al. (2001) we analyze a more general model and study the optimal contract between a risk averse franchise holder and a risk neutral regulator who sets optimal tolls. We show that the optimal contract trades off the distortions caused by tolls against the revenue uncertainty faced by the risk-averse franchise holder. Essentially, this problem is an extension of the standard Ramsey–pricing problem where the length of the franchise is an additional choice variable and distortions are minimized subject to the franchise holder's self–financing constraint. We also show that the optimal contract can always be implemented with exactly the same optimal auction we now describe.

### 3.3 The optimal auction

Consider first the standard auction mechanism where the government sets a fixed franchise term, and firms bid tolls. Under competitive conditions, the winning bid $P$ satisfies:

$$\sum_{i=H,\,L} \pi_i u\left(\frac{PQ_i(1-e^{-rT})-I}{r}\right) = u(0),$$

which means that $PQ_H(1-e^{-rT}) > I > PQ_L(1-e^{-rT})$. Hence the winning bid does not reproduce the planner's solution, since the winning bidder is required to face risk.

An alternative auction mechanism is to have bidders compete on the present value of toll revenue they require to finance the highway. In this case the winning firm bids PVR such that

$$\pi_L u\,(\text{PVR}-I) + \pi_H u\,(\text{PVR}-I) = u(0),$$

so that the winning bid satisfies $\text{PVR} = I$. It follows that a PVR auction implements the social optimum derived in the preceding subsection. Furthermore, the planner can implement the optimal contract using a PVR auction even if she does not know the values of $I$, the $\pi_i$'s or the $Q_i$'s, $i = L, H$.[47]

[46] It should be noted that uncertainty in $I$, which may be important in some projects, cannot be eliminated with a variable term contract.

[47] All the planner needs to know is a lower bound for $rI/Q_L$ to set a toll that allows the franchise holder to obtain revenue equal to $I$ in the low demand state.

### 3.4 Subsidies and the cost-of-funds argument

It is often claimed that highway franchising is desirable because private firms have access to funds at lower cost. By contrast, governments must resort to distortionary taxation to finance highways. Is this argument enough to make the case for highway franchising? We now relax the self-financing constraint and allow for transfers from the planner to the franchise-holder. In this way we extend the model to allow for traditional contracts, where governments finance roads, as well as BOT contracts.

Assume that the government subsidizes the project in amounts $S_H$, $S_L \geq 0$ depending on the state of demand. Then (2) extends to:

$$\begin{aligned} \min_{\{T_H,T_L,S_H,S_L\}} \quad & \sum_{i=H,L} \pi_i \left[ (\mathrm{PVR}_i + \lambda_\tau S_i) - (\lambda_\tau - 1)\left( \frac{PQ_i}{r} - \mathrm{PVR}_i \right) \right] \\ \text{s.t.} \quad & \sum_{i=H,L} \pi_i u_i(\mathrm{PVR}_i + S_i - I) = u(0). \end{aligned} \tag{3}$$

It can easily be shown that any combination of $T_H$, $T_L$, $S_H$ and $S_L$ such that the franchise-holder's income in both states is equal to $I$, that is, $\mathrm{PVR}_i + S_i = I$, $i = H,L$, solves this problem. Thus, on one hand the planner's optimum can be attained with no subsidies at all, by setting $\mathrm{PVR}_i = I$ and $S_i = 0$, $i = H,L$. On the other hand, the road can be financed only with subsidies, setting $S_i = I$ and $\mathrm{PVR}_i = 0$, $i = H,L$. The former solution can be attained via a PVR auction, while the latter corresponds to the traditional approach. This multiplicity of possible subsidy-toll combinations indicates that distortionary taxation ($\lambda_\tau > 1$) is not sufficient to make BOT contracts preferable.

The standard line of reasoning points out that subsidies are a more expensive means of financing roads, because they are paid from distortionary taxes. This argument suggests that the franchise-holder should use subsidies (and the ensuing distortions needed to finance them) only when strictly necessary. But this ignores an essential aspect of highway franchising, namely that the highways may also be used to collect public funds, which can be used to reduce distortionary taxes elsewhere.[48] Hence, under the assumptions we made above, one additional dollar of government subsidy generates one additional dollar of toll revenue for the government. This becomes apparent if we rewrite the objective function (3) as:

$$\sum_{i=H,L} \pi_i \lambda_\tau (\mathrm{PVR}_i + S_i),$$

where we have ignored a term that does not depend on the planner's choice variables.[49] It can be seen that social welfare depends on *total* transfers to the franchise-holder, no matter whether these come in the form of a subsidy or toll revenue.

[48] For example, under the franchise contracts considered in sections 3.1–3.4, the government collects all tolls after the franchise ends. More generally, the government could also obtain a fraction of toll revenue during the franchise.

[49] It then follows that the problem at hand is analogous to the one faced in the case without government transfers, with $\mathrm{PVR}_i + S_i$ in the role of $\mathrm{PVR}_i$.

### 3.5 When is franchising desirable?

We have shown that the cost-of-funds argument is not sufficient to justify franchises in our model. But we have not modelled other alleged advantages of BOT contracts. One of the main arguments in favor of franchises is that governments are unable to induce the public works ministry to spend efficiently, perhaps because of political economy considerations or outright corruption. This argument can be captured, in an admittedly simplified manner, by letting the cost of subsidies differ from the tax distortions the planner avoids by collecting toll revenue.

Thus, we let $\zeta_m$ be the number of dollars needed by the ministry of public works to give one dollar of subsidies to the franchise holder. This leads to the following planner's problem:

$$\begin{aligned} \min_{\{T_H,T_L,S_H,S_L\}} \quad & \sum_{i=H,L} \pi_i \left[ (\mathrm{PVR}_i + \zeta_m \lambda_\tau S_i) - (\lambda_\tau - 1) \left( \frac{PQ_i}{r} - \mathrm{PVR}_i \right) \right] \\ \text{s.t.} \quad & \sum_{i=H,L} \pi_i u_i (\mathrm{PVR}_i + S_i - I) = u(0). \end{aligned} \tag{4}$$

Note that $\lambda_\tau$ is multiplied by $\zeta_m$ in the planner's objective function, but not in the franchise holder's participation constraint. This is because the planner needs $\zeta_m$ dollars to increase the receipts of the franchise holder by one dollar and $\zeta_m$ dollars cost $\zeta_m \lambda_\tau$. In Engel, Fischer and Galetovic (2003, 2004) we show that the solution to this problem depends on whether $\zeta_m$ is larger, equal or smaller than 1:

- If $\zeta_m > 1$, the optimal contract involves no government subsidies and the same present value of toll revenue, $I$, for the franchise holder in all states of demand. This contract can be implemented with a PVR auction.

- If $\zeta_m = 1$, which is the case considered in Section 3.4, the planner's optimum can be implemented via any combination of $T_i$ and $S_i$, $i = H, L$, such that $\mathrm{PVR}_i + S_i = I$, $i = H, L$. This includes, in particular, the BOT contract associated with a PVR auction, and the traditional approach to highway financing, where the road is financed with general funds.

- Finally, if $\zeta_m < 1$, the optimal contract is such that all income received by the franchise-holder comes from subsidies. Direct government financing is to be preferred to a BOT contract in this case.

What is the intuition behind this result? When the ministry of public works reduces the subsidy to the franchise holder by one dollar, it relaxes the government's intertemporal budget constraint by $\zeta_m$ dollars, which saves $\zeta_m \lambda_\tau$. But, on the other hand, the franchise holder must appropriate one additional dollar of toll revenue in present value to meet her budget constraint. This forces the government to increase the tax burden by one dollar, which costs $\lambda_\tau$. Hence, it will pay to privatize the highway to avoid subsidies if $\zeta_m > 1$. On the contrary, the traditional method is better if $\zeta_m < 1$, for then subsidies through the ministry of public works are cheaper.[50]

[50] This is the case, for example, if the ministry has a technological advantage and is able to build cheaper than private concessionaires.

It follows from this result that there is a close connection between the desirability of franchising highways and the self-financing constraint: when $\zeta_m > 1$ the planner prefers to avoid transferring money to the franchise holder, and this imposes the self-financing constraint. A corollary is that guarantees, which are transfers contingent on traffic being low, are undesirable whenever privatization is optimal. Furthermore, profit sharing arrangements are never optimal even if we ignore their negative effect on incentives.

Our result raises the question of whether one of the three parameter configurations considered above ($\zeta_m > 1$, $\zeta_m = 1$ or $\zeta_m < 1$) is more likely to prevail in practice. We argue next that the most relevant case is $\zeta_m > 1$. Indeed, $\lambda_\tau$ in (4) captures the distortions associated with distortionary taxation. $\zeta_m$ also includes any source of additional inefficiency associated with the highway agency's management of resources which are added to the inefficiencies caused by distortionary taxation. Even the slightest inefficiency —and Section 2 suggests the presence of major inefficiencies— leads to the conclusion that $\zeta_m > 1$. It then follows that, highway privatization indeed should be preferred over the traditional approach because the ministry of public works manages less money with a BOT approach.[51]

To conclude we should mention that $\zeta_m > 1$ is *not* an argument against subsidies that correct discrepancies between the social and private value of a highway. The reason is that our exercise is valid when toll revenue can substitute for subsidies. By contrast, almost by definition a discrepancy between the social and private value of a project implies that the franchise holder cannot capture the excess by a direct charge on users—hence one cannot substitute tolls for subsidies. In those cases a standard subsidy, large enough to make the project privately attractive, is warranted.

# 4 When and how to franchise: a positive approach

## 4.1 Highway franchising: some outstanding puzzles

Our three case studies, and especially recent research by J. Luis Guasch (2003), have uncovered several stylized facts about concessions in general and highway franchises in particular.

First, renegotiations of concession contracts is pervasive. Guasch (2003) studies a sample of more than 1,000 concession contracts granted in Latin America between 1985 and 2000, 30% of which were renegotiated. Renegotiations were particularly common in the transport sector (54.7%) and water and sanitation (74.4%).[52]

As our case studies show, many highway franchises were renegotiated, apparently to bail out concessionaires in financial trouble. Such renegotiations pose an additional conundrum: theory suggests that the party that owns the sunk highway, namely the concessionaire, should be particularly exposed to opportunis-

[51] Of course, our model does not consider elements that may point in the opposite direction, such as the fact that under BOT contracts there is more opportunity for opportunistic behavior than under the traditional approach, since the relation between the government and private firms covers a much longer time period. Moreover, we have assumed that the cost of building the project under the traditional approach and with a BOT contract are the same. As we have already said, if the public sector has an intrinsic cost advantage so that $\zeta_m < 1$, then the traditional approach is preferable.. Also, as mentioned above, public provision may be superior if property rights are not sufficiently protected.

[52] The transport sector includes roads, ports, airports and rail.

tic government behavior. Yet evidence suggests that contracts have been typically renegotiated to bail out franchise holders and that the bailouts take place *after* the highways have been built. This begs an explanation, because governments can switch providers easily (asymmetries of information just don't seem to be relevant because the quality of assets is observable) so a threat by the concessionaire to abandon the franchise is not credible. In other words, renegotiations are pervasive without a holdup problem![53,54]

Second, while our normative results suggest that governments should impose hard budget constraints on franchise holders and avoid subsidies, most highway franchises are granted minimum income guarantees, which are subsidies contingent on the project being a failure. Incidentally, these guarantees have not been justified as necessary to correct discrepancies between social and private returns, but as necessary for franchise holders to obtain financing.

Third, as Gómez–Ibáñez and Meyer (1993) have documented, highway franchises are also routinely renegotiated in developed countries, which on average have stronger institutions.

There is no question that corruption, incompetence and other reasons (see Guasch, Laffont and Straub [2003]) may partly explain renegotiations and guarantees. Next we explore an additional reason why governments may be willing to grant guarantees and renegotiate contracts, and argue that it may help solve some of the puzzles mentioned above.

Our argument combines two elements. First, governments that spend more are more likely to be reelected. This implies that governments would like to anticipate expenditures. Second, institutions like parliamentary discussion of the budget constrain the extent to which governments can anticipate expenditures. Thus, if governments could, they would anticipate more expenditures than they actually do. Here enters highway franchising: renegotiations and income guarantees allow governments to relax the constraint they face on spending money.

The simplest type of intertemporal transfer is to issue debt –which must be included in the budget—. The problem is that in the normal budgetary process, the opposition may object to these expenditures, specially when it realizes that it affects its own chances of being elected. By contrast, guarantees and renegotiations are seldom included in the budget; and we argue below that they allow intertemporal transfers that enable the current government to anticipate spending.

In what follows we present a simple model that formalizes this bias towards present spending. We also discuss several applications which show how the current model of highway concessions allows the government to increase present spending.

[53] Of course, we do not claim that we should necessarily observe government expropriations—after all, they are probably interested in attracting franchise holders in the future. But we do want to stress that the standard explanation, holdup, does not seem to be relevant here.

[54] Cameron (2000) examines auctions of contracts to build and operate power plants in the United States. She presents evidence that projects awarded with "rigid" auctions, which are based on objective criteria, tend to fail more often than those allocated in "flexible" auctions, which allow subjective award criteria to be used (failure is defined as the project being abandoned or substantially delayed). One could argue that highway projects, which are allocated in rigid auctions, are thus more prone to "fail" and be renegotiated. Yet this does not explain why governments are willing to renegotiate after the highway has been built.

## 4.2 Model

We consider a two–period model,[55] where each period should be interpreted as the duration of an administration. Total tax revenue is determined exogenously and normalized to 1.[56] The discount factor equals 1. In period 1, the coalition in office chooses current expenditure, denoted by $I$. In the second period the coalition in government spends whatever is left, $1-I$. Social welfare is given by $\mathcal{U} = u(I) + u(1-I)$, with $u$ a strictly concave function.

The probability that the risk-neutral current government is reelected in period 2 is a strictly concave and increasing function of current expenditure, $p(I)$, that takes values between 0 and 1. To make the problem as simple as possible, we assume that the current government's preferences mimic social welfare as long as it is in power, but it does not obtain any utility when out of office.[57] Hence the current government maximizes $\mathcal{G} = u(I) + p(I)u(1-I)$. It follows that the only source of distortions in this model arises in the reelection concerns of the current government.

### 4.2.1 The planner's problem

To begin, consider the planner's problem. She chooses $I$ to maximize

$$\mathcal{U} = u(I) + u(1-I).$$

Concavity of $u$ then implies that the social optimum is achieved at $I^s = 1/2$.

### 4.2.2 The tendency to anticipate spending

Consider now a government with reelection concerns who can freely chose its fiscal policy subject to the intertemporal budget constraint. It would choose $I$ to maximize

$$\mathcal{G} = u(I) + p(I)u(1-I),$$

the same as the planner except that $p < 1$. The necessary FOC is now

$$\frac{d\mathcal{G}}{dI} = u'(I^*) + p(I^*)u'(1-I^*) + p'(I^*)u(1-I^*) = 0, \tag{5}$$

with SOC

$$\frac{d^2\mathcal{G}}{dI^2} = u''(I^*) + p(I^*)u''(1-I^*) - 2p'(I^*)u'(1-I^*) + p''u(1-I^*) < 0,$$

since $u$ and $p$ are concave and increasing.

[55] This not only keeps things simple, but also avoids having to deal with dynamic inconsistency issues that arise in a longer horizon problem.

[56] Endogenizing this revenue is straightforward but irrelevant for the point we want to make.

[57] This assumption is similar to that in Alesina and Tabellini (1990). In their paper the opposition spends in a public good that is not valued by the current government.

We now show that $I^* > 1/2$. To begin, assume that $p' = p'' = 0$, that is, there is a fixed probability of reelection $p \in [0,1]$. The FOC then simplifies to $u'(I^p) + pu'(1-I^p) = 0$. Simple differentiation then shows that

$$\frac{dI^p}{dp} = \frac{u'(1-I^p)}{u''(I^p) + pu''(1-I^p)} < 0.$$

Hence, $I^p > I^*$ for $p < 1$. This result is well known (see Alesina and Tabellini [1990]): the current government tends to anticipate spending because it bears the cost of it—less future spending—with probability less than one.

We return to the first order condition (5) with $p$ a function of $I$. We define $p^{\text{eq}}$ so that

$$u'(I^*) \equiv p^{\text{eq}} u'(1-I^*);$$

that is, $p^{\text{eq}}$ is the fixed probability such that the current government would optimally choose to spend $I^*$. Now from the FOC (5) we have

$$u'(I^*) = p(I^*)u'(1-I^*) - p'(I^*)(I^*)u(1-I^*).$$

It follows that

$$p^{\text{eq}} = p(I^*) - p'(I^*)\frac{u(1-I^*)}{u'(1-I^*)}.$$

Hence $p^{\text{eq}} < p(I^*)$ and $I^* > I^{p^*} > 1/2$, where $I^{p^*}$ denotes optimal government expenditure for a government with constant $p$ equal to $p(I^*)$.

Thus, there are two reasons why the current government wants to anticipate spending. The first is that the coalition may not be in office in the future: $p < 1$ acts as a discount rate. But second, more spending today increases the probability of reelection. The latter implies that the government's expenditure level not only depends on its probability of being re-elected, $p(I^*)$, but also on how responsive this probability is to changes in expenditures. A more responsive probability leads to higher expenditures, even when the actual probability of being re-elected remains unchanged.

Of course, when assuming only one type of expenditure we abstract from the fact that governments spend in both fungible and capital (infrastructure) goods. One may wonder whether it makes sense to anticipate spending in infrastructure, given that the benefits wrought by these projects are enjoyed over long periods of time. Formally, one can show that nothing of substance changes in a more realistic model, as long as capital spending increases the probability of reelection. We believe that this assumption is warranted by a long history of white elephants, pork barrel projects and the fact that governments like to dedicate big infrastructure while campaigning.

## 4.3 The tendency to anticipate spending: applications

### 4.3.1 Renegotiations

Contract renegotiations typically consist in an intertemporal transfer such that the current franchise holder is awarded funds in the future. Sometimes this transfer is paid out from future revenues that will be generated by a highway which is already operated by the franchise holder—e.g. when the concession term is extended; and sometimes (as it seems likely with the Chilean ex–post insurance), out of future budgets. Why do governments renegotiate *after* the highway has been built and sunk?

Assuming away the straightforward explanation of corruption, one plausible explanation is that in exchange for the renegotiation of the original contract, the current government gets concessionaires to finance the construction of additional public works now. For example, they may commit their "support" to the government's franchising program, or even take over projects that the government would have financed out of the current budget. Hence, under this interpretation, the objective of renegotiation is not necessarily to compensate for losses on previous contracts, but to sweeten conditions for future projects.

If governments are interested in new projects, why favor old franchise holders instead of calling a competitive auction? One reason is that current franchise holders have a short term monopoly position over the bidding for new franchises. There are various reasons for this advantage. In small countries where franchise holders are international firms, those that have already invested in franchises are acquainted with the regulations, norms and procedures and have some experience on how the country is run, so they have an advantage over new entrants. Furthermore, the fact that current franchise holders do not want to participate in bidding for new franchises reinforces the fears of new foreign entrants. Hence, it might take a fairly long time, before the government can convince new firms to participate in new franchise projects. Given the short span of political time, this provides current franchise holders with the ability to hold up the current government. Their threat is not that they will make off with their current investments (which is physically impossible), but that they will not participate in new projects, which means that such projects will be delayed until the government can attract new bidders.[58]

Incidentally, it is interesting to note that the bias towards excessive current expenditures is likely to be present in developing and developed countries alike. Consequently, it is probably not that surprising that contract renegotiations have been pervasive when developed countries like France or Spain, have franchised their highways (see Gómez Ibáñez and Meyer [1993]).

[58]The interest group mobilization theory of politics says that, holding stakes constant, a group that already exists and uses a program is more influential than the set of prospective beneficiaries at the time the project is proposed. The reason is that the set of prospective beneficiaries is a larger group. Thus, each member benefits with probability less than one, but has the same or higher per capita cost of organizing than a group that already exists, hence lower potential net gains from influence. If the government can not just reopen bidding, it is stuck with the incumbent operator. (We thank Roger Noll for pointing this out to us.)

### 4.3.2 Guarantees

Most highway contracts include minimum income guarantees, which are paid to the franchise holder if traffic flows fall below a pre-specified threshold. It may be that franchise holders and financiers demand guarantees just because fixed-term franchises distribute risks inefficiently (see Engel et al. [2001]). For example, it can be easily shown that if the auction is competitive and the term of the franchise is fixed, the franchise holder must loose money in low–demand states. Thus, guarantees may be just an imperfect solution to a design flaw.

Yet our model in section 3 suggests that guarantees are also a contingent subsidy which is paid in low–demand states. As we saw in that section, subsidies are not warranted unless there is a discrepancy between social and private return. But consider a government with reelection concerns, that wants to build projects. A guarantee helps franchise holders obtain financing for new projects more quickly because it simplifies their financial evaluation. And an important fraction of the expected costs of such guarantees are passed on to future administrations and therefore discounted more than is socially desirable.

### 4.3.3 Contracts with payments to the government should make renegotiations less likely

In his analysis of concessions, Guasch (2003) shows that contracts that involved payments from the concessionaire to the government were renegotiated far less often. Indeed, 60% of contracts awarded to the bidder offering the lowest tariff were renegotiated, while only 11% of contracts where firms bid on a monetary transfer to the government were renegotiated.

One reason why concessions awarded based on monetary payments to the government are renegotiated less often is that for these contracts, renegotiations are likely to involve a reduction of the payment, thereby reducing the ability to spend of the current government. This may also explain why monetary transfers are not among the most popular tendering variables; highway franchises have been generally awarded to the bidder offering the lowest toll or the shortest term.

### 4.3.4 Who should be in charge of the franchising program?

Last, one should also mention that incentives to anticipate expenditures are particularly relevant when the ministry of public works is in charge of the franchising program. One obvious reason is that the purpose of such an agency is, essentially, to build new projects. If the agency is given leeway to grant guarantees and renegotiate projects, it will probably use them to expand the public works program.

These incentives are probably strengthened by the fact that both guarantees and toll income are not part of the general budget. Hence, the agency in charge of building public works does not internalize the costs of guarantees and renegotiations, just as the current government does not fully internalize the future costs of its current policies.[59]

[59] While in some countries tolls from state-owned highways are collected by the agency that builds public works, this income usually reduces the transfer made from the general budget to finance the public works program. Hence, at the margin toll income forms part of the general budget.

# 5 Conclusion: how should it be done?

The title of this chapter asks whether the current model of highway franchising is the right one. The analysis suggests that the answer is no. It has been a privatization of sorts, as profits remain in firm's pockets and losses are socialized. To conclude we summarize the shortcomings of the current model and propose improvements.

There are two obvious design flaws that have fairly straightforward solutions. First, PVR auctions should substitute for fixed-term contracts, which allocate risks inefficiently. Second, by now the international experience has shown the inadequacies of the "privatize now, regulate later" approach that governments have followed. The root of the problem is that almost always, the government agency that promotes franchises is also in charge of monitoring compliance with the incomplete contract. This often leads to lax enforcement because these agencies are usually embedded in the ministry in charge of building public works, whose objective is to build as much as possible. Experience suggests that, independently of the means by which countries choose to privatize highways, a separate regulatory authority should be set up to monitor compliance with contracts and, given that many highways are natural monopolies, to regulate tolls.

On the other hand, solving the third flaw, soft budget constraints, requires a radical redesign of franchising programs. So far contracts are routinely renegotiated and minimum income guarantees are part of most contracts. Yet we have shown that renegotiations and guarantees are contingent subsidies and, as such, inconsistent with privatization from a normative perspective.[60]

Part of the reason why governments renegotiate and grant guarantees may be simply that they are corrupt or even incompetent. A complementary explanation is that these measures allow the government to increase current expenditures, to be paid with future tax receipts, without issuing debt and sidestepping the normal budgetary process. This is attractive for governments in danger of losing an election and explains why highway contracts are renegotiated when there is no obvious holdup problem.

To some extent, it may seem somewhat extreme to argue that the current model should be abandoned. But upon reflection, our recommendations are quite standard: the agency in charge of regulation should not promote the activity it supervises; subsidies should only be used when they are needed to correct a discrepancy between social and private benefits; and activities that generate revenues should be fully privatized when they are performed more efficiently by private firms.

[60] As mentioned in the introduction, some renegotiations are socially desirable (e.g. one to enlarge the highway when traffic grows faster than predicted; see Engel et al. 2002). In Engel et al. (2003) we show that an LPVR contract can be complemented by a buy–back clause that allows the government to renegotiate the contract when socially desirable, without expropriating the franchise holder.

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