



Stanford

Center for International
Development

Working Paper No. 40

**The Chilean Infrastructure Concessions Program:
Evaluation, Lessons and Prospects for the Future**

By

Eduardo Engel
Ronald Fischer
Alexander Galetovic

July 1999



Stanford University
John A. and Cynthia Fry Gunn Building
366 Galvez Street | Stanford, CA | 94305-6015

THE CHILEAN INFRASTRUCTURE CONCESSIONS PROGRAM: EVALUATION, LESSONS AND PROSPECTS FOR THE FUTURE

EDUARDO ENGEL, RONALD FISCHER AND ALEXANDER GALETOVIC¹

Abstract

This paper describes and evaluates the Chilean infrastructure concessions program, which is one of the main economic innovations carried out by the center-left coalition of political parties that has governed Chile since the return to democracy in 1990. The main principles underlying the economics of franchising are discussed and used to evaluate the program, thereby reviewing the privatizations of highways and seaports in detail. Compared with experiences in other countries, the results are promising. The infrastructure deficit has been greatly reduced, innovative ideas have been used successfully and several pitfalls have been avoided. However, since franchise terms are long, the final verdict will not be in for at least a decade. We offer various suggestions to increase the likelihood of a positive outcome. We believe implementing these suggestions would lead to important savings for taxpayers and users.

JEL Classification: H42, H54, L91.

Keywords: Infrastructure, Regulation, Franchises, Chile.

¹Centro de Economía Aplicada (CEA), Departamento de Ingeniería Industrial, Universidad de Chile. Engel is also with the NBER and was Visiting Professor at the Center for Research on Economic Development and Policy Reform at Stanford University while this paper was written. Address correspondence to: Av. República 701, Santiago, Chile. Fax: +56-2-689 7895, email: eengel@dii.uchile.cl, rfischer@dii.uchile.cl, agaleto@dii.uchile.cl. Financial support from Fondecyt (grants 1980658 and 1981188) and the Mellon Foundation (grant 9608) is gratefully acknowledged. The authors thank Mario Conca, Carlos Hurtado and Felipe Larraín for helpful comments and suggestions. We also thank Claudia Araya and Ronald Gibbs for providing useful information.

1 INTRODUCTION: CHILE'S INFRASTRUCTURE DEFICIT

In the early nineties, a major deficit in transportation infrastructure became evident in Chile. Lacking the financial, organizational and human resources to overcome it, the Chilean government embarked on an ambitious franchising program via so called build-operate-and-transfer (BOT) contracts. Under such a contract, a private firm builds and finances the infrastructure project and then collects user fees for a long period (usually between 10 and 30 years). When the franchise ends the infrastructure is transferred to the state.² By the end of 1998, 21 BOT concessions had been awarded involving investments of US\$3.6 billion, mainly in highways and airports; seaports are soon to follow. This chapter describes and analyzes the infrastructure franchising program undertaken by the governments of the *Concertación de Partidos por la Democracia*, a coalition of political parties (in what follows *Concertación*).³ We discuss the basic economics of infrastructure franchising and evaluate two of the main sectors in which the program has been applied, highways and seaports.

The infrastructure sector saw comparatively little action during the seventies and eighties, and it is fair to say that the sweeping market reforms that were introduced elsewhere in the economy largely bypassed it. Traditionally, infrastructure in Chile has been financed mainly by taxpayers and not by users. Moreover, until the early seventies, the Department of Public Works (and other government Departments) had its own building departments and construction workers were government employees. Only by special law could a private firm be hired to build public works. In the mid seventies, among many other reforms introduced in the public sector, the government decided to subcontract the building and maintenance of public works. Contractors were selected via competitive auctions, but the government continued to design and manage projects. Broadly speaking, construction costs were paid by taxpayers.⁴ At the same time, a comprehensive and centrally managed public project evaluation scheme was introduced aiming to choose those with the highest social returns among all conceivable public projects. Hence, infrastructure projects had to compete for funding with all public projects.

While these reforms had significant effects on the efficiency of approved public works, chronic

²See Gómez Ibáñez and Meyer (1993) for a thorough discussion and description of the international experience with transport privatization.

³This covers the Aylwin administration (1990-1994) and the first five years of the Frei administration (1994-1998).

⁴There were a few tolled roads, with tolls far above marginal costs, but the revenues were used to finance the whole infrastructure system rather than the tolled roads. It is noteworthy that Chile is one of the few countries with a long (more than 30 years) tradition of paying tolls for government owned highways. For more on this, see Gómez-Lobo and Hinojosa (1999).

budget constraints implied that infrastructure did not keep up with demand growth. Thus, even though the efficiency with which the *existing* infrastructure was managed and used improved (for example, few white elephants were built during that period), it was evident by the early nineties that there was a serious need for a large increase in investment for infrastructure.⁵ For example, Table 4 shows that investments needed between 1995 and the year 2000, as estimated by the Ministry of Public Works, were significant, adding up to US\$ 11 billion (by way of comparison, Chile's GDP is about US\$ 70 billion).⁶ To undertake these investments, the Ministry of Public Works (henceforth MOP, for its spanish acronym) would have needed to triple its yearly budget of \$800 million and probably be subject to a major organizational restructuring, an alternative which the *Concertación* considered politically inviable.⁷ For this reason the government chose to implement an ambitious franchising program, which was focused initially on awarding BOT contracts for privately profitable high-traffic highways and airports, but that will probably be extended to several other areas.

There are many reasons why economic welfare can be expected to be higher under the BOT program than with the traditional approach.⁸ First, as already said, under the traditional approach a major increase in the government's budget would have been necessary to finance the increase in infrastructure investment. Such an increase was hard to justify politically and was not necessary under the BOT scheme. Second, having the same firm in charge of construction and maintenance provides better incentives to invest in quality during the construction phase.⁹ Third, private firms are usually better run and more efficient than state-owned firms, thus maintenance and operations should be more efficient under BOT.¹⁰ Fourth, cost-based user fees are easier to justify politically when infrastructure providers are private.¹¹ Fifth, it may be advisable, on distributional grounds,

⁵By "insufficient investment" we mean that public projects that were socially and privately profitable were not undertaken.

⁶The Cámara Chilena de la Construcción (Chilean Chamber of Building) has estimated similar investment needs, see Table 2 in Acevedo and Errázuriz (1994).

⁷Furthermore, these budgets were much higher than the budgets of the preceding decade.

⁸In the *traditional approach* the government organizes a competitive auction among contractors for the *construction* of the road. The contractor making the lowest bid wins the contract and builds the road according to specification. Once the road is ready, the government operates and maintains it. Construction costs are paid by taxpayers. Even if users pay user fees, these do not relate directly to the project's construction costs.

⁹This and the last point are emphasized in Tirole (1997).

¹⁰This advantage can also be achieved under the traditional approach if the government contracts out management and maintenance operations.

¹¹Even though, as mentioned in an earlier footnote, there is a tradition of charging tolls for government owned highways in Chile, this pertains to intercity highways, not to urban highways. Also, this point is relevant for trucks, which have always paid tolls below the marginal cost they impose on roads.

to have those who benefit from the infrastructure project pay for it, as is the case with BOT but not with the traditional approach where new projects are financed with general funds. And sixth, in stark contrast with the traditional approach, the BOT scheme substitutes a market rather than central planning as the mechanism that selects projects. This helps to screen projects for white elephants, as the income the firm receives is related to demand realizations. Moreover, planners can rely on a market test to tell them where profitable public works need to be built.

The six advantages of BOT contracts must be weighed against the inefficiencies induced by user fees that are substantially above marginal costs, so as to pay for the construction of the project. In most developing countries, where white elephants are pervasive (see Box 1.1 for an extreme example), the advantages of BOT clearly outweigh this limitation. Furthermore, for high demand projects (e.g. most urban highways) efficient user fees will usually cover the construction cost.¹²

BOX 1.1 (Poor project screening) *In the mid-1940's, Chile and Argentina agreed to increase trade between the two countries. As part of this process, the governments projected a railway link between the seaports of Concepción in Chile and Bahía Blanca in Argentina. The Chileans built the line up to the border, constructing the Lonquimay tunnel, the (still) longest tunnel in Latin America, and rail stations along the way. The Argentine line was never built, and the project was never put to its intended use. A private firm participating in a BOT scheme, with income derived from user fees, would not have begun the Chilean part of the project without being assured that the Argentine part of the project would also be built. ■*

The advantages of BOT contracts cannot be taken for granted. The international experience indicates that the mechanism used to award the concession, the franchise contract, and the regulatory framework must be carefully designed in order to reap the potential benefits (see Box 1.2 for examples). There are three main reasons for this. First, firms' fears of being expropriated may deter them from participating in BOT schemes. Thus reforms securing property rights must be in place. Second, the franchise holder is often awarded a monopolic infrastructure project, which needs to be regulated. Third, most infrastructure projects face large commercial and policy risks, which have led firms to press the government for income guarantees or the implicit assurance that they will be bailed out should they face financial distress. But guarantees and renegotiations are undesirable for various reasons. First, they are liabilities for future administrations that are not accounted for in the budget; second, they encourage firms with experience in lobbying to underbid in the expectation of renegotiating later ('lowballing'); third, they make white elephants more likely

¹²See Engel, Fischer and Galetovic—henceforth EFG—(1998b) for a formalization of this result.

by reducing the risk that the project will lead to losses for the franchise holder. Moreover, they amount to privatizing profits while socializing losses. This last fact has a negative effect on public opinion and subtracts support for private participation in infrastructure provision.

BOX 1.2 (Renegotiations and government bailouts) ¹³

Renegotiations of contracts and government takeovers of bankrupt franchises have taken place in France, Mexico, and Spain. France awarded four private toll road concessions in the early 1970s. After the oil shocks three of the four went bankrupt and were taken over by the government.

In Mexico virtually all the highway concessions were renegotiated after costs exceeded expectations while revenues were lower than expected. The (declared) cost to taxpayers has reached US\$6 billion, not including the cost to users of extensions of terms, which more than doubled in several cases. Cost overruns were caused partly by the fact that the companies made their profits by inflating construction costs, siphoning funds through the building companies, and letting the operating companies go bankrupt.

In Spain twelve toll road concessions were awarded before 1973. Building costs ended up being four to five times higher than expected, and traffic was one third of projections in several of the franchises. Three firms went bankrupt, two others were absorbed by stronger franchise holders, and all firms were granted toll increases and term extensions. ■

Our evaluation of the Chilean franchising experience is positive. Compared with other countries, results are promising. Several pitfalls have been avoided, and the infrastructure deficit is being reduced. Nevertheless, many improvements suggest themselves and changes can (and should) be made. Furthermore, since most franchise terms are rather long, the final verdict will not be in for at least a decade. We offer several suggestions to increase the likelihood of a positive outcome.

Before proceeding, we call attention to two caveats. First, the term “infrastructure” refers to many types of projects in addition to sea- and airports and roads, for example, public utilities such as those for water, electricity and telephones. We do not discuss the reforms implemented in those sectors, both because they are the subject of other chapters and because there is a substantial literature on their privatization and regulation. By contrast, much less is known about industries where the periodic auction of temporary franchises can be used as a tool of regulation and competition.¹⁴ This is the main regulatory innovation introduced during the Concertación administrations. In the chapter we consider the cases of highways and sea- and airports. Highways account for

¹³Based on Gómez-Ibáñez and Meyer (1993).

¹⁴See Harstad and Crew (1999) for a recent theoretical contribution.

90% of investments undertaken under the Chilean franchising program. Seaports are one of the main pending challenges in infrastructure improvement, and they provide an interesting contrast to highways.

A second caveat is that, even though the chapter is focused on the franchising of transportation infrastructure projects, it does not analyze the transportation policies followed during the nineties. This limitation may be relevant in the case of *urban* highways, where we do not compare the merits of promoting public transportation with the desirability of increasing available infrastructure.¹⁵

The rest of the chapter proceeds as follows. In section 2 we discuss the economics of infrastructure franchises. Section 3 presents the Chilean highway concessions program. Section 4 discusses the privatization of ports. Section 5 concludes.

2 THE ECONOMICS OF INFRASTRUCTURE FRANCHISING¹⁶

This section sets up the conceptual framework used below to evaluate the infrastructure reforms carried out during the Concertación administrations. As mentioned in the introduction, the main regulatory innovation introduced during these administrations is the periodic auctioning of infrastructure concessions as a means of privatizing and introducing competition. For this reason, this section begins with a brief discussion of the basic economics of auctions and franchises.

2.1 The regulation of monopoly power via franchising

One of the main difficulties in privatization occurs when the project is a natural monopoly or, worse, when the government legally ensures a monopoly to the privatized firm. Substituting a public monopoly for a private one could even reduce social welfare, especially when the firm has good lobbying power. Thus, one of the main concerns of governments when privatizing should be to avoid selling off a monopoly, or, if the latter is inevitable, to set up an adequate regulatory framework.

There are in principle three ways of regulating or eliminating monopoly power. First, technological innovations may render a competitive market possible, as in the case of electricity gen-

¹⁵For more details on this issue see the document prepared by the Sociedad Chilena de Ingeniería de Transporte (1998).

¹⁶This section builds on our work cited in the references and on Klein (1998). We refer the reader to these sources for more details.

eration. Under these circumstances little intervention by the regulator is needed beyond creating market-like conditions. Second, firms may periodically compete for a franchise, as in the case of highways. In this case the regulator has a more active role, setting and enforcing both tolls and quality standards. And thirdly, the service associated with the infrastructure may be provided by a standard regulated public utility.

As is well known, there are compelling arguments against direct regulation. By now there is widespread agreement that regulated firms have better information about relevant cost and demand parameters, which makes it hard for the regulator to extract their monopoly rents and enforce quality standards (see for example Laffont and Tirole [1993]). Moreover, regulatory institutions are often “captured” by the firms it is supposed to regulate. Last, because regulatory institutions answer most of the time to multiple principals, their incentive schemes tend to be weak (see, for example, Dixit [1996]). These problems are exacerbated in Chile (and most developing countries) because regulators are neither independent from political authorities nor accountable to the general public, and moreover, courts have little expertise in regulatory matters (see, for example, Bauer [1998]). For these reasons, competition should discipline the provision of infrastructure whenever feasible.

Unfortunately, when the provision of a particular type of infrastructure is subject to scale economies, it is not possible to create a competitive market. But in many cases some competition can be introduced by periodically auctioning the franchise. This is what Chadwick (1859) called competition *for* the field, as a substitute for competition *in* the field. The reasoning, which was made popular by Demsetz (1968), is that competition for the franchise will dissipate economic rents and transfer them to users. This principle has been present in the main regulatory reform introduced by the Concertación administrations, the privatization of infrastructure projects via limited-term franchises adjudicated in competitive auctions.

One might argue, based on the limitations faced by direct regulation, that periodic auctions achieve rent extraction more effectively than regulated utilities. The problem with this argument is that a franchise establishes a long-term relationship between the franchise holder and the regulator. They are subject to Williamson’s “fundamental transformation,” from a competitive auction into a bilateral monopoly between the regulator and the franchise holder, since assets are sunk and it is very costly for the government to switch supplier. Thus, the bidding mechanism must be designed so as to reduce the likelihood of opportunistic renegotiations. Attention must be paid both to avoiding regulatory capture by the franchise holder and to the possibility of creeping expropriation by the government (for example, by fixing low user fees after investments have been made).

While the periodic reauctioning of the franchise dissipates rents, some regulation is inevitable. First, whenever substitution on the user side is difficult (the typical case when the franchise enjoys monopoly power), the franchise holder has clear incentives to deteriorate the quality of service.¹⁷ This incentive is even stronger when some sort of price-cap regulation is used to fix prices. Second, since the franchise will be reauctioned periodically, current franchise holders may not have the incentives to adequately maintain assets—this problem becomes particularly acute as the end of the franchise term approaches. The enforcement of quality standards is not always easy or forthcoming. Regulators usually face the lobbying pressure of firms to be lenient, and, when they are not independent from political authorities, are likely to be weak.¹⁸ Moreover, in many cases it is not straightforward to define objective standards and to measure them—information is asymmetric.

2.2 Risk, government guarantees, and renegotiations

A second pitfall observed in Chile and many other countries, is that franchising is often coupled to taxpayer-financed insurance against risks for the franchise holder. The risks insured against are typically demand risk, construction and maintenance risk, and policy risk (see Box 2.1 for a description). One reason why firms ask for guarantees is that by this means they can unload a large fraction of demand risk. This risk is large, since making accurate demand forecasts, even in a medium term horizon, is extremely difficult. Firms are unable to diversify these risks, possibly due to agency problems involving prospective financiers. As we argue below, the right way of dealing with this problem is by choosing the appropriate auction mechanism. A second source of the demand for guarantees is construction and maintenance risk. Here, firms often press for cost-sharing agreements with the government.

BOX 2.1 (Risks faced by a franchise holder) ¹⁹

With a typical franchise contract, where the franchise term is fixed in advance, and in the absence of government guarantees, the franchise holder faces the following risks:

Demand risk. This risk arises when demand forecasts are unreliable, which happens most of the time. Demand forecasts are based on estimates of the macroeconomic cycle, which are tied to

¹⁷Note that in a competitive market where users have alternative providers, firms will provide the “right” price-quality combination.

¹⁸When objective standards can be defined, quality enforcement may be subcontracted to private firms. Yet this raises the problem of providing adequate incentives for these firms. Since a concessionaire’s savings from lax enforcement are considerably larger than the profits any such firm may expect, this problem is far from trivial.

¹⁹Based on EFG (1997e).

the aggregate performance of the economy, and on estimates of microeconomic conditions, which reflect local demand fluctuations. Box 2.2 shows that both sources of demand risk are important in Chile. Demand risk may also be due to uncertainty on the changes in the income-elasticity of demand for motor vehicles and on uncertainty about the toll rate elasticity. Either of these sources of risk may throw off demand forecasts, which are usually inaccurate in the short term (three to five years) and all but useless in the long term.

Construction and operating risk. Construction and operating risk exists because the costs of building and maintenance generally differ from projections.

Policy risk. Many private infrastructure projects are subject to policy-induced risk, which may take two forms. Actions by different government agencies may unintentionally affect the profits of the franchise. A tightening of monetary policy by the central bank, for example, may cause a recession that significantly reduces demand growth, or a change in environmental standards may require additional investments. In these cases the government is not acting opportunistically, since these policies are desirable despite their negative impact on the profitability of the franchise.

A second class of policy risks occurs when the government implements policies which affect the profitability of the franchise holder without increasing overall welfare. The government may build or expand infrastructure that competes with the franchise and charge subsidized user fees, for example, or it may reduce user fees in response to political pressures.

Distinguishing between both kinds of policy risk may be difficult in practice. It is also sometimes difficult to distinguish between demand and policy risk, since many kind of policy decisions can affect demand. ■

BOX 2.2 (Demand Uncertainty in Chile) ²⁰

Table 1 shows the increase in the number of motor vehicles paying tolls during the past decade in three of the main tolled roads in Chile.²¹ Since tolls remained approximately constant (in real terms) during this period, fluctuations in growth rates are due mainly to demand fluctuations. Macroeconomic risk is reflected, for example, in the fact that vehicle flows grew much faster during 1988 than during 1990. Microeconomic risk is apparent in most years: the growth of vehicle flow fluctuates considerably around the annual average from one tollbooth to another. ■

²⁰Based on EFG (1996).

²¹The rates correspond to the growth in the flow of vehicles from one year to the next. For example the vehicle flow through the Angostura tollbooth in 1987 was 8.8% above that in 1986. These flows are representative, covering the three busiest highways near Santiago.

Government guarantees can be both explicit and implicit. For example, an explicit demand guarantee that is common in practice is when the franchise holder is assured yearly levels of toll income, which are specified in the franchise contract. If toll revenue is insufficient to generate these incomes, the government provides the difference.²² Another explicit guarantee that is used often is when the government pays a preestablished fraction of cost overruns. Implicit guarantees surface after renegotiating the original contract, typically when franchise holders run into financial trouble.

Explicit government guarantees have undesirable consequences that may offset the benefits of franchising (vis-a-vis the traditional approach described the introduction). First, they reduce the incentives of firms to perform efficiently. For example, if the government accepts to bear cost overruns, firms will have little incentives to control them. Or, in the case where the government guarantees a level of toll income, they weaken the incentives to screen projects for white elephants, because firms do not bear the costs of investing in bad projects; the more generous the guarantee, the more likely are white elephants. Second, although franchising reduces current government expenditures, guarantees shift obligations to future periods and administrations. These contingent liabilities are seldom valued, and they are typically not included in the year-to-year budget or counted as government debt. As a result, they are not subject to scrutiny.

Implicit guarantees, which emerge when the franchise contract can be renegotiated ex post, share these undesirable properties, while adding additional problems. Perhaps the most important one is that they create incentives for firms with good lobbying skills to underbid more efficient firms in the expectation of renegotiating the terms in their favor in the future. This may prevent the most efficient firm from winning the franchise. A commitment by the government to let the franchise go bankrupt would prevent this outcome, but there is no certainty that this will occur in Chile (or in other developing countries), since the government has repeatedly shown its inability to withstand pressures from interest groups.

2.3 Guarantees and externalities

There is a role for government intervention when the externalities associated with the infrastructure project lead to positive net social benefits but negative private benefits (see Box 2.3 for an example). A subsidy just large enough to make the project attractive to private investors would allow the project to be franchised as usual. The incentives to screen the private profitability of the project

²²This guarantee also serves as partial insurance against policy risk.

would remain in place, although the firm's value at risk would be smaller than if it had to finance the project itself.²³ Subsidies have the additional advantage of running through the normal budgetary process, so that they must compete with other items on the government's agenda. In comparison, demand guarantees normally face no such screening and lead to potential liabilities for future administrations.

BOX 2.3 (Subsidizing some sections of the Panamerican-Highway) *The Chilean government divided the Pan-American Highway, which runs through the country from north to south, into eight sections, which were auctioned separately. Motivated by the externalities associated with decentralization (and possibly also by political considerations reflecting the disproportionately large representation in the Chilean Congress of sparsely populated regions), the government designed the concession program so that similar tolls are levied in the eight sections, despite big differences in traffic flow. In low traffic volume sections, which are unattractive to the private sector, the government offers an up front subsidy to the winning firms. These subsidies are expected to be financed by fixed payments to the government from the holders of the sections with high traffic volumes. ■*

Guarantees may be justified in the early stages of the franchising process. Initial franchise holders generate learning externalities about the long-run viability of the system. In this case a contingent subsidy paid only if the franchise business is not viable provides adequate incentives and compensates initial franchise holders for the learning externalities they generate. These guarantees should be phased out as soon as learning externalities are exhausted. Moreover, before guarantees are provided their aggregate value at risk should be estimated and subject to standard budgetary approval procedures.²⁴

2.4 The insurance-quality trade off and the choice of an auction mechanism

As mentioned above, one of the main reason why firms demand government guarantees is that demand forecasts are very imprecise. Since typically the franchise length is determined before the franchise begins, this implies that demand over the franchise term can vary over a wide range. However, in many cases there is little doubt that if the franchise lasts long enough, the project would be profitable. For example, it may be impossible to tell whether the highway between

²³Value at risk refers to the largest loss with a probability higher than a prespecified value.

²⁴Value at risk (see preceding footnote) is more appropriate than the expected cost of the guarantee because guarantees present a problem under adverse economic conditions for the country as a whole, when guarantees on several projects are called simultaneously.

Santiago and Viña del Mar will generate enough toll income to cover investment and operation costs in *exactly* 10 years, but it is quite certain that the project will cover its costs over *some*, as of yet unknown, horizon that does not extend beyond 20 years. Elsewhere (see EFG [1996, 1998b]) we have shown that this fact can be exploited to design a *variable* term contract that eliminates most of the demand risk borne by the franchise holder, and also dissipates all rents. This contract can be implemented in a simple auction—a least-present-value-of-revenue (LPVR) auction. In it, the regulator fixes user fees and announces a discount rate,^{25,26} and then the franchise is awarded to the firm that asks for the least present value of tariff revenue. The franchise ends when the present value of user fee revenue is equal to the winning bid.

It can be shown formally that an LPVR mechanism achieves a risk-sharing outcome that is always Pareto-superior to that achieved by any other conceivable mechanism, including fixed-term franchises (see EFG [1998b] for the proof). However, it is well known from principal-agent theory that it may not be optimal to give full insurance to the franchise holder when his actions affect the level of demand—he may need to bear some risk in order to provide incentives for the provision of an adequate quality of service. Thus, there is a fundamental tradeoff between insurance and quality of service.

The terms of this tradeoff depend on the type of infrastructure that is franchised. One extreme is the case of highways, where the differences between competing designs are small (given the pre-planning procedures in Chile), there is little that the franchise holder can do to influence demand, and objective quality standards can be set, measured and enforced if the regulator is willing to do so. In that case, the franchise contract should seek to eliminate demand risk, and an LPVR auction is optimal.^{27,28} The other extreme is well exemplified by our second case study, ports. There one of the main virtues of privatization is that it takes advantage of the creativity of private firms both in designing the port and in managing it.²⁹ Both tasks are complex and it is difficult to define and enforce objective quality standards on a long term franchise contract. Moreover, quality of service has a significant effect on port users. Thus, the franchise contract should not provide full insurance

²⁵Section 2.6 argues that, in contrast with fixed term franchises, LPVR contracts allow for considerable flexibility in setting user fees.

²⁶The discount rate should be a good estimate of the cost of funds faced by franchise holders and could be variable (such as LIBOR plus some fixed risk premium).

²⁷This is the case considered in EFG (1998).

²⁸A case in which LPVR is appropriate are water reservoirs. The government is planning to use LPVR auctions to auction the construction of water reservoirs. See “Definen las Tarifas para Concesión de Embalses”. *El Mercurio*, February 7, 1999.

²⁹There are cases in which the short term infrastructure expansion path for the port is known, and in this case, as we shall see later, a combination of LPVR and a demand responsive auction system is appropriate.

to the franchise holder, because it would blunt incentives to be responsive to the needs of users.

Choosing along the insurance-quality tradeoff can sometimes be avoided altogether, as when an infrastructure project can be unbundled into separate parts, one that captures the advantages of demand risk reduction and another that provides adequate incentives to stimulate demand.³⁰ For example, the construction of the landing strip of an airport can be auctioned with an LPVR scheme, while the franchising of services provided at the airport is done via a standard fixed term franchise which provides strong incentives to attract demand.

2.5 Simplicity

A desirable property, both of a franchising contract and the corresponding auction design, is that they be simple. A cursory examination of the mechanisms used to auction franchises in different countries shows that this principle is often ignored. The shortcoming of complex mechanisms is that they depend on many variables, which makes them difficult to analyze and can lead to complaints of evaluator bias. Multifactor point rating systems are commonly used. In order to reduce the scope for evaluator subjectivity, these factors should be quantifiable. However, since the weights assigned to different factors are to some extent arbitrary, they can lead to unanticipated outcomes, thereby increasing uncertainty. Furthermore, complex contracts are not transparent, and this widens the regulator's discretionary scope and the franchisee's scope for opportunistic behavior. These arguments suggest that the choice of the winner should depend on a single variable. Many of the problems associated with a complex auction design are illustrated with the case of the first project auctioned under the Chilean franchise program (see section 3.1).

Regulators are usually led to complex designs in an effort to satisfy the different interests with stakes in the franchise. For example, planner's offering demand guarantees may link them to profit sharing between the state and the franchise holder, thereby seeking compensation for the guarantee if the returns exceed a predetermined limit. This makes it difficult for potential bidders to estimate the value of a project and requires sophisticated monitoring.

Another problem with complex contracts is that supervision is more difficult and there may be a lack of coherence between different provisions of the contract, making renegotiations more likely. Furthermore, complex contracts hinder the public's ability to understand what has been awarded in the auction, thereby weakening public oversight of the regulator and increasing the likelihood of regulatory capture.

³⁰See EFG (1997c) for details.

2.6 Flexibility

Franchise contracts in developing countries tend to lack flexibility. This is necessary to reduce “creeping” (or even outright) expropriation of the franchise holder, and to reduce the power of corrupt regulators to favor franchise owners at the expense of the public. However, there are circumstances when inflexibility may be very costly to society. In particular, an attractive characteristic of a franchise contract is that it should be easy to calculate fair compensation for breach of the original contract. Consider the case in which the project must be expanded or rates must be increased for efficiency reasons. How are the expansion costs to be divided between the franchise holder, the government and users? How much of the additional income from user fees is to be appropriated by the franchise holder?

In such cases, two options are open to the planner. One is to renegotiate the original contract, which this carries with it all the problems of bargaining in a bilateral monopoly situation. The second option is to cancel the concession and pay a fair compensation for the profits foregone by the franchise holder. The problem with the second option is that the fair compensation is the expected present value of future profits had the concession continued under the original terms. Often this figure cannot be deduced from accounting data and is highly subjective, making endless disputes a likely outcome (see Box 2.4 for an example) .

BOX 2.4 (Compensation dispute over termination of airport concessions in Argentina) *The government of Argentina announced early 1997 that it wanted to end the present airport franchises in order to reauction them under new terms. To do so the government had to compensate the present franchise holders. According to the former Economics Minister Domingo Cavallo, government employees, swayed by the franchise holders, wrote a decree that provided compensation of \$400 million—ten times his estimate of a fair compensation (El Mercurio, 6 February 1997). ■*

The issue of flexibility also arises when setting user fees. To reduce risk it is advisable to specify the schedule of user fees (in real terms) before the franchise begins. Yet this often leads to fees that ex post turn out to be very inefficient. For example, in the case of an urban highway which is franchised for a 20 year period, the high demand uncertainty discussed earlier implies that user fees set in advance will almost surely lead to either inefficiently high levels of congestion, or to politically untenable levels of underutilization.

LPVR franchises are more amenable to changes in user fees than their fixed term counterparts, since tolls may vary substantially without affecting the franchise holder’s present value of user fee

income.³¹ In the urban highway example, a LPVR contract could stipulate that tolls will be reset every year, by an independent agency/commission, so that users optimally internalize congestion costs imposed on others.³²

2.7 A common misconception

To end this section, we briefly comment on a common misconception that has become commonplace when thinking about franchising of infrastructure projects. It is important to stress that the purpose of competitive auctions is to dissipate rents by transferring them to users. This follows from the more general principle that regulation should ensure firms a *normal* rate of return. In Chile (and in many other countries) it is quite common to hear claims that “projects must be made attractive for the private sector,” which can be interpreted as the idea that one of the goals of privatization should be to transfer rents to private firms. This is clearly wrong. For example, one of the ways of achieving this transfer would be to grant the franchise holder monopoly power, which runs counter to all known welfare principles. Another would be to grant explicit or implicit guarantees against commercial risks, which, as we discussed earlier in this section, is also undesirable. The main purpose of franchising and privatization is to get socially worthwhile projects done, not to create business opportunities per se or transfer rents to firms.³³

3 HIGHWAY FRANCHISING IN CHILE³⁴

The main privatization program introduced in Chile during the *Concertación* administrations is the franchising of highways. Traditionally, roads have been viewed as public goods to be provided by the state. But it was evident by the time the *Concertación* took office that highway construction

³¹Profits are affected, since the franchise term determines maintenance and operational costs, but these costs are usually much smaller than construction costs.

³²Discretion in toll setting may be limited by fixing a lower and upper bound (in real terms) on possible tolls.

³³A more charitable interpretation of MOP’s desire to make projects more “attractive” is that by making projects seem more attractive, additional firms will be interested in participating in the auction for the franchise, increasing the degree of competition, which eliminates any potential rents from making the project more attractive. According to this interpretation, the management of a firm that wants to participate in an auction prefers a more attractive project as this will make participation more likely to be approved by the company board. It is easier to defend to shareholders the losses in a project in which there are many bidders than one which was so unattractive that there were few participants.

³⁴For other papers covering some of the topics considered in this section, see EFG (1996, 1997a, 1997d), Fischer (1995), Gómez-Lobo and Hinojosa (1999) and Mognillanski (1997).

in Chile had not kept pace with overall economic growth, and that existing roads had become patently deficient: many were too small and very congested, and their overall quality was low. For example, between 1980 and 1994 the stock of motor vehicles doubled, while the rate at which roads were being paved decreased from 350 kilometers per year between 1955 and 1970 period to only 150 kilometers per year during the following two decades.³⁵ Table 2 shows that between 1986 and 1993 the kilometers of paved (concrete and asphalt) roads grew by 25.8%, well below demand growth. Furthermore, Table 3 shows that 45% of paved roads were in “regular” or “poor” conditions in 1993. It is therefore not surprising that average traffic speeds decreased substantially over the last decades. For example, the average speed of a vehicle in Santiago decreased from 37.4 km/hr in 1977 to 24.6 km/hr in 1991. For this reason, since 1993 the government began divesting Chile’s main highways, which are now built, financed and operated by private firms. In exchange, these firms have the right to collect tolls for a limited term, typically between 20 and 30 years. As mentioned in the introduction, this scheme goes by the name of Build-operate-and-transfer contracts—BOT in short. In this section we describe the main features of this program and discuss its main virtues and defects.

3.1 Brief description of the franchise program

In 1991 congress passed a law that allows the state to franchise almost any public work including roads, ports and airports.³⁶ In contrast to what occurs in many countries, where contracts are negotiated bilaterally, in Chile 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 be any of the following (or a combination thereof): 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.³⁷

Private firms or individuals can propose projects and MOP can reimburse the proponent for the costs associated with preparing the proposal or a fraction thereof. The project is evaluated by MOP using a fast and simple procedure and the proponent receives a bonus at the auction when the idea

³⁵Figure 3 in Acevedo and Errázuriz (1994) makes this point without the need of words.

³⁶DFL 164 and DS 240, 1991.

³⁷The last two tendering variables were added in a modification of the original law approved by Congress in 1995.

is adopted. So far, there are two roads that have been proposed by private firms and franchised, the access road to Santiago's main airport and the *Autopista Los Libertadores* (route 57) which joins Santiago with the city of Los Andes. In both cases the winner of the auction was the firm that proposed the project. In addition, projects to modernize four regional airports (Concepción, Calama, Puerto Montt and Iquique) were proposed by private firms. To date 135 proposals have been filed by private firms. 100 have been rejected, 35 have been studied and 9 approved. (The source of this information is MOP).

The law establishes that the concessionaire must build the project within the time limits established in the tendering process, and must maintain its quality, giving an uninterrupted service of a quality consistent with his winning bid. MOP checks the construction and operation of the project, and is allowed to fine, suspend or even terminate the concession should the franchise holder fail in complying with his obligations. The law also establishes a dispute resolution mechanism to review conflicts between the state and franchise holders.³⁸ Both the government and the franchise holder may take a case to the Conciliatory Commission. This commission is composed of three members, one nominated by each party and one nominated jointly by both parties.³⁹ If the Conciliatory Commission is unable to mediate between both parties, the concessionaire can choose between taking the case to the courts, or requesting that an Arbitration Commission be established. Decisions by the Arbitration Commission, which is composed of the same individuals as the Conciliatory Commission, are binding and cannot be appealed at the courts.

The original list of roads and timetable of auctions has been altered repeatedly. Nevertheless, projects that have or will be put to tender can be classified into four groups (see also Table 5):

- the Panamerican Highway (Ruta 5) from La Serena in the north to Puerto Montt in the south, which was divided into 8 segments and extends over approximately 1500 kilometers;
- several highways joining Santiago with nearby cities (e.g., Los Andes, San Antonio, Valparaíso);
- a number of local roads (e.g., Camino de la Madera, Nogales-Puchuncaví, Acceso Norte a Concepción);
- three urban highways in Santiago: the Americo Vesputio Beltway, the Costanera Norte highway and the North-South axis.

³⁸The remainder of this paragraph is based on Gómez-Lobo and Hinojosa (1999).

³⁹All members are nominated soon after the franchise is awarded and therefore long before any dispute arises.

The program was launched in 1993 with the 23-year long El Melón tunnel franchise. The auction mechanism used was unnecessarily complex.⁴⁰ 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.⁴¹ 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 upon the basis of the annual payment to the state, which is inefficient, as we show below. 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 (see Table 5). 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 to keep tolls per kilometer within a narrow band in all of the Panamerican highway (see Box 2.3 for details), most segments of this route were auctioned using a mechanism that made firms compete first on tolls and then, when a preestablished lower bound was reached, for either the shortest franchise term or a yearly payment to the state (that was legally/politically justified under the name of “payment for preexisting infrastructure”). Moreover, some segments, which were thought to be privately unprofitable, were awarded subsidies. Last, Route 68, which joins Valparaíso with Santiago, was franchised using a LPVR auction (see Box 3.1). It would seem that in most cases tenders were reasonably competitive, since with few exceptions, the number of bidders was between three and six (see Table 5 for details).⁴²

BOX 3.1 (First LPVR auction) *The first road franchised with an LPVR auction is the Santiago–Valparaíso–Viña del Mar concession, which was auctioned in February of 1998.⁴³ The project 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*

⁴⁰Section 2.5 stresses the importance of having simple auctions and franchise contracts.

⁴¹Some of the variables were included only to satisfy legal constraints.

⁴²This statement is based on the assumption that a larger number of bidders implies that collusion is less likely.

⁴³Even 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 a LPVR franchise. See EFG (1997e) for details.

grounds. A government minimum traffic guarantee was 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—the winner declined the guarantee. Bidders could choose between two real rates to discount their annual incomes: either a fixed rate of 6.5% or a variable 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.⁴⁴ One possible explanation for this outcome is that the risk premium (and hence the discount rate) was too high, neglecting the fact that LPVR auctions substantially reduce risk faced by the franchise holder.

It is also interesting to mention that, beyond the pressure exerted by the Ministry of Finance (see Section 3.3 below), the main reason why MOP decided to use the LPVR mechanism is that in this case it is easy to define a fair compensation should MOP decide to terminate the franchise early (see Section 2.6). This is an important feature of LPVR since MOP estimates that at some moment before the franchise ends, demand will have increased sufficiently to justify 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. ■

As can be seen from Table 5, 15 interurban highways were either in operation, under construction or had been awarded by the end of 1998. An estimated US\$3.3 billion will be invested in these roads, a considerable sum when compared with MOP's annual budget of US\$800 million. Most highways are in the hands of either Mexican or Spanish firms. The urban program, however, has been repeatedly postponed, and the first franchise has yet to be auctioned (see Box 3.2).

BOX 3.2 (The Failed Auction of the Costanera Norte Urban Highway) ⁴⁵

The 30 km-long Costanera Norte is the first urban toll road that will be built in Chile. It will join Santiago's downtown with three high-income municipalities in the eastern part of the city. After several postponements and protracted negotiations between construction companies, MOP and the Ministry of Finance which lasted almost three years, it was put to tender at the end of 1998.

⁴⁴The former was \$374 million while the latter was \$379 million.

⁴⁵Based on Thomson (1999).

The (estimated) US\$400 million project was auctioned under an LPVR contract. The franchise holder would receive a minimum traffic guarantee equivalent to 80% of the project's estimated cost and a reimbursement of 85% of all toll income that users fail to pay (electronic tolling in urban concessions make compliance an important issue). Only one firm bid in the auction but it was disqualified because its offer did not comply with the rules set up by the MOP. The other potential bidders declined to participate claiming that the project was unattractive because guarantees were set too low.

Apparently, the main problem with the project is that it was initially designed to cost around US\$ 180 million. However, the cost of the project increased substantially after pressure by environmentalist groups and neighbors forced MOP to raise environmental standards and modify the original design. An additional problem cited by the firms was that risks were much larger in the urban case, in particular: (i) the existence of untolled substitute routes makes it even more difficult to forecast demand; it also limits the maximum toll that can be charged without inducing substitution toward untolled alternatives; (ii) policy measures adopted by municipalities and other government agencies can affect traffic flows; (iii) electronic tolling makes it more difficult to enforce payment⁴⁶; (iv) opponents of the project (e.g. environmental groups, neighbors) may go to the courts to delay the project.

The Cámara Chilena de la Construcción, an association of big construction companies, lobbied for higher guarantees and insurance against unpaid tolls. One reason why the auction was delayed so often is that the Ministry of Finance was reluctant to provide guarantees and subsidize the project. This ministry argued that risks could be reduced substantially by adopting an LPVR auction. The second reason why the auction was delayed is that grass root organizations and environmental groups agreed to organize a public opinion campaign against the project.

After protracted negotiations, MOP finally settled for an LPVR auction. Nevertheless, firms argued that a variable-term contract did not provide enough insurance, and the Cámara threatened that they would not participate unless the rules were changed so as to make the project financially attractive. In fact, the only firm which bid in the failed 1998 auction was not a member of the Cámara. One reasonable interpretation of this failure to award the franchise is that LPVR successfully detected a white elephant, which is a possibility, given that the projected cost of the project increased more than 100%.

⁴⁶As of yet, not paying a toll is not penalized. Tolls are paid because toll booths are equipped with red traffic lights. Crossing a toll booth without paying is equivalent to running a red light, hence a punishable offence. This strategy is not applicable to electronic tolling, so the legislation may need to be modified in the future.

In May of 1999 the Minister of Public Works announced several changes that would make the project financially more attractive. Among these are: (i) the State will invest US\$ 80 million in bridges, river defenses and parks, thus effectively reinstating subsidies that were initially ruled out by the Ministry of Finance; (ii) minimum traffic guarantees will not depend on the number of cars that use the road but on those that pay, thus weakening the franchise holder's incentives to collect tolls; (iii) firms participating may propose changes to the design of the project. The project is expected to be auctioned by the end of 1999. ■

With the exception of Ruta 68, franchises share two key characteristics. First, their duration was fixed before construction began, so that the term cannot be adjusted to demand realizations. Thus, Chile overwhelmingly adopted fixed term franchises. Second, they were awarded with generous “minimum income guarantees.” In essence, these guarantees ensure that taxpayers cover the difference should traffic fall below a certain yearly threshold specified in the contract. These thresholds were calculated so as to ensure that the franchise holder recovers at least 70% of estimated investment and operation costs. In each case MOP had to announce its cost estimate before the auction. It has been common for firms to argue that guarantees are insufficient and to press for higher cost estimates.⁴⁷ As argued below, these guarantees are one of the main weaknesses of the Chilean highway program.

3.2 Evaluation

3.2.1 The regulatory framework

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. Most of the credit for this feature can be attributed to reforms implemented in Chile since the mid-seventies. These reforms have 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 of MOP (see below). Yet the legal framework put in place for the concessions program does have important additional provisions to dispell fears of expropriation. For example, we argue shortly that the dispute resolution mechanism is biased in favor of the franchise holder, possibly beyond what is necessary to protect his property rights.

⁴⁷If guarantees are excessive because the estimated investment and operations cost are overestimated, the franchise system no longer perform its role as a filter against projects that are white elephants.

A second virtue 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, by providing a degree of transparency that would be absent if the concessionaire could be chosen by the government based on bilateral negotiations, as is still the case in many countries.

A third virtue of the Chilean toll roads program is that no cost sharing agreements between the state and the franchise holder have been used. Thus, except in a few particular instances, cost overruns are paid in full by the franchise holder. It is well known that cost-sharing agreements lead to cost overruns when information is asymmetric, and this pitfall has largely been avoided.

In order to attract a larger number of bidders, reduce the scope for ambiguity in the franchise contract and lower the costs of participation, MOP introduced a *prequalification procedure* (proceso de precalificación) in 1994 which takes place before firms make their bids.⁴⁸ During this procedure, MOP presents a detailed construction schedule and preliminary engineering studies of the project. Firms participate actively, posing questions and making suggestions. This procedure reduces duplication of expenditures by bidders; furthermore, by lowering firms' costs of preparing their tenders it increases the number of bidders. This procedure also reduces uncertainty for the concessionaire, since incomplete projects are likely to involve unexpected investments and costly changes to the original project (see, for example, Box 3.2). One possible caveat for such a procedure is that it may facilitate collusion among bidders.⁴⁹ Also, it may be expected to limit the scope for creative designs by bidders. However, the experience with Costanera Norte suggests that having a *precalification procedure* is particularly useful in the case of urban highways.

MOP has a long experience in auctioning projects to private contractors, with the winner being the firms that asks for the smallest lump sum payment.⁵⁰ The winner receives partial payments after completing specific phases of the project. Delays in completing these phases are fined. Under this scheme independent monitoring firms supervise compliance with construction standards. Furthermore, the winner posts bonds that guarantee the quality of the project for a long period (e.g., 10 or 15 years). Generally MOP does not renegotiate the conditions in the original contract, though there is some flexibility in contract terms related to building bridges and tunnels. There is little doubt that previous experience with subcontracting has enabled the ministry to be an efficient

⁴⁸See also Fischer (1995) and Gómez-Lobo and Hinojosa (1999).

⁴⁹In EFG (1996a) we briefly mention the contributions that economic science can make to reducing the possibility of collusion.

⁵⁰This is what we referred to as the "traditional approach" in footnote 8 in the introduction. The remainder of this paragraph is based on Fischer (1995).

regulator in the construction phase.

As argued by Gómez-Lobo and Hinojosa (1999), the dispute settlement procedures contemplated in the Chilean Concessions Law can be improved. First, a time limit should be set for the Arbitration Commission to reach a verdict. Second, the period between the moment when a grievance occurs and when it is brought to the Conciliatory Commission should be limited. Third, the procedure is biased against the State, since it is the concessionaire who chooses between the Arbitration Commission and the courts. Furthermore, he makes this choice knowing how the members of the Arbitration Commission acted as members of the Conciliatory Commission. Finally, the resolution procedure lacks clear guidelines for arriving at its decisions. So far its rulings have tended to “average” the proposals of both parties, which gives perverse incentives for future cases.⁵¹

3.2.2 Government guarantees

While there have been marked improvements over similar programs abroad, not all mistakes have been avoided. The main shortcoming of the Chilean highway program is that of fixed-term franchises and their handmaiden, guarantees against commercial risks. In view of the results of the Route 68 auction, MOP’s insistence on fixed-term franchises is hard to justify. MOP has argued that variable-term franchises are inconvenient because financiers—domestic and foreign—are not willing to make variable-term loans.⁵² But, as shown in EFG (1997d), this is not correct: any stream of payment that can be met under a fixed-term contract can also be replicated under a variable term franchise while substantially reducing the likelihood of default. Moreover, it is known that several large scale private infrastructure projects have been undertaken in Britain under systems similar to LPVR.⁵³ These projects have been completely financed with debt, using no capital.⁵⁴ A plausible explanation for the ministry’s opposition to LPVR is that construction firms and franchise holders dislike the system, for reasons to be discussed below.

There might be a substantial loss in welfare from not using variable term contracts. In previous

⁵¹For example, in one of the two cases settled so far (La Madera Road) the dispute was regarding whether 2 Km. of road were part of the original concession or not. MOP argued that the stretch was part of the original contract and that therefore the firm was responsible for its maintenance. The firm argued otherwise. The Conciliatory Commission was unable to produce an agreement and the case was taken to the Arbitration Commission, which ruled that MOP must compensate the firm for 50% of the maintenance and other costs. See Gómez-Lobo and Hinojosa (1999).

⁵²See also Klein (1997).

⁵³See EFG, “El Puente sobre el Río Tamésis”, *El Mercurio*, June 14, 1997, page D4.

⁵⁴These are the Queen Elizabeth II Bridge, that crosses the River Thames at Dartford, and the Second Severn Crossing bridge on the Severn estuary at the English Stone site. See EFG (1997e) for more details.

studies, EFG (1996, 1998b) have estimated that the reduction in the cost to users, due solely to the reduction in risk premium, is equivalent to one-third of the investment cost—around US\$1 billion given the size of the Chilean toll road program.

As mentioned before, guarantees are a contingent liability assumed by taxpayers. While substantial, guarantees granted to toll road franchises have not been valued, and their possible impact on future budgets has not been estimated. Moreover, the studies made by the MOP that set the levels of guarantees are not public, and have not been subject to independent scrutiny.

It is hard to tell to what extent guarantees have increased the likelihood of white elephants. There is even some evidence that despite guarantees, a few white elephants may have been avoided, since some projects were abandoned when it became evident that the auction would not attract any bidders. For example, the “La Dormida” highway, which would have joined Valparaíso with Santiago, thus competing with Route 68, was cancelled.⁵⁵ Nevertheless, in almost all cases insurance has been provided for free, and it is telling that in the one case where MOP chose to charge for it (Route 68), the winner declined the offer.

3.2.3 Renegotiations

The international experience also suggests that fixed-term contracts are usually renegotiated when franchise holders run into financial trouble. What about the experience in Chile? So far no important renegotiations have taken place. There have been repeated pressures to renegotiate the El Melón tunnel franchise, where the winning firm offered an annual payment that turned out, in retrospect, to be too high. The franchise holders has argued that it would be beneficial to society to lower both the toll and the payment to the government.⁵⁶ So far the Ministry of Public Works has opposed a renegotiation, mainly to avoid setting a precedent. But it is still too early to say whether its backbone will be stiff enough to resist the combined pressure of many franchise holders, a scenario which is likely to emerge if the economy falls into a recession.

Furthermore, there have been some hints that if renegotiations occur, they will take place behind closed doors beyond the scrutiny of public opinion. This was the case with a renegotiation between the ministry and the San Antonio–Santiago franchise (Route 78) that occurred in 1998. After signing the contract, the ministry required additional works that were not in the original con-

⁵⁵It should be mentioned that the initial project was revised and costs were raised substantially. This may account for lack of interest in the project, as was the case for the Costanera Norte project.

⁵⁶Note that it is not clear how the appropriate combination of reductions in tolls and payments to the State would be determined.

tract. The franchise holder rightly asked for a compensation. The ministry finally decided that tolls would be increased for five years by 18.1% to compensate the franchise holder. No further explanation was given—public opinion learned of the agreement only after it was signed—, and the calculations made to fix the compensation were not made public.⁵⁷ It is clearly not desirable that the ministry renegotiates its own mistakes—the conflict of interest is evident.⁵⁸

3.3 The political economy of highway franchising

One of the most interesting aspects of Chile's toll road program has been its political economy. The main issue is that private firms, especially building companies, press for government guarantees. MOP, which is interested in roads being built soon, has been an advocate of guarantees and even subsidies, at times. It has often sided with private firms,⁵⁹ and claimed that guarantees are key to the success of the program. On the other hand, the Ministry of Finance, who will have to foot the bill if guarantees become due, has been less enthusiastic, and has insisted on careful evaluations of the issue. These controversies have reached the public on several occasions, as in the case of the Costanera Norte urban highway. This road will provide most of its benefits to the inhabitants of the municipalities with the highest per capita income in Chile. The MOP pressed for a US\$60 million subsidy to make the project more attractive for potential franchise holders and construction companies. This sum is not negligible considering that MOP's annual budget is approximately US\$800 million. In the end the Ministry of Finance prevailed, rejecting the subsidy and claiming that it could not be politically justified (yet see Box 3.2).

There is a close relationship between the pressure for government guarantees and the opposition of firms to LPVR auctions. As we have mentioned earlier, the LPVR mechanism makes it difficult to justify government guarantees. As argued in EFG (1997e), LPVR auctions reduce the scope for opportunistic renegotiations, which, as shown by international experience, usually benefit franchise holders at the expense of users and taxpayers. There are two reasons for this. First, renegotiations typically increase the return to the franchise holder by either extending the franchise term or by increasing tolls. Both these options are useless with an LPVR mechanism, since the term is variable

⁵⁷See "Estado compensará a privados por concesión", *El Mercurio*, July 15, 1997, page C8.

⁵⁸As Eckstein (1956, p. 223), cited in Williamson (1985), puts it politely, publicly accountable decision-makers "acquire political and psychological stakes in their own decisions and develop a justificatory rather than a critical attitude towards them".

⁵⁹For example, in the controversy over the Costanera Norte urban highway, MOP's official in charge of the highway franchising program explained that his ministry was mediating between the firms and the Ministry of Finance. See "Divergencias entre el MOP y Hacienda por Costanera Norte," *El Diario Financiero*, March 11, 1998.

by definition and higher tolls will only make the franchise end sooner.⁶⁰ Thus, almost the only possibility of renegotiation is an explicit wealth transfer from the state to the franchise holder. The visibility of such a transfer makes it hard to justify. Second, and more important, in a competitive LPVR auction the winner's bid reveals the revenue it requires to earn a normal profit. This figure is an observable benchmark, which is easy to compare with any ex post wealth transfer made to the franchise holder. For example, if the winning bid is \$100 million, and the franchise holder asks in a renegotiation for an additional \$40 million, it is straightforward for public opinion to understand that a firm that voluntarily revealed its willingness to build and operate the highway for \$100 millions is now demanding an additional \$40 million. By contrast, when the term is extended or tolls are raised, it is difficult to estimate the wealth transfer received by the franchise holder. In order to estimate the size of the transfer, the actual revenue (after the contract is renegotiated, in principle observable) must be compared with the income that the franchise would have generated if the contract had remained unchanged. The latter quantity cannot be inferred from accounting data, so the estimates of the firm and the government can differ substantially. Firms stand to win more from renegotiations when it is difficult and disputable to estimate how much they are getting.

The details of the dispute between ministries are specific to toll roads, but the controversy reflects a deeper limitation of Chile's regulatory agencies: regulation is often done by sectoral ministries, whose objectives include the promotion of their regulated activities. As Paredes (1997) has noted, experience shows that the minister for agriculture favors domestic farmers, the minister for transportation favors domestic airlines, and the minister for public works seeks to inaugurate public works. Often these ministers act as if they were representing firms within the government. In these cases the conflict between promotion and regulation becomes evident, since, as noted earlier, the latter should ensure firms only a normal rate of return.

In the case of toll roads, MOP often seeks to make projects "attractive" to construction firms, fearing that otherwise there will be no interest in the franchise. While it is important to try to attract as many active participants as possible, in order to increase the competition between prospective bidders, the government should not use this argument as a reason for making the projects so attractive (by excessively raising guarantees, for example) that the benefits of franchises are lost. In the absence of collusion, the threat of no participation should not be taken too seriously by the government. Since firms are free to enter bids as high as they deem necessary to obtain their desired level of profits, if no firm presents an offer the correct interpretation is that the project is not financially sound from a private point of view. It follows that either the project is a white elephant,

⁶⁰In the latter case the franchise holder saves on maintenance costs, but this effect is minor.

in which case it is good news for society that it will not be built, or the government should provide an explicit subsidy reflecting the difference between private and social benefits.⁶¹

It has been fortunate that the Ministry of Public Work's objective of attracting bidders conflicted with those of the Ministry of Finance, for this has forced a more independent evaluation of the toll road program. This has happened because the budget—a responsibility of the Ministry of Finance—will be affected if guarantees become effective. More generally, however, ministries can also transfer rents to incumbents via regulations or the lack thereof. These transfers are unlikely to engage the Ministry of Finance if the budget is not affected. Consequently, there has been little discussion about how franchises should be regulated and quality standards enforced. Franchise contracts implemented in Chile dictate quality standards, but their enforcement mechanisms have not been tested. Information about compliance is to be provided by franchise holders and mechanisms which enable users to complain do not exist. In each project, enforcement is carried out by a single person, the “government inspector,” an employee of the Ministry of Public Works. His exact duties and the process by which he is chosen have yet to be specified.

4 THE PRIVATIZATION OF SEAPORTS

4.1 A Brief Description of the Seaport Problem in Chile.

As Chile is a small economy open to trade, trade represents a large fraction of its GDP. Since most Chilean exports consist of natural resources and their derivatives, both of which are bulky, and Chile is geographically isolated from its main markets, a large fraction of its exports are shipped. Similarly, a large fraction of imports consists of cars, capital goods and intermediate goods such as oil, which are also shipped. Hence, seaports concentrate most of the imports and exports of the country, and represent a natural bottleneck to trade.

Since Chile has few natural bays that are suitable for deep water ports, the latter are therefore a scarce resource.⁶² In Chile, most present and potential seaports require large investments in artificial protective works and load bearing piers. A new entrant in the seaport market would need to incur substantial sunk investments, so there exist substantial barriers to entry into the sector.

⁶¹Sometimes, as in the case of Nogales-Puchuncaví, downsizing the project may make it privately attractive.

⁶²There exist some natural bays not yet developed, such as Mejillones in the Northern desert, but these lie far from urban centers and require complementary sunk investments in rail or road connections which increase the size of the project and its associated risks.

The main Chilean seaports (under state ownership) have already incurred these costs, and if this infrastructure were utilized optimally with new equipment, these ports could move much greater quantities of cargo, see table 6.⁶³

There are 10 state owned seaports and 22 private ports. These seaports mobilize three types of cargo: bulk cargo, general cargo and containers, see Table 6. Containerized cargo is projected to be the segment that will grow fastest in the future. The private ports have tended to specialize in bulk cargo, which requires small sunk investments, but also has a smaller value. The state ports move 80% of general and container cargo. Given the importance of state owned seaports, the decision to franchise the state seaports must be analyzed with care so that problems with the franchises do not harm future growth by creating inefficiencies in a vital link in international trade.

Until 1981, Chilean ports were operated by the state. Operations were extremely inefficient. There was a strong longshoreman's union, which restricted entry into the union to keep high rents, which had been obtained through crippling strikes in previous decades. Members employed non-union workers to carry out the work, paying them a fraction of the wages they received.⁶⁴ The union opposed mechanization and attempts at reorganization that would improve efficiency.

In 1981, a new law established the free entry of firms into the transfer and portage operations inside the state ports and ended the power of the longshoreman's union. The market structure that evolved was a multi-operator scheme with several firms involved (within each port) in the various internal activities. This led to a substantial increase in efficiency vis-a-vis the preexisting operation by the state. Yet by the late 90's the multi-operator scheme was showing its weaknesses. The main problem was congestion in the ports due to lack of investment in specialized cranes and other equipment, and in the failures of internal organization that obstructed optimization of seaport activities. This was specially noticeable in the container segment of the business, the fastest growing sector. The problem for the current multi-operator scheme is that the required investments are discrete (i.e., non-divisible) and it is difficult for the multiple operators to coordinate their investment and their operations to achieve efficiency.

Thus, ports became congested even though with appropriate equipment and internal organization it is possible to have large increases in capacity, see Table 7. In addition, it is important to note that ports are subject to important economies of scale, which means that ports with high volumes can lower transport costs. Even though the combined ports of Valparaíso and San Antonio

⁶³See also, Fernández, E.: "Operación portuaria y participación eficiente del sector privado", monograph prepared for Emporchi, 1998.

⁶⁴In some cases, these "*medios pollos*" would hire their own "*cuartos pollos*" to do the work on their behalf, for an even smaller fraction of the original wages.

(separated by less than 40 miles) represent the largest container port in South America (600.000 Twenty-foot equivalent units or TEUS, 65% of Chilean TEUS), they represent only 5% of the TEUS volume transferred by the large Asiatic ports such as Hong-Kong or Singapore. The low capacities of the Chilean ports raise shipping costs not only because congestion leads to long waiting times but also because the transfer operations themselves are more expensive. The higher capital costs of operating in Chile implies that shipping lines use smaller container ships, which are less efficient in operations and in transfer. The purpose of franchising the state ports is to revert this situation, by introducing single private agents into each port, who will invest in appropriate equipment and reorganize the transfer processes in such a way that the ports are used to the full capacity of the fixed infrastructure.

This explains the government's interest in franchising the state ports to a single operator, which would internalize all the externalities present in a multi-operator scheme, would invest in equipment, and would optimize internal procedures. There is a further, strategic reason that explains the haste of the Chilean government in franchising ports. Given the large economies of scale in ports, the government believes that the long run trend will be towards a small number of megaports in South America and is interested in having one of those ports develop in Chile.

The Chilean government has a program of franchising its ports under a mono-operator scheme, beginning with Valparaíso, San Antonio and San Vicente, which are three of the most important ports in Chile. The port terminals will not be franchised in their entirety: smaller terminals will remain under the previous multi-operator scheme. The other ports will be franchised in the near future. San Antonio and Valparaíso lie sufficiently close that they can compete for cargo, which helps reduce concerns about the danger of a monopoly in seaports. These two terminals dominate general and container cargo in the main economic region of Chile. The terminals to be franchised move 59% of the general cargo and 77% of the containers in their area of influence. Further to the South, the port of San Vicente is not dominant in its own area of influence since it competes with private ports; it transfers 37% of general cargo and 30% of the region's containers.⁶⁵

The objectives pursued by EMPORCHI, the state owned company that owns the state ports, with its franchise program are:

- To receive a rent that corresponds to the rental value of its assets.⁶⁶

⁶⁵Source: EMPORCHI and Cámara Marítima y Portuaria, 1997.

⁶⁶There are two reasons for this objective: first, it provides political legitimacy by making franchise holders pay for using state assets and second, it eliminates an inefficient subsidy (no payment for sunk investment) which reduces incentives for the entry of new private ports.

- To use the ports efficiently and have users pay the price that corresponds to an efficient use of the port infrastructure.
- To contribute to having a Chilean port become one of South America’s megaports.

4.2 Market Structure in Franchised Seaports in Chile

Even if we assume that the shipping industry is competitive, the fact that ports are *common carriers* implies that an integrated firm (shipper and port franchisee) can use the port to monopolize the industry.⁶⁷ Since seaports represent a bottleneck for maritime transport, they represent a strategic stage for a franchise holder interested in reducing competition in maritime transport. Box 4.1 presents a simple model, derived from Tirole (1987), formalizing this idea.

BOX 4.1 (Monopolization of a competitive shipping industry) *This example shows that a seaport monopoly operating in a competitive shipping industry obtains the same profits as a vertically integrated monopoly that combines shipping and the seaport.*

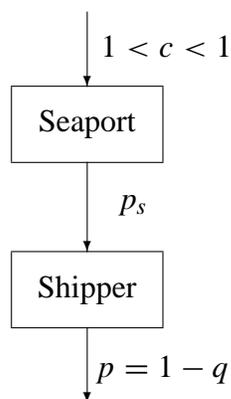


Figure 1: Vertical structure in shipping

Consider a shipping sector with zero marginal costs and a seaport with constant marginal costs $0 < c < 1$. The seaport charges the shipping companies p_s for its services. The demand for shipping services is given by $p = 1 - q$ (see Figure 1).

⁶⁷A common carrier is a natural monopoly in a required intermediate stage in a production process: oil and gas pipelines, electrical transmission lines, the local telephone service (for long distance and value added services) and airports and seaports for the transportation industry.

Competition in shipping *The competitive shipping industry sets price equal to its marginal cost, i.e., the price p_s charged by the seaport. Hence the derived demand for seaport services is $q = 1 - p$, and marginal costs are c . Setting marginal income equal to marginal costs leads to $p = (1 + c)/2$, $q = (1 - c)/2$ and profits $\pi = (1 - c)^2/4$.*

Monopoly in shipping *Assuming that the seaport is controlled by the monopoly shipper, there is no double marginalization, i.e., the port charges the marginal cost c of transferring a unit of cargo.⁶⁸ Hence, if the shipper charges a price p per unit shipped, its derived demand is: $q = 1 - (p + c)$ and solving leads to exactly the same profits, prices and quantities as before.*

■

Chile has not been fortunate in its management of common carriers. In the electric industry, the integration of the main power generator (mainly hydroelectric) with the transmission facilities has reduced competition in generation. Moreover, the second most important electrical generator has specialized on thermoelectric power so that it does not compete head on with the dominant firm and has set its plants close enough to the main consumption points so that it does not depend as much on the monopolized transmission facilities. In telecommunications, the dominant local company has been able to leverage its local telephone monopoly (a common carrier for other segments of the industry) so as to reduce the profits of its competitors in other segments of the industry (long distance, mobile phones, ISP provision, etc). This has forced several players in the market to exit while others are close to bankruptcy. The only case where a common carrier has not reduced competition in related industries is that of the Chile-Argentina Gasandes gas pipeline, in which there were two competing projects and the rules of an open access common carrier were enforced. Thus, many competitors have access to the gas carrying capacity of the gas pipelines at prices set in an *open season* with equal opportunities for all participants.⁶⁹

Another possibility is that the holder of a franchise on the port does not invest in equipment, thereby lowering the capacity of the port and implying long delays for ships. By delaying investment in equipment, a franchise holder might make bigger profits as scarcity drives up the price. In addition, there is the possibility of collusion between the few competing ports in Chile (San Antonio and Valparaíso in particular),

Given the previous experience with common carriers, one may consider eliminating this possibility through two mechanisms. One approach is to preempt monopolies by having an auction in

⁶⁸Any stable industrial structure will eliminate double marginalization.

⁶⁹It is not clear what will happen when the contracts come up for renewal since the threat of a competing gas pipeline in gas transport.

which the franchise is awarded to the bidder that offers to charge the lowest price for cargo transfers. However, this does not rule out the possibility that a shipper which is the controller of the port can acquire a monopoly position in a competitive shipping industry. The seaport may discriminate against competing shippers by providing worse service, longer waiting periods for loading and unloading, preference in waiting queues for the controlling shipper, etc. In this way, competitive shippers are discouraged and the end result would be a situation in which only one firm operates in the franchised port and charges the monopoly price, even though technically there is free entry into shipping.⁷⁰ The difficulty in verifying quality of service implies that auctions based on price might run into trouble.

BOX 4.2 (Evading maximum tariffs through vertical integration) *Consider the previous example of a monopoly seaport which is auctioned to the applicant that offers to charge the lowest tariff. There is no regulatory supervision on the quality of port services. Suppose there is Bertrand competition between shippers and that a decline in quality of service offered by a shipper is analogous to a rise in the price of using that company. In this case, in a competitive auction, a shipper will bid a tariff $p_s = 0$ for port operations, provide such low quality to shipping competitors that even when charging the monopoly price in shipping (plus seaport services) it faces no competition and achieve the profits of an integrated monopoly. Hence, an integrated shipper can evade the equivalence between “competition for the field and competition in the field” if there is no measurement of quality.⁷¹ ■*

As a second alternative, one may consider auctions in which the port operator commits to a minimum quantity transferred by the port. Under these schemes, the franchise holder bids on the volume it will transfer each year of the franchise. This reduces the monopoly problems, as the volume requirement implies that service must be sufficiently good so that there is no monopolistic behavior, since otherwise the committed volumes are not achieved. The problem of this mechanism is that it is difficult to penalize violations of the conditions as the lack of sufficient cargo may be due to market conditions or the failure to adequately forecast long term trends in trade, both of which are unrelated to anticompetitive behavior and hence provide endless margin for renegotiation.

The Chilean government has chosen to select the franchise holder that offers to charge the lowest price (a composite index of charges for various port operations) for cargo transfers or, if

⁷⁰Economides (1999) has examined the incentives to lower quality for an unregulated monopoly which is vertically integrated with a downstream firm in a Cournot setting.

⁷¹Using Economides' arguments, this example can be adapted to a Cournot setting.

a minimum price is reached, by the applicant that offers the highest lump sum payment to the state.⁷² In addition, the franchise holder must make a fixed annual payment to the state which supposedly corresponds to the rental rate on the sunk investment in the port (quays, protection, load bearing surfaces). The object of this payment is to allow the possibility of entry of new ports, which would be discouraged if they had to compete with the established ports and their subsidized sunk investments.

Since a price scheme is subject to the possibility that bad (i.e., slow) service may be used to create a monopoly, if such a scheme is used, the franchise contract should include an auditing scheme for quality. The quality standards should specify maximum times for loading and unloading and waiting at anchor for individual ships; they should also set maximum average times of service for ships over a quarter.⁷³ If these auditing systems can be enforced, the possibility of creating shipping monopolies would be reduced.

Nevertheless, the above mentioned regulations might be insufficient to restrain a monopoly shipper, particularly those with large lobbying capacities, given the weakness of the Chilean antitrust authorities. This problem is exacerbated since in the case at hand the monopoly behavior involves quality of service and not price. This explains the vertical and horizontal restrictions the government has imposed on potential franchise holders. These restrictions have had the effect of delaying the privatization of ports, due to judicial stay orders requested by Chilean operators. The main Chilean shipper is excluded from fully controlling any of the ports under the proposed restrictions and has sued in order to lift them. The argument of the government is that even though the franchised ports face competition from private ports and other (non-franchised) sites at the state ports, this is not a sufficient guarantee. First, because there are no private ports that can currently compete in general cargo and containers with the main state seaports and there are large sunk costs which reduce the possibility of entry and second, because the non-franchised sites at state ports will continue under less efficient multi-operator schemes and therefore cannot increase capacity beyond their already strained limits.

Finally, one may wonder why LPVR is not used in seaport franchises. Since efficient demand management is one of the fundamental objectives of seaport concessions, and this the main weakness of LPVR, it is not an appropriate method. However, it is possible to combine a modified version of LPVR for the basic infrastructure of a seaport (the sunk investment in piers, protections

⁷²It is an open question whether imposing a minimum price is appropriate.

⁷³The maximum times may depend on the type of cargo and ship. Failures to comply should lead to compensations that are related to the capital cost of the delayed ship.

and barriers) auctioned to one bidder and a fixed term auction mechanism for equipment (cranes, etc) and operations auctioned to another bidder. Hence, the modified method combines the incentives to increase demand induced by fixed term auctions with the reduction in risk and other advantages of an LPVR auction to finance and build the sunk investment in the port. In Chile, the destruction caused by the 1985 earthquake and the ensuing reconstruction of the ports has reduced or eliminated the need for sunk investment and hence only fixed term auctions have been used.

5 CONCLUSIONS

The Chilean infrastructure concessions program involves a significant increase in private participation in the provision of infrastructure. Under this program the private sector not only builds new projects, as has been the case for many decades, but also finances, maintains, and operates these projects for a long period of time.

Whether the advantages that can be gained from a franchising program are realized depends on how such a program is designed and implemented. For example, franchising can help reduce the number of white elephants, yet this requires that the profit of the concessionaire depend on the demand for the project, a condition which is vulnerable to the existence of guaranteed minimum income levels for the concessionaire. In addition, society stands to benefit from the efficiency of private firms in building, operating and maintaining a project, yet this requires that the mechanism that selects the winner does not provide an advantage to the firm that is best at renegotiating the terms of the franchise contract.

A precondition for a successful franchising program is that the concessionaire's property rights are secure. If these rights are not guaranteed, the traditional approach, where projects are financed by taxpayers and private firms build the project, is a better alternative. The reforms introduced in the two preceding decades in addition to the Concessions Law approved in 1991 (and modified in 1995), have dealt with this problem. In fact, in the case of the dispute resolution mechanism, the Chilean concessions program may have gone too far in dispelling fears of "creeping" expropriations.

Transparency is another key feature of a franchising program. This makes opportunistic behavior by the government and concessionaires less likely. It also improves the public's perception of the benefits of private participation in infrastructure. On this count our review of the Chilean concessions program is mostly positive. The open and competitive auctions used to determine the

concessionaire are a major advantage. The simplification of the complex awarding mechanisms used in the early stages of the program is also positive. On the other hand, the one instance where MOP negotiated a compensation to the franchise holder is a source of concern since the details of the negotiation were not made public. Similarly, the calculations on the probabilities that guarantees will be exercised have not been made public.

Most highways have been franchised using auctions that fix the term of the franchise in advance. This is unfortunate, since demand uncertainty is high and there is little that firms can do to reduce this risk. Adequate risk sharing is an important characteristic of any BOT scheme. MOP has been reluctant to use franchising schemes, such as Least-Present-Value-of-Revenue (LPVR) auctions, where the franchise term adjusts to demand realizations. Under a LPVR scheme there is a substantial reduction in the demand uncertainty faced by the franchise holder, hence in the demand for guarantees. Moreover they are far more flexible than fixed term franchises.

The government is in the process of franchising the main state seaports after long delays due to court actions by opponents of the scheme decided by the government. In these franchises, the main object has been to switch from a multi- to a mono-operator scheme. The regulator believes that there are economies of scope in the operation of seaports and that, because of common property problems under multiple operators, the investment in necessary equipment has been delayed. The method the government has chosen is that of awarding a monopoly over a terminal to a single operator. A fixed-term franchise is awarded to the bidder that asks for the lowest maximum price (a composite index) for operations. If a set minimum price is reached by two or more firms the firms must compete on a lump sum payment to the State.

In the case of seaports, demand management is important and therefore a LPVR scheme (in its pure form) is inappropriate, because it insures firms against changes in demand. Hence a fixed term contract provides adequate incentives and the problem for these franchises is how to avoid monopolization of the terminal by a single integrated company. Such a company would obtain a monopoly by providing lower quality of service to competing users of the port and then reap the monopoly rents. Avoiding this possibility requires efficient monitoring of service quality. Whether the mechanisms in place are sufficient to safeguard quality levels against a determined franchise holder is an open question. As another means of defence against the possibility of service quality discrimination, the government has tried to limit vertical integration by setting limits to the ownership of terminals by firms that are important operators in the region.

It is too early to claim that the concession process has been a success, since no ports have been awarded. However, the process is proceeding after a long hiatus caused by court delays and there

appears to be strong interest by national and international operators in bidding for the main ports in Chile.

A franchising program such as the one described in this paper faces a tradeoff between the speed at which it proceeds and the price due to hasty proceedings. Both the private sector and MOP have emphasized the importance of advancing fast. This is one possible explanation for the lack of adequate regulation of franchised projects, even though six years after the first concession was awarded this explanation is not altogether convincing. Whether this will be costly is hard to tell at this point. The fact that the infrastructure deficit was very large when the program was launched might have justified this speed.

The following recommendations follow from our analysis in this paper. First, there should be an independent agency in charge enforcing quality standards. Second, the dispute resolution mechanisms should be improved. Third, LPVR auctions should be the main option in highway franchises. Fourth, minimum income guarantees provided by the government should be avoided if possible. If granted, they should be paid for by the franchise holder and accounted for in the national budget. Fifth, the restrictions imposed by the government on potential bidders for franchises of state owned seaports have a meaningful role. Finally, when franchising urban highways, MOP should retain more flexibility to modify tolls in response to demand realizations.

Most important roads have been already awarded, so it has become customary to claim that Chile's highway franchising program has been a success. The international experience suggests that some caution is warranted. Problems typically begin years after roads have been built, when a recession allows firms to claim that they face financial distress and ask for renegotiation of the original contract. It is somewhat worrisome that most franchises have been awarded to Mexican and Spanish firms, some of which have acquired a formidable renegotiating experience in their home countries. All in all, there are marked improvements over similar concession programs abroad, but not all pitfalls have been avoided. The jury is still out on Chile's highway franchising program.

References

- [1] Acevedo, R., and J. E. Errázuriz, “Infraestructura: oportunidad u obstáculo para el desarrollo”. In F. Larraín (ed.) *Chile hacia el 2000: Ideas para el desarrollo*. Santiago: Centro de Estudios Públicos, 1994.
- [2] Bauer, C., “Derecho y economía en la Constitución de 1980,” *Perspectivas en Política, Economía y Gestión* **2**, 23–47, 1998.
- [3] Chadwick, E., “Results of Different Principles of Legislation in Europe,” *Journal of the Royal Statistical Society Series A22*, 381–420, 1859.
- [4] Demsetz, H., “Why Regulate Utilities,” *Journal of Law and Economics* **11**, 55–66, 1968.
- [5] Dixit, A. *The Making of Economic Policy*. Cambridge, MIT Press, 1996.
- [6] Eckstein, A., “Planning: The National Health Service,”. In R. Rose (ed.) *Policy-Making in Britain*. London: Macmillan, 1956.
- [7] Economides, N. “The Incentive for Non-price discrimination by an Output Monopolist,” *International Journal of Industrial Organization*, (16), 271–284, 1999.
- [8] Engel, E., R. Fischer and A. Galetovic, “Licitación de carreteras en Chile,” *Estudios Públicos* **61**, 5-37, 1996.
- [9] Engel, E., R. Fischer and A. Galetovic, “¿Cómo licitar una concesión vial urbana?,” *Estudios Públicos* **67**, 177–214, 1997a.
- [10] Engel, E., R. Fischer and A. Galetovic, “Highway Franchising: Pitfalls and Opportunities,” *American Economic Review Papers and Proceedings* **87**, 177-214, 1997b.
- [11] Engel, E., R. Fischer and A. Galetovic, “Revenue Based Auctions and the Unbundling of Infrastructure Franchises,” Technical Paper IFM-112, Washington: Inter American Development Bank, 1997c.
- [12] Engel, E., R. Fischer and A. Galetovic, “Respuesta a Michael Klein y Jean Tirole,” *Estudios Públicos* **67**, 215–225, 1997d.

- [13] Engel, E., R. Fischer and A. Galetovic, "Infrastructure Franchising and Government Guarantees" in T. Irwin, M. Klein, G. Perry and M. Thobani (eds.) *Dealing with Public Risks in Private Infrastructure*. Washington DC: The World Bank, 1997e. (Also in *Revista de Análisis Económico* **13**, 51–73, 1998)
- [14] Engel, E., R. Fischer and A. Galetovic, "Least Present Value of Revenue Auctions and Highway Franchising," NBER Working Paper 6889, 1998.
- [15] Fischer, R., "La Economía de las Concesiones Viales en Chile". Paper prepared for the Regional Workshop on Managing Regulatory Policy and Regulatory Reform in Chile and Latin America organized by the World Bank's Economic Development Institute and the Center for Applied Economics (CEA) of the University of Chile. Santiago, October 5–7, 1995.
- [16] Gómez-Lobo, A., and S. Hinojosa, "Broad roads in a thin country: Infrastructure Concessions in Chile". Mimeo. 1999.
- [17] Gómez-Ibáñez, J. and J. Meyer, *Going Private: The International Experience with Transport Privatization*. Washington: The Brookings Institution, 1993.
- [18] Harstad, R. and M. Crew, "Franchise Bidding Without Holdups: Utility Regulation with Efficient Pricing and Choice of Provider," *Journal of Regulatory Economics* **15**, 141-164, 1999.
- [19] Klein, M. "Los requisitos de una política global de infraestructura vial," *Estudios Públicos* **65**, 215–223, 1997.
- [20] Klein, M. "Bidding for Concessions," *Revista de Análisis Económico* **13**, 25–49, 1998.
- [21] Moguillanski, G., "Chile: las reformas estructurales y la inversión privada en áreas de infraestructura," *Serie Reformas Económicas* N° 2, Santiago: Cepal, 1997.
- [22] Paredes, R., "Políticas de competencia en países sin tradición de mercado," *Perspectivas en Política, Economía y Gestión* **1**, 45–66, 1997.
- [23] Sociedad Chilena de Ingeniería de Transporte, "Un sistema de transporte urbano para una ciudad sustentable," *Anales del Instituto de Ingenieros* **109**, 71–75, August 1997.
- [24] Thomson, 1999.

- [25] Tirole, J., *The Theory of Industrial Organization*. Cambridge, MIT Press, 1988.
- [26] Tirole, J., “Comentario a la propuesta de Engel, Fischer y Galetovic sobre licitación de carreteras,” *Estudios Públicos* **65**, 201–214, 1997.
- [27] Williamson, O., “Franchise Bidding for Natural Monopoly”. Chap. 13 in O.E. Williamson, *The Economic Institutions of Capitalism*. New York: The Free Press, 1985.

Table 1: VEHICLES PAYING TOLLS: GROWTH RATE (%)

	1986	1987	1988	1989	1990	1991	1992	1993	1994
Angostura:	8.8	15.0	11.7	4,5	8.7	12.4	6.7	7.8	9.4
Zapata:	21.5	14.4	13.1	8.1	7.2	5.2	2.9	3.9	4.9
Lampa:	3.8	13.4	15.9	8.9	6.8	18.0	8.8	16.2	12.5

SOURCE: ENGEL, FISCHER AND GALETOVIC ((1996) FROM MINISTRY OF PUBLIC WORKS, CHILE.

Table 2: THE CHILEAN HIGHWAY SYSTEM (IN KILOMETERS)

Year	Concrete	Asphalt	Gravel	Dirt	Total
1986	3314	6503	33635	35226	78678
1987	3473	6847	32718	36184	79222
1988	3469	6855	32679	36126	79129
1989	3525	7237	32391	36329	79482
1990	3646	7298	32407	35884	79235
1991	3663	7338	32426	36166	79593
1992	3769	8305	32778	34462	79314
1993	3834	8517	32709	34233	79293

SOURCE: ENGEL, FISCHER AND GALETOVIC ((1996) FROM COMPENDIO ESTADÍSTICO 1991-1994, INE

Table 3: STATE OF THE HIGHWAY NETWORK

Classification	Good	Average	Poor	TOTAL
Concrete	1611	1726	499	3835
Asphalt	5157	2157	1802	9116
Gravel	4191	15405	17802	34423
TOTAL (%)	15	52	33	100

SOURCE: ENGEL, FISCHER AND GALETOVIC ((1996) FROM MINISTRY OF PUBLIC WORKS

Table 4: INFRASTRUCTURE INVESTMENT NEEDS, 1995–2000

Sector	Investment (millions US\$)
Intercity roads and highways	4,250
Urban roads	2,000
Water treatment	1,480
Potable water supply	950
Equipment	810
Railroads	470
Seaports	450
Irrigation	370
Control of rainwater	195
Airports	100
Total	11,075

SOURCE: GÓMEZ-LOBO AND HINOJOSA (1999) FROM MINISTRY OF PUBLIC WORKS

Table 5: HIGHWAY FRANCHISING IN CHILE: 1993–1998

Project	Term (years)	Bidding variables	Number of tenders	Investment (US\$ mill.)	Status (Dec. 1998)
El Melón Tunnel (1993)	23	Seven variables (see text)	4	42	In operation
La Madera Rd. (1994)	25	Subsidy	1	34	In operation
Acceso Norte Concepción (1995)	28	Toll	6	230	In operation
Santiago-San Antonio. Rt. 78 (1995)	23	Toll	6	140	In operation
Nogales– Puchuncaví Rd. (1995)	22	Toll	4	12	In operation
Talca-Chillán Rt. 5 (1996)	10	Toll, then term	4	183	Under construction
Santiago–Los Andes Rd. (1996)	28	Toll, then term, then payment to gov.	1	146	Under construction
Santiago–Los Vilos (Rt. 5) (1996)	23	Toll, then term	4	272	Under construction
Los Vilos– La Serena (Rt. 5) (1997)	25	Toll, then term	2	265	Under construction
Chillán– Collipulli (Rt. 5) (1997)	22	Toll, then term	3	224	Under construction
Temuco–Río Bueno (Rt. 5) (1997)	25	Toll, then payment to gov.	3	203	Under construction
Río Bueno–Puerto Montt (Rt. 5) (1997)	25	Toll, then payment to gov.	5	176	Under construction
Santiago– Valparaíso (Rt. 68) (1998)	Variable	Least Present Value of Revenue	3	401	Awarded
Santiago–Talca Rt. 5 (1998)	25	Payment to government	4	720	Awarded

Source: Prepared by the authors based on information from the Ministry of Public Works.

Table 6: REQUIRED INVESTMENT AND PROJECTED DEMAND IN STATE SEAPORTS

Ports	Investment 1997-2015 (US\$MM)		Demand in MMtons		
	Private	Public	1996	2005	2015
Arica	182	2.8	1.1	3.7	6.6
Iquique	112.6	6.7	1.1	4.3	7.0
Antofagasta	104.5	28.4	2.5	5.6	6.7
Coquimbo	20.85	0.5	0.3	0.9	1.1
Valparaíso	428	12	4.5	15.4	29.4
San Antonio	309	3.9	6.4	19.1	35.6
Talcahuano	168	2.8	3.6	12.5	15.0
Puerto Montt	18.3	2.0	0.7	1.2	2.8
Chacabuco	27	1.5	0.2	0.3	0.5
Punta Arenas	22	1.6	0.3	0.6	0.7

Source: Moguillanski (1998) from EMPORCHI, April 1997.

Table 7: CARGO MOVEMENTS IN PRIVATE AND PUBLIC SEAPORTS

Type of port	Thousand tons	% of total
Open private	13,373	26
Closed private	20,852	40
State ports	17,736	34
Total	51,958	100

Source: Estadísticas de la Cámara Marítima y Portuaria.