FRANCHISING OF INFRASTRUCTURE CONCESSIONS IN CHILE: A POLICY REPORT

Eduardo **E**ngel
Ronald **F**ischer
Alexander **G**aletovic

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Centro de Economía Aplicada
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Eduardo Engel, Ronald Fischer and Alexander Galetovic[1]

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Abstract

This report describes and evaluates the present state of the Chilean infrastructure concessions program. This program is leading to a complete upgrade of Chile's highway system and has been recently extended to seaports. The main principles underlying the economics of franchising are examined and used to evaluate the program of privatizations of highways and seaports. Compared with experiences in other countries, the results are fairly good. 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.

The main shortcoming of the program of highway franchising is that the state granted generous minimum traffic guarantees, which may create fiscal problems in the future and may have weakened the market test that franchising is supposed to provide. This problem may become increasingly important as most projects to be auctioned in the future are not profitable privately and must therefore be subsidized to be undertaken. Related to the latter, privatization of infrastructure has been carried out without creating a regulatory framework and institutions, while regulatory conflicts of interest have been ignored. This issue gained widespread attention recently, when a franchise holder ran into financial problems and failed to meet contract deadlines. The Ministry of Public Works, which both promotes and regulates the concessions program, renegotiated the contract with the franchise holder behind closed doors.

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[1]Centro de Economía Aplicada (CEA), Departamento de Ingeniería Industrial, Universidad de Chile. 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. The authors thank Gonzalo Edwards and Antonio Estache for helpful comments and suggestions, and Claudia Araya and Ronald Gibbs for providing useful information.

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Executive Summary

1. The Chilean concessions program involves a significant increase in private participation in the provision of infrastructure. By the end of 1999, so called build-operate-and-transfer (BOT) contracts had been used to franchise the most important highways, seaports and airports, with cumulative investments of over US$4 billion.

2. Whether the advantages that can be gained from a franchising program are realized depends on how such a program is designed and implemented. Two examples, both of them relevant for the Chilean case, illustrate this point:

   (a) Franchising can help reduce the number of projects whose net social value is negative (i.e. *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.

   (b) Society stands to benefit from the efficiency of private firms in building, operating and maintaining a project. For this to happen, renegotiations that favor the franchise holder must be avoided, since governments are chronically bad at renegotiating open-ended contracts, providing an advantage to firms that are relatively better at renegotiating terms as compared to building, operating and maintaining the franchised road.

3. A precondition for a successful franchising program is that the concessionaire's property rights are secure. 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.

4. Transparency in rules and procedures also is a key feature of a franchising program, since it 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 mixed:

   (a) The open and competitive auctions used to award the franchise are a major advantage, and so are the simplification of the complex awarding mechanisms used in the early stages of the program.

   (b) There is concern because the details of the renegotiation of the Route 78 franchise between the Ministry of Public Works (Spanish acronym: MOP) and the concessionaire were not made public.

(c) Lack of transparency became a major public issue recently when Tribasa ran into financial trouble and was unable to meet original construction deadlines for its Santiago–Los Vilos concession. MOP and the firm renegotiated the contract behind closed doors.

(d) The calculations of the probabilities that guarantees will be exercised, the estimations of construction costs used to calculate guarantees and the social project evaluations that led to substantial subsidies for the Costanera Norte urban highway have not been made public.

5. After several postponements and protracted negotiations between construction companies, MOP and the Ministry of Finance, the Costanera Norte urban highway was put to tender at the end of 1998. Only one firm bid in the auction and was disqualified because its offer did not comply with the rules set by MOP. The problem seems to have been that pressure by environmentalist groups and neighbors forced MOP to raise environmental standards and modify the original design, thereby increasing the cost of the project more than twofold (to US$400 million). There also is evidence that cost estimates increased substantially before environmental concerns were raised. In any case, the project was auctioned again, this time successfully, in December of 1999, after several changes were introduced to make the project more attractive, including a subsidy of US$80 million, exchange rate insurance and minimum traffic guarantees.

6. Most highways have been franchised using auctions that fix the term of the franchise in advance. This is unfortunate, since revenue uncertainty is high and there is little that firms can do to reduce this risk. 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 revenue uncertainty faced by the franchise holder, hence in the demand for guarantees. Moreover they are far more flexible than fixed term franchises.

7. The LPVR scheme was used to auction the Santiago-Valparíso-Viña del Mar concession in February of 1998. The winner did not demand the government traffic guarantee, which was optional and at a cost (instead of free and automatic, as had been the case in previous auctions). Apart from the pressure exerted by the Ministry of Finance, the main reason why MOP decided to use the LPVR mechanism was that, contrary to fixed term contracts, in this case it is easy to define a fair compensation should MOP decide to terminate the franchise early.

8. The lack of a regulatory framework is one of the main shortcomings of the Chilean concessions program. MOP has been in charge of designing, implementing and then monitoring its performance, without a regulatory framework in place.

9. The Chilean Concessions Law gives an advantage in the auction to proponents of new projects that are offered for tender. This is a mistake, since project proponents usually own land whose value will increase when the project is undertaken. Hence they will automatically internalize the benefits of their proposal. This point is illustrated by the road to Chicureo project, which was proposed by owners of land which will benefit from the project approved by MOP.

10. The government has also franchised Chile's main ports. Initially there were long delays due to court actions by opponents of the scheme designed by the government. In these franchises, the main objective 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 government chose to award 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.

11. In the case of seaports, the main issue when designing an auction is to avoid monopolization of the shipping market by a vertically integrated company comprised of the winner and a shipping company. Such a company can monopolize the shipping market by providing lower quality of service to competing users of the port and then reaps the monopoly rents, thus nullifying the benefits associated with a competitive auction for a bottleneck. Avoiding this possibility requires efficient monitoring of service quality.

12. To counter the possibility of discrimination in the quality of service, and thereby *de facto* monopolization of the shipping market, the government took the following actions:

    (a) It set limits to the ownership of terminals by firms that are important operators in the region.

    (b) It set a floor on the cargo-handling fee that firms can bid in the auction.

    It can be shown formally that the combination of both measures makes it less likely that the franchise owner will monopolize the shipping market. Nevertheless, it is an open question whether they suffice to avoid monopolization by a determined franchise holder, since shippers can own up to 40% of a port.

13. It is noteworthy that the main Chilean operator won the first three auctions for general cargo ports. It was only the application of antitrust clauses in the auction rules that made it give up the port of Valparaíso. Moreover, it was the winner and only bidder in a fourth auction for a smaller port (Iquique). These results suggest that the government's apprehension over the possibility of a monopoly were not groundless.

14. A franchising program such as the one described in this paper faces a tradeoff between the speed at which it proceeds and the additional costs associated with 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.

15. The following recommendations follow from our analysis in this report:

    (a) Establish an independent agency (financed from general revenues) in charge of enforcing quality standards and monitoring compliance with concession contracts.

    (b) Independent social project evaluation is needed not only for the original project, but for any changes in design or financial conditions of the franhise. These evaluations should be publicly available.

    (c) Improve the dispute resolution mechanisms.

    (d) Adopt LPVR auctions as the main option in highways franchises.

    (e) Avoid minimum income guarantees provided by the government whenever possible. If granted, they should be paid for by the franchise holder and accounted for in the national budget.

    (f) When franchising urban highways, retain a degree of flexibility to modify tolls in response to demand realizations.

    (g) Eliminate the bonus contemplated by the Chilean Concessions Law for the proponent of new concession projects that are approved by MOP. Avoid minimum traffic guarantees in these cases.

    (h) Continue imposing restrictions on vertical integration of potential bidders for franchises of state owned seaports.

    (i) To make underhand agreements between the port and shippers less likely:

        i. Supervise port franchises strictly by enforcing quality standards, using for instance, standards derived from yardstick competition.

        ii. Set sufficiently high minimum for the cargo handling fee that can be bid in the auction of the port. If this minimum is reached, have firms compete on a transfer to the State.

16. 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 in other countries, but not all pitfalls have been avoided. The jury is still out on the Chilean franchising program.

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.[2,3] By the end of 1999, the most important highways, seaports and airports had been franchised, with cumulative investments of around US$4 billion. This report describes and analyzes the infrastructure franchising program of the nineties. Since the economics of franchising of public infrastructure projects is very recent, we begin with a primer on this topic. We then evaluate the two main sectors in which the program has been applied, highways and seaports.

The infrastructure sector saw comparatively little activity during the seventies and eighties, and it remained a province of the government, in contrast to the market reforms that were introduced elsewhere in the economy. Traditionally, infrastructure in Chile has been financed mainly by taxpayers and not by users. Moreover, until the early seventies, the Ministry of Public Works (henceforth MOP, for its Spanish acronym) and other ministries and departments had their 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 reforms introduced in the public sector, the government began subcontracting the building and maintenance of public works.[4] Contractors were selected via competitive auctions, but the government continued to design and manage projects. Broadly speaking, construction costs were paid by taxpayers.[5] At the same time, a comprehensive and centrally managed public project evaluation scheme was introduced that determined the social return of all projects and a cutoff rate for the projects that could potentially be funded. 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 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

[2] See Gómez Ibáñez and Meyer (1993) for the international experience with transport privatization.

[3] There are many variants on BOT contracts. In one of them (IOT), the private firm improves an existing project, instead of building it from scratch. In another (DBOT), the private firm also designs the project.

[4] Quality inspection was delegated to the private sector in the mid-eighties.

[5] There were a few tolled roads, with car tolls set at what appear to be monopoly levels. 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).

that there was a serious need for a large increase in infrastructure investment.[6] For example, Table 1 shows that investments needed between 1995 and the year 2000, as estimated by MOP, were significant, adding up to US$ 11 billion (by way of comparison, Chile's GDP is about US$ 70 billion).[7] To undertake these investments, MOP would have needed to triple its yearly budget of $800 million which was considered politically inviable. 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, ports and airports, but is planned to be extended to several other areas such as water reservoirs and regional public roads and works.

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 is not required 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 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, 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.[12] And sixth, in stark contrast with the traditional approach, the BOT scheme uses a market instead of 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.[13] Moreover, planners can rely on a market test

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

[7] The Cámara Chilena de la Construcción (Chilean Chamber of Building) has estimated similar investment needs, see Table 2 in Acevedo and Errázuriz (1994). It must be noted that these numbers are estimated by agents who are interested in showing large deficits.

[8] In 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 are not directly related to construction costs.

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

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

[11] Even though, as mentioned in an earlier footnote, there is a tradition of charging tolls for government owned highways in Chile, this pertains only to intercity highways, so that this point is relevant for urban highways. Furthermore, for the case of trucks, this point pertains to all kinds of roads, since trucks have always paid tolls far below the marginal cost they impose on roads.

[12] It should be noted, though, that since a franchised road may reduce congestion in an untolled road, there is an externality produced by the franchise that is not internalized and may lead to tariffs that are too high for welfare maximization.

[13] Our definition of a white elephant is a project whose net (of costs) social value is negative. In the case of projects without negative externalities, a positive private value for a franchise is *prima facie* evidence of positive net social value. Hence the market test of the the auction for the franchise provides a filter for projects. There are, of course,

to tell them where profitable public works need to be built. This advantage does not exist in the case of IOT contracts (see footnote 3), since the improved quality of the rebuilt road might be so costly as to reduce social welfare below the *ex ante* situation.[14] This implies that in the case of IOT projects, an independent social project evaluation is required. Note that, in principle, IOT contracts will filter white elephants if the franchise holder is made to pay the economic value of the pre-existing infrastructure.

The six advantages of BOT contracts must be weighed against the distortions that may arise from setting fees high enough so as to pay for the construction of the project, since such fees often end up being substantially above marginal costs.[15] In most developing countries, where white elephants are pervasive, 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, so that the inefficiency mentioned above does not attain.[16]

The advantages of BOT contracts cannot be taken for granted. The international experience indicates that the mechanism used to award the concession, its design, the franchise contract, and the regulatory framework must be carefully designed in order to reap the potential benefits. 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 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.

Our evaluation of the Chilean franchising experience is positive. Compared with other countries, results are fairly good. 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

projects whose social value is positive while their private value is negative, but in developing countries the problem is the abundance of projects that turn out to be white elephants.

[14] This point was made to us by Gonzalo Edwards with the following example: suppose a road is improved by placing a white elephant every mile. If users are charged for the cost of the improvement, the fact that there are firms willing to undertake the project does not imply that social welfare has increased.

[15] In a competitive auction where the award variable is the toll, the result is Ramsey pricing for the road, but this is only second best.

[16] See Engel, Fischer and Galetovic—henceforth EFG—(1998) for a formalization of this result.

least a decade. The main shortcoming of the program of highway franchising are minimum traffic guarantees, which may create fiscal problems in the future and may have weakened the market test that franchising is supposed to provide (guarantees have been avoided in the case of ports). There also are signs suggesting that the agency in charge of carrying out the highway concessions program (MOP) may be giving in to pressures by the construction lobby to grant subsidies to projects. These pressures may become increasingly important as most projects to be auctioned in the future are not privately profitable and require subsidies to be undertaken. Related to the latter, privatization of infrastructure has been carried out without creating a regulatory framework. Regulatory conflicts of interest have been ignored since MOP is also in charge of monitoring and enforcing performance of the highway program, as is the Ministry of Transport in the case of the program of seaport franchising.

Before proceeding, we call attention to two caveats. First, the term "infrastructure" refers to many types of projects in addition to highways and seaports, for example, public utilities such as those for water, electricity and telephones. We do not discuss the reforms implemented in those sectors, focusing instead on the main regulatory innovation introduced during the Concertación administrations, namely the concessions program. Highways account for 90% of investments undertaken under the Chilean franchising program. The franchising of seaports is relatively recent and the experiences (positive and negative) during the franchise process can be useful in the design of public policy. Other recent developments that we analyze are the repeated attempts at franchising the first urban highway project and policies towards privately proposed projects.

A second caveat is that, even though this report addresses the franchising of transportation infrastructure projects, it does not analyze the closely related transportation policies. 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.[17]

The rest of the report 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 franchising[18]

This section sets up the conceptual framework used later to evaluate the infrastructure reforms. As mentioned in the introduction, the main characteristic of the franchising program is the periodic auctioning of infrastructure concessions as a means of privatizing and introducing competition.

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

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

For this reason, this sections begins with a brief discussion of the basic economics of auctions and franchises.

2.1 Franchises are useful to regulate monopoly power

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 generation. 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 they are 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 can be 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 re-auctioning 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.[19] This incentive is even stronger when some sort of price-cap regulation is used to fix prices. Second, since the franchise will be re-auctioned 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.[20] Moreover, in many cases it is not straightforward to define objective standards and to measure them—information is asymmetric. This is specially the case of seaports, where to a certain extent, quality of service can be lowered without it being verifiable.

2.2 Avoid government guarantees whenever possible

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

[19] Note that in a competitive market where users have alternative providers, firms will provide the "right" price-quality combination.

[20] When 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. Note that a concessionaire's savings from lax enforcement are considerably larger than the profits any such firm may expect from one project. However inspection firms can gain a reputation for honesty that can be extremely valuable.

cost-sharing agreements with the government.

BOX 2.1 (A classification of risks faced by a franchise holder) [21]

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 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 is very high in Chile) [22]

Table 2 shows the increase in the number of motor vehicles paying tolls during the 1986–1995 period in three of the main tolled roads in Chile.[23] *Since tolls remained approximately constant (in real terms) during this period, fluctuations in growth rates are due mainly to demand fluctuations.*

[21] Based on EFG (1997e).

[22] Based on EFG (1996).

[23] The 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 grew 8.8% between 1986 and 1987. These flows are representative, covering the three busiest highways near Santiago.

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.* ∎

Government guarantees can be both explicit and implicit. For example, an explicit demand guarantee that is common in practice is when the concessionaire 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.[24] 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 in the introduction). First, they reduce firms' incentives 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, some time in the future, the terms in their favor. 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 Subsidies may be justified when there are important 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 allows the project to be franchised as usual. The incentives to screen the private profitability of the project remains in place, although the firm's value-at-risk is smaller than if it has to finance the project itself.[25]

[24] This guarantee also serves as partial insurance against policy risk.

[25] Value at risk refers to the largest loss with a probability higher than a pre-specified value.

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.

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.[26]

There is one further argument for guarantees under fixed term projects. Some socially and privately profitable projects may be so risky that potential bidders face credit rationing. This might lead to a situation with few if any bidders for the project. A government minimum revenue guarantee will reduce the risk, loosen the credit rationing constraint and allow more participants to bid for the franchise. In that case, guarantees might lead to more competition for the franchise, raising welfare. Since guarantees have problems (among them weakening the screening against white elephants), this is a second best solution to the problem; a first best alternative that does not require guarantees is the LPVR auction described in the next section.

2.4 Flexible term franchises should be used in the case of highways

As mentioned above, one of the main reasons why firms demand government guarantees is that demand forecasts are very imprecise.[27] 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

[26] Value 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.

[27] Hence projects are very risky and firms may be unable to obtain financing due to credit rationing.

be profitable. For example, it may be impossible to tell whether the highway between 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, 1998]) 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,[28,29] 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 [1998] 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 preplanning procedures used 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.[30,31] The other extreme is well exemplified by seaports. 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.[32] 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 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

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

[29] The 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).

[30] This is the case considered in EFG (1998).

[31] Another case in which LVPR 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.

[32] There 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.

of demand risk reduction and another that provides adequate incentives to stimulate demand.[33] 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 Keep the auction and franchise contract simple

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 both the regulator's 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 often choose 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.

2.6 Flexibility can be incorporated into LPVR franchises without fostering opportunistic behavior

Franchise contracts tend to lack flexibility. This reflects the desire 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

[33] See EFG (1997c) for details.

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 should the expansion costs 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 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.

The issue of flexibility also arises when setting user fees. In the case of a fixed term franchise, 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 are *ex post* 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 under-utilization.

LPVR franchises are more amenable to changes in user fees in response to changes in demand than their fixed term counterparts, since tolls may vary substantially without affecting the franchise holder's present value of user fee income.[34] In the urban highway example, a LPVR contract could stipulate that tolls will be reset by an independent agency/commission every year in response to demand conditions, so that users internalize congestion costs.[35]

2.7 LPVR franchises are more attractive for financiers than fixed term franchises

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

- Bidders must offer call bonds (*bonos de garantía*) that are cashed in by the government if the bidder cannot finance the project. Moreover, similar bonds are callable if construction targets are not achieved by predetermined dates.

- Banks lend money for construction of the road. These are the only financial institutions that are legally authorized to make loans for the construction phase of these projects. Banks

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

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

are experienced in making loans for construction projects and release funds sequentially as project stages are completed.

- After the road is built, the franchise owner can issue bonds backed by toll revenues (securitization). These coupon bonds are usually bought by the private pension funds and insurance companies.

- The law stipulates that the franchise owner cannot securitize all of the debt but must keep at least 30%. It does so to induce good behavior in the maintenance and operational phase of the franchise.

It is obvious that for the same toll rate the flow of toll revenue is identical under LVPR or a fixed term scheme. If the project does not pay back the bond during the life of the fixed term franchise, it might still pay it back under LVPR. By contrast, when the flow of toll revenues leads to a shorter franchise under LVPR, funds should be left in escrow to pay the bond at the specified maturing dates of the coupons or the bond should be prepaid. It follows that from the point of view of a bond holder, the project is less risky under LVPR and it should be easier to finance a project under this scheme.[36]

Understanding why most franchise holders have had problems financing and securitizing their projects possibly deserves a separate report and, in any case, is beyond the scope of this one. An answer to this question requires, among other things, a detailed study of Chile's financial markets, in particular, of the incentives government regulations impose on institutional investors such as pension funds.

2.8 Private proponents of new projects should not receive a bonus in the auction

It has been suggested that private agents should be able to propose new highways and, in analogy to the case of patents, should obtain a rent when their projects are effectively implemented. One such scheme is part of the Chilean Concessions Law. Agents that suggest proposals that are finally approved and auctioned (after going through an evaluation process in which among other things, their incidence on other potential projects is evaluated) have the right to participate in the bidding process with an advantage. If, for instance, the franchise is awarded to the company that offers the lowest toll, the original proposer will win the project unless the best alternative offer is more than a $x\%$ (usually 10%) lower. We have recently shown (see EFG [2000a]) that this is a serious mistake in the law, since project proposers usually are owners of land whose value will increase when the project is undertaken. Hence they automatically internalize the benefits of their proposal, which is not the case of those freely transmissible ideas which are the scope of patent law. In EFG

[36] For more details, see EFG (1997d).

(2000a) we formally show that having a bonus for proposals not only has undesirable distributional consequences but may also decrease overall welfare.

Having ruled out a bonus for new proposals, it is interesting to study the relation between land values and highway auctions (see EFG [2000a]). For the sake of the argument, suppose that the land that will benefit from the new highway is owned by two landowners, both of which own a significant portion of the land. Furthermore, suppose that tolls are not sufficient to pay for the road, even if monopoly tolls are charged. By contrast, once the increase in land values is considered, the project is privately profitable for both landowners. Then both landowners will prefer that the other builds the road; whoever builds the road provides a large positive externality for the other owner. In this context a competitive auction to determine who builds the road may not be the best way to proceed. Allowing landowners to build the road jointly, regulating the highest toll they may charge, may be both welfare improving and privately profitable.

BOX 2.4 (The Road to Chicureo) *Many of the points made above can be illustrated with the case of the road to Chicureo, which the Chilean government decided to auction in 1999. The Chicureo project runs off Américo Vespucio, a highway running around Santiago, eventually meeting the Pan-American highway (also franchised) North of Santiago. The road requires drilling several tunnels through intervening hills and is expected to cost US$170 million. It will provide a direct exit from the wealthier burroughs of Santiago to resorts on the Pacific coast. More important than the toll revenue from through-traffic flows, from the point of view of the proposers of the project, it would add value to their holdings of real estate in an area slotted for major expansion of the city, by providing easy access to Santiago. Hence, even if the traffic revenue by itself is insufficient to pay for the cost of the road, the appreciation of the real estate holdings of the proposers of the project would help defray costs.*

Participants in a road auction always have incentives to lobby for a more attractive project. This problem is exacerbated in the case of an auction where one of the participants knows in advance that she is likely to be the winner, since this reduces the transaction costs associated with lobbying and also because it reduces the interest of other potential bidders in participating. This is the case of the road to Chicureo where the proponent will have an advantage over other participants in the auction. Not only does it receive a bonus, but it also stands to gain from large real estate price increases. The value of the road to the proposing firm is given by the overall profitability of the combined project: toll revenue plus real estate capital gains. In these cases, the road will be built even if traffic flows are insufficient to finance the road. Hence, MOP should not insure these projects since there are other needs for its scarce resources. Also, changes in the design of the road should be ruled out, unless a re-evaluation of the social benefits of the project shows that it continues being socially profitable after taking into account its effect on other projects. This point is relevant in the case of the road to Chicureo since part of it could run parallel to the much transited Americo Vespucio Avenue. ∎

Finally, note that these arguments show that public roads could be financed, without any tolls, by property taxation which appropriates the increases in the rental value of land induced by the new road. Moreover, this would be more efficient than schemes in which tolls are charged. However, since usually property taxes are raised only after a sale, there is a gap in the value of the property to original and new owners, causing economic inefficiency. Moreover, it is difficult to ascertain whether a road is a white elephant when financing comes from local taxation.

2.9 "Making projects attractive for the private sector" often is a misleading objective

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.[37]

3 Highway franchising in Chile[38]

The main privatization program introduced in Chile during the nineties was the franchising of highways. Traditionally, roads were viewed as public goods to be provided by the state. But it was evident by the time the *Concertación* took office that highway construction in Chile had not kept pace with overall economic growth, and that existing roads had become patently deficient: many were too small and 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 to only 150 kilometers per year during the

[37] A more charitable interpretation of MOP's desire to make projects more "attractive" is that 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.

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

following two decades.[39] Table 3 shows that between 1986 and 1993 the kilometers of paved (concrete and asphalt) roads grew by 25.8%, well below demand growth. Furthermore, Table 4 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.[40] 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.[41]

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 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). As argued in Section 2.8, there is no need to provide the bonus for highway proposals in order to reward proposers, and in fact, the costs of preparing the proposal should also probably not be reimbursed.

[39] Figure 3 in Acevedo and Errázuriz (1994) makes this point.

[40] DFL 164 and DS 240, 1991.

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

The law establishes that the concessionaire must build the project within the time limits established in the contract, 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.[42] 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.[43] 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 Pan-American 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 (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 Vespucio Beltway, the Costanera Norte highway and the North-South axis.

The program was launched in 1993 with the 23-year long El Melón tunnel franchise. The auction mechanism used was unnecessarily complex.[44] Firms bid on a weighted average of seven variables: annual subsidy by or payment to the state, toll level and structure (composed by six different tolls, with different weights for different classes of vehicles), term of the franchise, minimum income guarantee, degree of construction risk borne by the franchise holder, score on the basis of additional services and CPI adjustment formula. While only two of these variables (toll rate structure and payment to the state) were given weights that would have an effect on the final outcome, the result of the tender was unexpected. Four firms presented bids for the franchise and they all demanded the maximum toll and franchise term allowed by the auction. The selection was decided solely based upon the annual payment to the state, which is inefficient, as we show below. Apparently,

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

[43] All members should be nominated soon after the franchise is awarded and therefore long before any dispute arises. Yet it has recently come to public that this has not been the case in practice.

[44] Section 2.5 stresses the importance of having simple auctions and franchise contracts.

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 Pan-American 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, on 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).[45]

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.*[46] *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 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.*[47] *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, apart from 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 it facilitates defining 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.

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

[46] Even though firms did not bid on the present value of revenue, the franchise contract underlying the building of the Queen Elizabeth II Bridge, tendered in 1987 in the UK, is similar to a LPVR franchise. See EFG (1997e) for details.

[47] The former was $374 million while the latter was $379 million.

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, was repeatedly postponed, and could be auctioned only at the end of 1999, after substantial subsidies were granted (see Box 3.2).

BOX 3.2 (The Auction of the Costanera Norte Urban Highway) *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. 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 makes 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 of insufficient guarantees.*

Apparently, the problem with the project was that pressure by environmentalist groups and neighbors forced MOP to raise environmental standards and modify the original design, thereby increasing the cost of the project more than twofold.[48] *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 payment*[49]*; (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*

[48] Nevertheless, there is evidence that cost estimates increased substantially before environmental concerns were raised.

[49] As of yet, in Chile there is no penalty for not paying a toll. The solution to this problem has been to equip toll booths with traffic lights, so that crossing a toll booth without paying is equivalent to running a red light, the latter being a punishable offence. This strategy is not applicable to electronic tolling, so the legislation needs to be modified in the future.

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 its members 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%.

Apparently, the government interpreted the outcome of the tender as a political failure, not as a signal the project was a white elephant. Consequently, in May of 1999 the Minister of Public Works announced several changes that would make the project financially more attractive: (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 would 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) minimum traffic guarantees were raised to cover close to 100% of the estimated private cost of the project; (iv) participating firms may propose changes to the design of the project; (v) franchise holders were granted exchange rate insurance free of charge. Moreover, the auction method was changed. MOP chose a complex fixed-term franchise with three different auction variables: one-time payment for the franchise, additional time for building part of the project and subsidy (with an upper bound of US$12 million).

The project was put to tender at the end of 1999. Three firms presented offers, and it was awarded to a consortium headed by Impregilio, an Italian firm offering to pay the largest amount for the right of undertaking the project, slightly more than US$12 million. Construction is scheduled to start in March, 2001. ∎

BOX 3.3 (The case of TRIBASA) *Tribasa is a large infrastructure company in Mexico, which was an important participant in the first stage in Mexico's franchise program. At the time, it was one of the companies that was close to bankruptcy before being rescued by the government. Notwithstanding that experience, it became an important participant in Chile's infrastructure program, being awarded three important franchises: Acceso Norte a Concepción, Chillán-Collipulli and Santiago-Los Vilos. After completing the Acceso Norte a Concepción it ran into liquidity problems and sold Chillán-Collipulli in July 1999 and is currently (March 2000) trying to unload Santiago-Los Vilos to another company before the government can seize the financial guarantees it was required to post when it was awarded the franchise. There are some questions about the possibility that a new franchise might not be subject to the penalties that Tribasa would face. This, of course, would*

negate much of the reasons for establishing the guarantees in the fist place. This question will be an interesting test of the solidity of the regulatory framework developed in Chile. ∎

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.[50] 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. An important part of the credit for this feature can be attributed to reforms implemented in Chile since the mid-seventies which considerably strengthened property rights. Perhaps the most evident indicator that there is little fear of expropriation among franchise holders is that they have been quite happy with the "build now, regulate later" approach 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.

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 are being 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.

[50] If guarantees are excessive because the estimated investment and operations cost are overstated, the franchise system no longer serves as a filter against projects that are white elephants.

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.[51] 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 is may facilitate collusion among bidders.[52] Also, it may be expected to limit the scope for creative designs by bidders. However, the experience with Costanera Norte suggests that having a *prequalification 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.[53] The winner receives partial payments after completing specific phases of the project. Delays in completing these phases are penalized. 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 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.[54]

[51] See also Fischer (1995) and Gómez-Lobo and Hinojosa (1999).

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

[53] This 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).

[54] For 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).

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. But, as argued in Section 2.7, 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.[55] These projects have been completely financed with debt, using no capital.[56] 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 studies, EFG (1996, 1998) 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.[57] 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

[55] See EFG, "El Puente sobre el Río Tamésis", *El Mercurio*, June 14, 1997, page D4.

[56] These 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.

[57] It 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.

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.[58] So far MOP 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.

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 contract. 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.[59] It is clearly not desirable that the ministry renegotiates its own mistakes—the conflict of interest is evident.[60]

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 and subsidies. MOP, which is interested in roads being built soon, has been an advocate of guarantees and at times even subsidies. It has often sided with private firms,[61] and claimed that guarantees are key to the success of the program. On the other hand, the Ministry of Finance, in charge of footing 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. Initially the Ministry of Finance prevailed, rejecting the subsidy and claiming that it could not be politically justified. However, after the tendering failed in 1998,

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

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

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

[61] For 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.

the Ministry of Finance lost and almost all that was requested by the construction lobby was granted, in particular a US$80 million subsidy and guarantees that cover all of the project's cost (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 by definition and higher tolls will only make the franchise end sooner.[62] 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 sectoral 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

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

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, 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.[63]

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. In fact, careful examination of the dispute on occasion of the Costanera Norte project shows that the Ministry of Finance did not care when the project's finances were strengthened by increasing tolls that users would pay. 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 MOP. His exact duties and the process by which he is chosen have yet to be specified.

The lack of a regulatory framework is one of the main shortcomings of the program. So far MOP has been in charge of designing, implementing and then monitoring its performance, this without specific regulatory rules. On the contrary, each project has been designed independently and its rules are defined by the specific contract. The conflict of interest is evident, for it is unlikely that MOP will be willing to expose its own mistakes. Moreover, the process has not been transparent enough. For example, calculations made to estimate the level of guarantees have never been made public; neither have social project evaluations supposedly used to justify subsidies (as in the case of the Costanera Norte project).

With exceptions, lack of regulation and transparency may not have been that important so far since most franchised highways were congested and in clear need of an upgrade. Nevertheless, these shortcomings may become far more important now, since MOP has announced a new stage of the program where projects that are clearly not privately profitable will be put to tender with subsidies. Since the construction lobby does not care about the social return of projects, it will be especially important to have independent and public social project evaluations that make sure that

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

subsidies are not squandered in inefficient projects.

4 The privatization of seaports

4.1 A brief description of the seaports problem in Chile.

As Chile is a small open economy, 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.

The Chilean coastline, while long, offers few sites at which ports can be built, without huge sunk investments in artificial protective works and load bearing piers.[64] A new entrant in the seaport market would need to incur considerable sunk investments, so there exist substantial barriers to entry into the sector. The three main Chilean seaports for general cargo (which used to be 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.[65]

There are 10 state owned seaports and 22 private ports. Of the state owned ports, four have been recently franchised for long periods to private operators. 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 was analyzed carefully so that problems with the franchises would 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.[66] 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

[64] There exist some natural bays that have not yet been developed or are in the process of being 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.

[65] See also, Fernández (1998).

[66] In 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.

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 to the failures of internal organization that obstructed optimization of seaport activities. This was specially noticeable in the container segment of the business.

Thus, ports became congested even though with appropriate equipment and internal organization it would have been possible to achieve 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 (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 imply 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 desire to franchise the state ports to single operators, which would internalize all the externalities present in a multi-operator scheme, therefore investing in equipment and optimizing 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 government program of franchising its ports under a mono-operator scheme began with Valparaíso, San Antonio and San Vicente, the three main ports.[67] The port terminals were not franchised in their entirety: smaller terminals remain under the previous multi-operator scheme. 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

[67] Two terminals were franchised in San Antonio: the general (and container) terminal and the bulk cargo terminal.

ports; it transfers 37% of general cargo and 30% of the region's containers.[68]

The objectives of EMPORCHI, the state owned company that owns the state ports were:

- Obtain a canon (for the state) that corresponds to the rental value of its assets.[69]
- Use the ports efficiently and have users pay the price that corresponds to an efficient use of the port infrastructure.
- Contribute to having a Chilean port become one of South America's megaports.

Prior to the beginning of the franchising process, EMPORCHI divided itself into autonomous port authorities, corresponding to the different ports that would be auctioned. The port authorities will supervise service quality and will be legally responsible for supervision of the fulfillment of the conditions of the franchise contract.

4.2 The auction mechanism

After a technical selection process for interested parties from all over the world, the firms competed on the basis of the maximum rate they would charge for a composite of unit services provided by the port. The value of this index had to lie between a maximum and a minimum value. According to the rules, if firms reached a minimum value, they had to compete on the basis lump sum payments to the government. As we show below, the lower bound was much more important than the upper bound, which was never active in all three auctions.[70] In fact, in the first three auctions the lowest price was reached and the government collected almost US$294MM as a result.[71] Recently, the government auctioned the smaller Northern ports of Arica and Iquique. Only one bidder showed up for Iquique and none for Arica, possibly reflecting the fact that both concessions were not privately profitable.

4.3 Market structure and 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.[72] Since seaports represent a bottleneck for maritime transport, they represent a strategic stage for a franchise holder interested in reducing competition in maritime transport.

[68] Source: EMPORCHI and Cámara Marítima y Portuaria, 1997.

[69] There are two reasons for this: 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.

[70] The upper bound is used as an insurance in case the government gets really bad bids.

[71] It could have collected more since one firm won all three auctions, but had to relinquish Valparaíso due to anti-monopoly rules included in the design of the auction.

[72] A common carrier is a natural monopoly in a required intermediate stage in a production process. Well know examples are 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.

Chile's experience in managing common carriers has not been fortunate. 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 was (until recently) able to leverage its local telephone monopoly (a common carrier for other portions 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 forced several players in the market to exit while others came 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 initially two competing projects (of which only Gasandes survived) 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.[73]

In the case of ports, a port owner can monopolize the shipping market by not investing 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 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 is only one firm operating in the franchised port charging the monopoly price, even though technically there is free entry into shipping.[74] The difficulty in verifying quality of service implies that auctions based on price might run into trouble if the franchise holder also owns a shipping company.

BOX 4.1 (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*

[73] It is not clear what will happen when the contracts come up for renewal since there is no threat of a competing gas pipeline in gas transport.

[74] Economides (1999) has examined the incentives to lower quality for an unregulated monopoly which is vertically integrated with a downstream firm in a quantity competition setting.

tariff. There is no regulatory supervision on the quality of port services. Suppose there is price 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.[75]

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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 room for renegotiation.

The Chilean government chose 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 a minimum price is reached, by the applicant that offers the highest lump sum payment to the state.[76]

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). As mentioned earlier, 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, the franchise contract should include an auditing scheme for quality if such a scheme is used. 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.[77] 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 problems are exacerbated since in the case at hand the monopoly behavior involves quality of service and not price.

[75] Using Economides' arguments, this example can be adapted to a quantity competition setting.

[76] We show below that the existence of a minimum price was essential to the avoidance of an integrated monopoly.

[77] The 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.

This explains the vertical and horizontal restrictions the government imposed on potential franchise holders. The government argued that restrictions on lateral and vertical integration were necessary to prevent monopolization. It decided to award one of the three main ports to a different firm, and limited the participation of a shipper in a bidding company to 40%.[78] These restrictions delayed the privatization of ports for a year and a half, due to judicial stay orders requested by Chilean operators. The main Chilean shipper was excluded from fully controlling any of the ports under the proposed restrictions and 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.

The shipping companies argued that these restrictions were inefficient and irrelevant, since the franchise-holder can always make underhand arrangements with shipping companies to monopolize shipping through the port. Competition among shipping companies would ensure that the franchise holder would receive all of the rents. Moreover, the companies argued that since the ports of Valparaíso and San Antonio are less than sixty miles apart, they would compete, thus eliminating the possibility of a monopoly.

In EFG (2000b) we study whether restrictions on vertical integration together with auctioning the franchise are effective means of regulating a port monopoly. It is well known from monopoly theory that an unregulated owner of an essential facility can exploit most of its monopoly power simply by choosing its price—vertical integration is not necessary to extend monopoly power. A competitive auction to set the cargo-handling fee is thus necessary to regulate the monopoly. When regulated, however, the monopoly can still exploit its power if it vertically integrates into the competitive segment and drives its competitors out of business by discriminating them.

As argued by the shipping companies, it is not enough to prohibit vertical integration to prevent discrimination and monopolization, since underhand agreements are still possible. Yet, and this is the main rationale for restrictions, these agreements cannot perfectly replicate vertical integration because separation introduces a conflict of interest that forces the port to share some of the rents with the shipper and to distort production. One of the reasons why underhand agreements are inefficient is that the shipper knows its costs with more precision than the port, and thus incentive-compatibility constraints force the non-integrated port to pay an informational rent and distort production decisions. But there are several other reasons why the port may be forced to share rents and distort production, and all of these make monopolization less attractive, when compared

[78] This restrictions applied for 'relevant shippers', i.e. companies that carry more than 25% of the cargo transferred in the 'region', a geographical division of Chile. This is a prospective rule, i.e. it must hold during the life of the franchise.

with operating the port for volume with a competitive shipping market. Thus, a competitive shipping market becomes more likely with mandatory vertical separation.

Restrictions to vertical integration, however, are not enough. The second necessary element to make underhand agreements unprofitable, is to set a minimum cargo handling fee below which firms competing for the port cannot go. The reason for this is that when the floor is set too low (say, at zero), competition in the auction would eat up the rent that the port could earn under a competitive shipping market, while not affecting the profitability of a potential underhand rent–sharing agreement (cargo handling fees set in the auction become irrelevant when an underhand agreement is closed, because rent sharing is governed by the underhand agreement, not by the fee set in the auction). Thus, a very low cargo handling fee would make monopolization inevitable, independent of whether vertical separation is allowed. Moreover, it can be shown that when monopolization occurs (with or without integration), welfare is lower than with an *unregulated* port. Hence, it is better to err by fixing the minimum fee too high rather than too low.

In summary, both the auction design and restrictions to vertical integration were sound measures. If anything, our results suggest that the limits to vertical integration should have been set lower than 40%, and that this concession to lobbying pressures by the shipping companies should have been avoided. In order to reduce the possibility that franchises lower quality to competing shippers, the independent port authorities should monitor quality closely, enforcing penalties for bad service, using yardstick competition (on quality standards).

Finally, one may wonder why the LPVR mechanism is not used in seaport franchises. Since efficient demand management is one of the fundamental objectives of seaport concessions, and this is 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 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 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 mixed. The open and competitive auctions used to determine the concessionaire are a major advantage, and so are the simplification of the complex awarding mechanisms used in the early stages of the program. 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, the estimations of construction costs used to calculate guarantees and the social project evaluations that led to subsidies for the Costanera Norte highway have never 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. Preliminary evidence from a recent World Bank study shows that fixed-term franchises awarded to the firm bidding the lowest fee are much more likely to be renegotiated than concessions awarded with alternative mechanisms.

The lack of a regulatory framework is one of the main shortcomings of the program. MOP has been in charge of designing, implementing and then monitoring its performance, this without

specific regulatory rules. With exceptions, lack of regulation and transparency may not have been that important so far since most franchised highways were congested and in clear need of an upgrade. Nevertheless, lack of regulation and transparency may become far more important now, when projects that are clearly not privately profitable will be put to tender with subsidies. The Costanera Norte auction suggests that the construction lobby has been quite successful in influencing the terms of contracts in their favor, and that the Ministry of Finance will not be able to stop subsidies in the face of a "failed" auction. Clearly this lobby does not care about the social return of projects, so that it will be especially important to have independent and public social project evaluations that make sure that subsidies are not squandered in inefficient projects. In that sense, Costanera Norte suggests that Chile may be losing one of the main advantages of franchising, namely subjecting projects to a market test.

The government has also franchised Chile's main ports. Initially there were long delays due to court actions by opponents of the scheme chosen 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 bidders 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.

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. This was the reason for the delay, as the private firms that were affected went to court. Eventually, the stay orders were lifted and the government proceeded to auction the ports. It is too early to claim that the concession process has been a success. The government was right in restricting vertical integration and fixing a floor to the cargo-handling fee that ports can bid in the auction. Nevertheless, it is an open question whether the mechanisms in place are sufficient to safeguard quality levels against a determined franchise holder, because shippers can own up to 40% of a port. It is noteworthy that the main Chilean operator won the first three auctions for general cargo ports.[79] It was only the application of antimonopoly

[79] This was the company most opposed to restrictions on vertical integration.

clauses in the auction rules that made it give up Valparaíso. Moreover, it was the winner and only bidder for the port of Iquique. These results make it likely that the government's apprehension over the possibility of a monopoly were not entirely groundless.

A franchising program such as the one described in this paper faces a tradeoff between the speed at which it proceeds and the costs associated with 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, even though recent developments in the Tribasa case are worrisome. 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 report. First, an agency that is independent from the ministries in charge should be established to enforce quality standards and monitor compliance with concession contracts. Second, the dispute resolution mechanisms should be improved. Third, LPVR auctions should be the main option in highways franchises. Fourth, minimum income guarantees provided by the government should be avoided whenever 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 franchising program.

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Table 1: 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 MOP

Table 2: 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: EFG (1996) from MOP, Chile.

Table 3: 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: EFG (1996) from Compendio Estadístico 1991-1994, INE

Table 4: 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: EFG (1996) FROM MOP

Table 5: Highway Franchising in Chile: 1993–1998

1 **Project**	2 **Term (years)**	3 **Bidding variables**	4 **Number of tenders**	5 **Investment (US$ mill.)**	6 **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

	Investment 1997-2015 (US$MM)		Demand in MMtons		
Ports	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: Moguillansky (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.