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PUBLIC-PRIVATE PARTNERSHIP AND TARIFF SETTING: THE CASE OF CHILE

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Abstract: In this document I provide an analysis of the regulated tariff scheme for water and sanitation services in Chile. The primary purpose is to describe the organization of the sector, including utility companies, and regulatory institutions. Furthermore, I also provide accounts of the design and operation of the current regulated tariff scheme. An analysis of the main characteristics of the Chilean regulated tariff system and its implementation thus far is also provided.

1. Introduction

Water and sanitation services in Chile were traditionally perceived as a public good that should be provided by the state. Since the second half of the 1970s, and in parallel with the macroeconomic transformations, the military government started a process of legal, economic, and institutional transformations in sectors that were traditionally seen as the responsibility of the state. These sectors included telecommunications, electricity, and water and sanitation. In effect, since 1975 the government took the first steps in a long-run program intended to promote structural changes in the Chilean water and sanitation sector. The democratic government continued implementing those changes into the nineties. The transformation within the sector has included, legal reforms, changes in the organization of providers, changes in ownership of utility companies, the design of new regulatory institutions, design of a new regulated tariff scheme, and the implementation of a comprehensive direct subsidy program for the water and sanitation services to low-income households.

The aim of the document is to provide insights on the Chilean experience on the design and implementation of a regulated tariff scheme for water provision. I describe the principles under which the system was designed, the setting for the tariff structure, and a description of the administrative procedures for the process of tariff determination. An assessment of the elements that are behind the successful implementation of the system thus far is also provided.

The layout of this document is as follows. Section 2 begins with a brief description of the organization of the system for water and sanitation service provision in Chile. Section 3, is devoted to the analysis of the regulated tariff scheme introduced in the country by the end of the eighties. In section 4 I describe the effects of the implementation of the scheme on tariff levels and water consumption. An analysis of the regulated tariff system as well as of its implementation is provided in section 5.

2. A Brief Description of the Chilean Water and Sanitation Sector

Provision of water and sanitation services in Chile is under the responsibility of several utility companies, each of them being operated as a local natural monopoly.¹ Ownership of the providers is heterogeneous. In some cases providers are private, in many others, utility companies are state-owned. Mixed ownership is also present and seems to be the norm. Despite the heterogeneity in ownership structure, since the introduction of the legal and institutional reforms of 1988/1989, utility companies whose principal owner is the state are organized and must operate under a structure that is similar to the private companies.

The new institutional design of the sector was introduced in 1988. It considered the allocation of a franchise to each company to authorize its operation. The concession is transferable, indefinite, and is allocated for each of the stages in which the productive process involved in water and sanitation provision can be divided: water production, water distribution, water collection, and water treatment and disposal.² Taking into consideration only the urban areas of the country, and data from the state regulatory agency, by the year 2000 there were 44 utility companies in operation distributed among the 13 political-administrative regions into which the country is divided.

Several utility companies are still under the control of the state. The private sector has just recently started to take control of some of the main utility companies in what is perceived as the first steps of the privatisation of the sector. Regarding the size of the companies, there is an important degree of variability. A list of each of the principal companies currently operating in urban areas at the regional level is provided in Table 1. Also shown there is the current number of customers per company and the stakeholder group. While EMOS S.A., the largest company in the country, located in the metropolitan region of Santiago, has over 1,200,000 customers (36.8% of the total number of customers in the country). Figures in Table 1 suggest that the 13 companies listed there provide services for almost 90% of urban customers in the country.

According to the new regulatory design, utilities holding a franchise are under control of a state regulatory agency called Superintendencia de Servicios Sanitarios (SISS). The SISS is the regulatory institution for the national water and sanitation service sector. The SISS was created by law as an autonomous, decentralized governmental agency, which depends on the President through the Ministry of Public Works. The SISS was created as a part of the process of legal, economic, and institutional

¹ A natural monopoly exists when it is more efficient for one firm to serve the market than to have multiple firms serving the market.

² The franchise is given for each specific locality. The utility company holding the franchise is obligated to provide the service within the geographic region of that locality. In total, there are 317 urban localities with about 335 related systems [Morandé and Doña (1997) and SISS (2000)]. A sanitation system is defined as the set of installations, water sources, receptors of effluents, among other assets, with feasible interaction at different stages of the sanitation service: water production, water distribution, water collection, and treatment and disposal.

transformation of the water and sanitation services sector started at the end of the 1980s. The SISS is responsible by law for the controlling the sector. The agency has normative responsibilities, including enforcement and compliance with norms relative to water and sanitation services provision. Furthermore, the SISS has a relevant role in the determination of the tariff formulas to be applied to consumers (see the discussion related to tariff design and tariff process in this report).³

Table 1
Customers Distribution and Stakeholder Group for Selected Companies and Region. Chile, 2000.

Region	Main Utility Company in the Region	Number of Customers. ^a	Urban Population	% Customers ^b	Stakeholder Group
I De Tarapacá	ESSAT S.A.	97.1	378.8	2.9	Chilean Fisco
II De Antofagasta	ESSAN S.A.	106.5	453.6	3.2	Chilean Fisco
III De Atacama	ESSAT S.A.	62.6	249.0	1.9	Chilean Fisco
IV De Coquimbo	ESSEL S.A.	132.3	426.4	4.0	Thames Water
V De Valparaíso	ESVAL S.A.	370.1	1,430.9	11.2	Anglian Water
VI De O'Higgins	ESSEL S.A.	138.4	534.8	4.2	Thames Water
VII Del Maule	ESSAM S.A.	150.2	578.9	4.5	Chilean Fisco
VIII del Bío-Bío	ESSBIO S.A.	349.4	1,559.5	10.5	Thames Water
IX De la Araucanía	ESSAR S.A.	142.5	577.7	4.3	Chilean Fisco
X De Los Lagos	ESSAL S.A.	125.4	696.4	3.8	Iberdrola
XI De Aysen	EMSSA S.A.	17.9	71.0	0.5	Chilean Fisco
XII De Magallanes	ESMAG S.A.	39.8	145.8	1.2	Chilean Fisco
Metropolitana	EMOS S.A.	1,220.8	5,915.9	36.8	SLDE-Aguas Barcelona
Total		3,313.3	13,018.9	89.0	

Sources: Superintendencia de Servicios Sanitarios, and National Institute of Statistics.

^aThousands of customers.

^bPercentage of customers in the region over total customers in the country.

3. The Regulated Tariff Scheme for Water Provision in Chile

We now turn our attention to describe the design, and operation of the regulated tariff scheme for water and sanitation services in Chile. We will focus on aspects of the regulation that pertain to the principles guiding the scheme, tariff structure, and administrative procedures for tariff determination.

³ Specifically, the SISS has among its duties: i) studying, proposing, and enforcing compliance of technical norms relative to the design, construction, and exploitation of sanitation services; ii) monitoring and enforcing of norms relative to tariff per services provided by utility companies operating in the sector; iii) application of the franchise regime, including allocation, exploitation, transferences, and expiration of the franchise; iv) defining norms and executing control over industrial effluents; and v) applying penalties and other types of sanctions to violators of the existing regulations in the sector.

3.1 Principles

Regulated tariff system in Chile is intended to introduce appropriate incentives to the development of the sector as well as economic incentives for consumers.⁴ The legal framework that supports the Chilean water and sanitation tariff system was structured under the following principles: i) dynamic efficiency, ii) economic efficiency, iii) intelligibility, iv) equity, and v) self-financing [SISS, internet site]. The principle of *dynamic efficiency* is included in the tariff law and associated regulations by the introduction of the concept of a model firm that operates efficiently. For regulated tariff design purposes, a model firm is an idealized conceptual firm that performs an efficient operation, different from each of the real utility companies.⁵ The concept of a model firm was introduced to allow the regulator to estimate the costs upon which to define tariff formulas independently of the actual firms operating in the sector. In addition, *dynamic efficiency* also means that productivity improvement in the production and provision of the water and sanitation service can be incorporated in the tariff formulas over time. It can be accomplished by designing the model firm for each tariff processes.⁶

The *economic efficiency* principle is considered in the tariff design under the concept of marginal cost. The very basic conceptual idea behind this principle is that marginal cost represents the opportunity cost of producing an additional unit of a good or service; therefore, it represents the amount of resources that society should allocate to the production of that good or service. The Chilean tariff law introduced this principle through the concept of *incremental cost of development*. It is defined as the “value equivalent to a constant per unit price which, when being applied to the incremental forecasted demand, generate revenues to cover incremental operation efficient costs and the required investment from an optimised project of expansion of the firm, such that it should be consistent with a net present value (NPV) of the project equal to zero.” [D.F.L. No 70/1988].

With regard to the principle of *intelligibility*, the legal tariff framework considers a tariff structure that is intended to provide appropriate incentives to guide decision of consumption and production to the economic agents involved (consumers and utility companies). The tariff structure considers tariffs per stage of service provision (production, distribution, collection, and disposal and treatment), per system of provision, and per seasonality in demand.

⁴ The Law of Tariffs, D.F.L No 70/1988, introduced the current tariff system in 1988. The associated operative rules were promulgated in 1990 under Supreme Decree (D.S.) No 453.

⁵ A model firm is understood to be a firm that in its design contains the following characteristics: a) provides sanitation services with a design that includes efficiency in services provision, b) operates with all feasible interconnections among companies and systems to achieve maximum efficiency, and c) the firm develops its activities under current law and norms, given geographic, demographic and technological characteristics. Each of the model firms must have an administrative and institutional design, and a physical scheme of the model system for the stages of the sanitation service being considered [Medina (2000)].

⁶ Because tariff formulas are modified every 5 years, each provider has incentives to obtain efficiency gains that might be funded through cost savings obtained within that period.

The *equity* principle being applied implies a non-discriminatory tariff policy among customers, except when there are different costs of service provision. Under this principle, the tariff system is designed in a way so that tariffs reflect the costs of water and related service provision at its different stages, eliminating cross subsidies for customers within a given system.

Finally, under the *self-financing* principle, the legal framework recognizes that it is possible that a firm that is being regulated with marginal cost-based tariff might not be able to become self-financing. The situation was considered by the introduction of the concept of *long run total costs*. These types of costs represent the cost of repositioning a model firm that is starting its operation, with the appropriate size to provide services to the annual demand corresponding to a period of five year.⁷ The application of the tariff formulas should allow each company operating efficiently to cover its long-run total costs.

3.2 Tariff Structure

In principle, the regulation considers the tariff as a maximum price that utility companies might charge to consumers. As we mentioned before, tariffs are established based on the concept of incremental cost of development. The law requires that tariff be determined according to stage of the service provision and by system. The tariff structure also considers variable and fixed charges and explicitly differentiates by seasonal demand. In the event of differences in demand by season, tariff structure includes, for each stage of the service and system, the following items: variable charge in high demand season (tariff per cubic meter in $\$/\text{m}^3$), variable charge in low demand season ($\$/\text{m}^3$), and variable charge because of over consumption ($\$/\text{m}^3$) (applies only in high demand season).⁸ In the absence of seasonality, there is only a uniform variable charge. Regarding fixed charges, the current tariff structure considers only a fixed charge per customer, which depends on the diameter of the connection [see an example in Table 2].⁹ The explicit consideration of differences in demand by seasons is intended to introduce in the tariff structure the differences in the costs of service provision.

⁷ The actual estimation of the long-run total cost is transformed in annual operation and investment costs. It represents the required revenue to the reposition of the model firm considering a time horizon of 35 years. We notice here that the annual demand for the period of 5 years is considered because, according to the regulation, a tariff term lasts for that period.

⁸ Charge because of over-consumption is applied on the amount of cubic meters that exceed the customer average consumption within periods defined as high seasonal demand.

⁹ The two tariff processes implemented prior to the legal adjustments introduced in 1998 considered two additional types of fixed charges. They were related to the distribution stage of the service provision and included a fixed charge for equivalent connection to the distribution system and a fixed charge for equivalent union to the water collection system. The changes in the legislation introduced in 1998 established that the cost recovered by fixed charges already mentioned, will be included in the variable charges.

Table 2

Tariff Structure for Water and Sanitation Services for ESSBIO (One Tariff Group)^a
(December of 2001)

	Chilean \$	US \$ ^b
Fixed charge		
Customer	605.0	0.90
Variable charges		
<i>Low demand season</i>		
Water (\$/m ³)	232.7	0.34
Sewage (\$/m ³) ^c	204.2	0.30
<i>High demand season</i>		
Water (\$/m ³)	227.0	0.34
Over consumption		
Water (\$/m ³)	476.7	0.71

Source: Superintendencia de Servicios Sanitarios (SISS).

^a The company has two tariff groups. Each of them applied on consumers living in some of the two service areas of the company.

^b Consider an exchange rate of 675 \$/US\$.

^c The sewage tariff applies for all consumers located in the Bío-Bío river Basin.

3.3 Administrative Procedures

From a practical perspective, the Chilean tariff regulation explicitly considers administrative procedures for the process of tariff determination. In principle, the process considers the interaction of the SISS with each utility company for which tariff formulas are being regulated; however, the regulation of the tariff process allows also any interested party to participate. Specifically, the general public is allowed to make observations to the process. The law establishes that tariffs are defined for periods of five years. The regulation considers mechanisms of automatic indexation to adjust tariffs by inflation within that period. The determination of tariff—the tariff process— is implemented under a set of administrative steps that are clearly identified in the legislation. The procedures to be applied in the process are intended to make the implementation of regulations a transparent process. In addition, the procedures also allow the regulatory agency (SISS) and utility companies the possibility to interact.¹⁰

Chronologically, the administrative process of tariff determination includes the following steps [Medina (2000)]. First, twelve months before the expiration of current tariff application, the regulatory agency SISS should make available to the public and to the utility company involved, the terms of references upon which tariff studies should be conducted. Second, companies and the general public have

¹⁰ Since the adoption of the new regulations for the sector, three tariff processes have been successfully completed: 1989-1990, 1995-1996, and 1999-2000. The first two of them were conducted considering the initial regulation under which regulated companies had a passive role. In effect, at that time they were only allowed to make observations to the regulatory agency proposals. Given the legal adjustment of 1998, utility companies now

a period of 60 days to make comments on the terms of references for tariff studies. The comments should be communicated to the SISS. Third, the regulatory agency must respond to the comments within a period of 45 days before the deadline of the request. Fourth, the regulation establishes that regulator and the utility company should exchange their own tariff studies at least 5 months prior to the expiration of the current tariff formulas. The exchange of studies takes place formally in the presence of a public notary. Fifth, after the exchange of tariff studies is performed, the company has 30 days to inform to the SISS of eventual disagreements. Should discrepancies exist, they must be formally presented to the SISS along with the studies supporting company's opinion. Sixth, if within a period of 15 days after the company presentation of the discrepancies, there is no agreement between the regulatory agency and the company, the SISS is allowed to appoint a Committee of Experts.¹¹ The Committee must resolve the discrepancies by making explicit its opinion on the sources of discrepancies. The opinion of the Committee of Experts is definitive and mandatory for both parties. Seventh, and finally, 30 days before expiration of the application of the current tariff formulas, the Ministry of Economy should define the new tariff formulas and start formal procedures in the Contraloria General de la Republica. The process is completed with publication of the tariff formulas in the Official Newspaper.

4. Implementation of the Regulated Tariff Scheme

Before 1990 one of the main features of the tariff system in the Chilean water sector was that they did not reflect the true cost of providing the service. Early in 1990 a new tariff system was applied. The target was to enable an efficient firm to self-finance its operation and development. This framework was gradually introduced. As a result, charges on water and sanitation services increased substantially in real terms in the first four years. Price increase was steeper in areas with higher cost [Morandé and Doña (1997)]. By 1998 average regional water tariffs ranged from U\$0.44 to U\$1.20 per cubic meter of consumption. Table 3 shows the evolution of average tariff over time in some selected providers throughout the country for the last five years. The introduction of price regulations intended to reflect the true costs made it necessary to design a subsidy for water demand consumption to mitigate the impact on the poor.

have a more active role. In fact companies must now participate in the tariff process conducting their own tariff studies and tariff formula proposals parallel to that of SISS.

¹¹ The Committee of Experts is composed of three people. According to the regulation, one person is appointed by the SISS, another by the utility company, and the third person also by the SISS chosen from a list of names previously agreed with the company.

Table 3
Average Water Tariff per Selected Provider 1996-2000 (US\$ / m³)^a

<i>Region and Utility Company</i>	1996	1997	1998	1999	2000
North of the Country (desert): ESSAN	0.94	1.18	1.20	1.29	1.39
Center-North of the Country: ESVAL	0.48	0.62	0.63	0.68	0.76
Center of the Country: EMOS	0.26	0.31	0.31	0.32	0.39
Center-South of the Country: ESSBIO	0.38	0.43	0.44	0.45	0.48
South of the Country: ESSMAG	0.47	0.67	0.81	0.76	0.84

Source: Calculations based on information from SISS (several years) and Banco Central of Chile.

^aTariffs in constant US \$ (2001). Figures were calculated dividing the total annual revenues from the franchise operation by the total amount of annual water cubic meters billed.

As it was mentioned, before 1990 prices for water and sanitation service did not reflect the true cost of providing the service. Given that situation and the cross-subsidies implied by it, a culture related to water care did not exist in Chile at that time. No historical records on average water consumption exist, but a conservative estimate based on information obtained from some of the providers suggests that since the end of the 1980s, average water consumption per consumer was reduced by about 50% after the tariff increase. Estimations on recent available information for the year 2000 suggests that average monthly consumption of water in Chile is about 22.7 m³/customer.

5. Analysis of the Chilean Regulated Tariff Scheme

5.1 Tariff Design and Implementation

The tariff system for water and sanitation services in Chile was considered in the legal reforms of the sector in 1998-1999. The main characteristics of this regulated tariff system are:

- i) Price signal for providers. Tariff design in Chile incorporate not only the need to cover current operational costs, but also the required funding and returns for investment to ensure the development of the sector in anticipation of future demand. On one hand, water production and sanitation services have very high fixed costs and low marginal costs, on the other hand water and sanitation service demand is expected to relatively inelastic, at least from a social perspective. Under that market structure for water services, it is likely that when demand increases, prices would eventually increase rapidly because firms can not increase output beyond fixed capacity. Prices that provide right incentives to suppliers to expand fixed capacity as demand increases avoid future deficit in the provision of sanitation services.
- ii) Tariff as a signal for consumer decisions. The tariff design is intended to provide a clear signal of the true social cost of water production and provision as well as the related sanitation services. Tariffs are in

principle a way to generate the right incentives in the context of a decentralized system where million of consumers take daily decisions on how much water to use and how to use it.

iii) Avoiding cross-subsidy. The Chilean tariff structure for water and sanitation services explicitly pursue to avoid cross-subsidies. Under the current tariff system, it is likely that any two consumers receiving water and sanitation services from a different system in different regions will face different costs. For example, as a result of the tariff processes implemented under the current tariff regulations, water tariff in the north region, where water is a scarce resource are higher than those that are faced by customers in the south, where water is available, and therefore the cost of provision are lower.¹²

iv) Gradual Implementation. Tariff increase was gradually introduced after the first tariff process was completed in 1990. The tariff increase was trespassed to consumer between 1990 and 1995.

v) Tariff term. The length of the tariff term should be long enough to allow providers to avoid costs associated to tariff renegotiation and also make it possible that they be able to recover efficiency enhancing investment. However, at the same time, tariff term should short enough to trespass on customers the efficiency gains through the model firm. As usual a trade-off seems to be present in the decision.

5.2 Tariff Process

The new model for designing tariff formulas in water and sanitation services in Chile has been applied since 1990. In that period, and according to the current regulatory framework, three tariff processes have been completed. The main features from that processes are:

i) Transparency. One of the main features of the tariff process is the transparency in its implementation. In effect, all interested parties know in advance the regulatory steps, the associated timing, and rights and obligations.¹³

¹² It is believed that cross-subsidies are still present to some extent. That might be the situation because the actual tariffs for systems that are closed to each other from a geographic perspective are obtained by averaging the specific tariffs for each system.

¹³ However, some authors have pointed out that during the implementation of the first tariff process in 1989-1990, not all formalities were followed. In particular, some utility companies complaint that they did not have the chance to effectively participate in the process, having instead a passive role. The situation changes during the implementation of the second and third tariff process in 1994-1995, and 1999-2000. After the third tariff process, and because of complaints from customers that faced bill increase, the SISS has just recently requested to the companies to provide further information to customers on the result of the tariff process. It is not clear at this point the precise reasons behind the complaints; but they may be in part related to an effort to improve the targeting of the water subsidy program.

ii) Participation. Although the regulatory framework initially allow only participation of the regulatory agency (SISS) and the regulated company, part of the reforms introduced in 1998 were intended to increase participation and the transparency of the process, allowing also the possibility of intervention of the general public.

iii) Information requirements. The implementation of the tariff regulations requires that the regulator interact with providers. In particular, the regulator should be able to obtain detailed information on several aspects related to costs and operation of each utility company whose tariff formulas are being regulated. A potential difficulty faced by the regulator in this situation is known as an asymmetries information problem. This type of problem exists because the regulated firm holds valuable information from the regulator. One way to avoid this problem, which have been considered in anticipation of the privatisation of companies, is that the state be able to keep a participation in the company ownership.

iv) Protection for low-income families. Because the tariff process have implied an important increase in tariff levels; achieving in some cases tariff levels that more than double the levels previous to the regulatory reform, the implementation of the subsidy to the demand program have clearly improve the acceptability of the reforms. It is also likely that the subsidy program has make politically viable the regulatory reform process.

Structural reforms in the Chilean water and sanitation sector have been gradually introduced in the last 25 years. These changes have to do with the design of new legal rules, institutions, and economic incentives for providers and consumers. The main effects of the reforms are related with the increase in coverage for service provisions, ownership and organization of the firms, and the introduction of a new regulated tariff scheme. Further, it seems very possible that viability of the transformations and its impacts on tariff increase have been achieved because of its gradual implementation and the design of an reasonable well targeted subsidy direct to the demand program explicitly intended to protect low income families.

Despite the progress that has been made, the sector faces new challenges. Ensuring water quality seems to be a priority for the almost universal coverage already achieved in urban areas. Coverage for rural areas, a sector not considered here seems also be in need of an institutional design, and new regulatory framework. The increasing pressure for water treatment and others environmental related issues are also been anticipated by policymakers and analyst of the sector. Finally, the privatisation process of the providers is just starting, without doubt new regulatory challenges and lessons need to be address in the future.

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