United Nations University
WIDER
World Institute for Development Economics Research

Discussion Paper No. 2001/74

The Reform of the Utilities Sector in Argentina

José A. Delfino[1] and
Ariel A. Casarin[2]

September 2001

Abstract

The Privatization of the national public utilities that took place almost a decade ago in Argentina seem to be explained by the persisting deficits of the enterprises, a general dissatisfaction with their performance and the difficulties government faced in their control. During the period of private management, companies restructured their revenues by both regrouping consumers and raising their two-part tariffs unevenly, increased the number of customers and achieved perceptible quality improvements. For assessing the impact of the reforms in the telecomunications, electricity, natural gas and sanitation services upon residential consumers' economic well being, welfare changes of the initial consumers and the surplus of the newcomers are estimated using household level data from the Gran Buenos Aires. The results obtained suggest that the direction as well as the intensity of welfare changes differ across income groups and services and that magnitudes vary according to the rigidity of demands; the benefits for the newcomers also differ across services but they seem to have had little significance in all cases, except in water and sewage.

Keywords: privatization, public utilities, regulatory reform, welfare changes, consumer surplus

JEL classification: D1, D6, L5, L9

[1]Nacional de Córdoba (Córdoba); [2]Warwick Business School (Coventry).

This study has been prepared within the UNU/WIDER project on The Social Impact of Privatization and Regulation of Utilities in Latin America, which is co-directed by Dr Cecilia Ugaz, UNU/WIDER (Helsinki) and Professsor Catherine Waddams Price, School of Management, University of East Anglia (Norwich).

UNU/WIDER gratefully acknowledges the financial contribution to the project by the Ministry for Foreign Affiars of Finland.

Acknowledgements

The authors wish to thank the participants at the UNU/WIDER meeting in Helsinki for their discussions. We are also grateful to Cecilia Ugaz and Catherine Waddams Price for their comments on a previous version of this paper. All remaining errors are our responsibility.

1. Introduction

The privatization of public enterprises began in Argentina in 1989, a decade after the process was launched in the UK, and seems to have been lead by the same reasons. In fact, the motivations behind the programme consisted of the negative effect on certain macroeconomic variables caused by the frequent need to use public funds to finance service extension or merely to cover firm's operating deficits, the general dissatisfaction with public management performance mainly characterized by the poor quality of the services, and the difficulties faced by the government in controlling them. These factors, as well as the transformation of some monopolistic activities into competitive ones made possible by technical progress and the contribution of new developments in economic analysis, have moulded public opinion to believe that the state should leave market-oriented activities to the private sector concentrating on areas where private involvement would not be possible, and consequently to support the programme.

Furthermore, several macroeconomic imbalances, such as hyperinflation, declining economic activity and large fiscal deficits (to a great extent explained by public utilities losses), placed privatization at the centre of a broader programme of reforms. This critical economic situation had two important consequences. On the one hand, it put pressure on the privatization process by constraining public policies. This was translated into weak regulatory mechanisms that initially ignored the market structures emerging as a consequence of privatization (although more rigid regulations were adopted later and competition was encouraged by splitting up the utilities being privatized). On the other hand, the prevailing economic situation of the country prompted significant tariff increases during the preprivatization period and the progressive elimination of cross-subsidies. Both measures were intended to achieve more cost reflective prices in order to ensure private operators a reasonable rate of return.

The purpose of this paper is to assess, after a decade of reforms, the welfare changes and the distributional impact associated with the privatization of telecomunications, electricity, natural gas, and water and sewerage services of the Gran Buenos Aires area. It is interesting to focus the analysis on Buenos Aires because it is the site of the earliest reforms and also because it is the region where privatization has been completed for all four utilities. In addition, a third of the country's population is concentrated around this area; it also accounts for half of the country's industrial production and an even more important share of the services' output. The reform of public utilities in Argentina is still incomplete as many provincial water and electricity distribution companies are still in the hands of the public sector. The results of this study, however, are highly indicative of the changes to be expected in provinces where reforms have already been implemented or are forthcoming.

The paper is organized into five sections. Section two briefly describes the main aspects of the privatization process of utilities in Argentina with an emphasis on the restructuring of the markets involved. The third section presents and analyses the evolution of the structure and level of residential tariffs from the start of the reforms to the present. The fourth section introduces the methodology adopted for estimating both changes in consumer surplus for users at the time of reforms and the expected welfare effects for newcomers to

the system as a result of privatization. It also describes the data and discusses the results. Finally, the last section summarizes and concludes the paper.

2. An overview of the privatization programme

The reform of the utility sector began in Argentina in 1989 when the Peronist Party, having won the presidency and both houses of congress, launched a programme of structural reforms. The legal and conceptual framework for privatization was quickly established through national legislation of State Reform Law (No. 23,696) and Economic Emergency Law (No. 23,697). These were complemented with other decrees and ministry resolutions. In view of the prevailing economic environment at that time, it is not surprising that privatization was not only motivated by efforts to improve the performance of the markets, but that it was also fiscally driven. Furthermore, with the urgent aim of improving fiscal performance, the reform programme followed a decentralized implementation, albeit with central monitoring.

Two phases can clearly be distinguished within the process. The first period lasted until 1991 when the government implemented a very stringent stabilization plan. Reforms were brought about almost exclusively through executive decrees without sufficient consideration to the organization of the markets and to the subsequent development of good regulatory frameworks. These oversights hindered the process of privatization of the telecom company. In contrast, second-phase reforms were carried out through legislative action which, on the one hand, defined more precisely the conditions for privatization and, on the other, improved the regulatory norms prior to the transfer of public utilities.

2.1 The scope of the privatization programme

The majority of the state-owned enterprises were privatized between 1989 and 1993, following a two-stage procedure. The first stage was the approval for privatization from the congress. The second stage was the division of companies into different business units, the cancellation of debts between firms, and a reduction in the number of employees. Table 1 shows that the proceeds from the privatization process totalled US$18 billion (7.6 percent of the 1993 GDP), consisting of US$9.3 billion in cash, 6 billion recovered from public debt at market value, and 2.6 billion from corporate debts transferred with the firms. However, the nominal value of the debt redeemed was US$15 billion and the total equity value of the privatized companies, estimated at initial stock values, rose to US$26 billion.[1] As Table 1 indicates, proceeds from the telecom, electricity and gas utilities were essential for Argentina's economy, and accounted for US$10.7 billion, or about 60 percent of the total income generated by privatization.[2] Transfer of the telecom company produced US$3.5 billion, two-thirds in cash (mainly from the stock market sale of the government-owned share) and the rest in national debt bonds that traded at one-quarter of their market value. Privatization of the electricity and gas utilities procured US$4.1 and 3 billion,

[1] Out of this last amount, US$12.7 billion was obtained through concessions or direct sales and 5.3 billion from flotation on stock markets. The 8 billion balance remained in the hands of the national and some provincial governments.

[2] The water and sewerage company assets, on the other hand, were given in concession to the bidder offering the largest tariff reduction.

respectively. As these figures reflect, cash bids were important, the value of traded debt increased about 50 percent of its nominal value and firms were transferred with their corporate debts. Moreover, at the company level, the proceeds of the sales derived from these utilities was topped only by the sale of the former national oil company, YPF SA, still the largest firm in the country.

Table 1
Argentina's privatization programme January 1990–December 1993 (millions of US$)

		Sales value					
Sector	Privatization method (1)	Cash	Debt recov'd (market)	Firm's transferr'd debt	Total	Debt recover'd (nominal)	Total equity value
Telecom	Sale	2.271	1.257	–	3.528	5.000	3.919
Airlines	Sale	260	483	–	743	1.610	892
Railways	Concession	–	–	–	–	–	–
Electricity	Sale	855	1.853	1.476	4.185	3.707	6.439
Ports	Sale/concession	14	–	–	14	–	14
Roads	Concession	–	–	–	–	–	–
Radio/television	Concession	14	–	–	14	–	14
Oil, exploration	Contracts	2.041	–	–	2.041	–	3.205
Oil, YPF	Sale	3.040	884	–	3.924	1.271	6.711
Water & sewerage	Concession	–	–	–	–	–	–
Natural gas	Sale	300	1.541	1.110	2.951	3.082	3.956
Petrochemical	Sale	55	28	–	83	140	265
Shipyards	Sale	60	–	–	60	–	60
Steel	Sale	143	22	–	165	42	199
Conductors	Sale	12	3	–	15	4	15
Real estate	Sale	184	–	–	184	–	184
Others	Sale/concession	65	2	–	68	12	68
Total		9.313	6.074	2.586	17.973	14.867	25.940

Source: Ministry of Economy and Public Works and Services (1996: 23).

Notes: (1) The concessions of railways, water and sanitation services and roads were granted according to bids based on investment programmes.

2.2 Main aspects of the reforms of the utilities

Only two months after the new government took office, executive decree Decreto No. 731/89 initiated the reform of telecom services by making the privatization of Empresa Nacional de Telecomunicaciones (ENTel) possible. Argentinean telecom services, which date back to 1880, were provided by more than thirty private operators until the mid 1940s, when the companies were gradually merged and nationalized as the ENTel. Before privatization, this state-owned company controlled about 90 percent of the country's telephone lines, with hundreds of small co-operatives and one private company operating in six provinces (Compañía Argentina de Teléfonos) controlling the rest. Despite several nationalization attempts, Compañía Argentina de Teléfonos continued to service these six provinces under uncertain licences until 1992.

In the transfer to private ownership, ENTel was divided into two holding companies, Telecom SA in the north, and Telefónica SA in the south, each with a licence to provide basic telephone services in these geographic regions. The scheme also contemplated the division of the Buenos Aires metropolitan area into two zones (Decreto 59/90 and 60/90).[3] Sixty percent of the holding companies were sold through competitive international bidding, 30 percent floated on the stock market between 1991-2 and the remaining 10 percent reserved for ENTel employees. Licences for these regional monopolies were granted for seven years with the option of renewal for three more years, subject to achieving certain performance targets. By the end of the year 2000, these companies would still have a license to operate, but without exclusive rights.

The regulation of telecoms was originally entrusted to the Comisión Nacional de Telecomunicaciones, an agency created with the specific aim of ensuring regularity, equity and continuity of the services, to promote universal access to basic telephone services and to encourage competition in non-exclusive segments. This office, in spite of its transformation in 1997 into the Comisión Nacional de Comunicaciones, had very little independence because the Communications Secretariat retained power to intervene in its activities. Hence, the overall management of the process and the implementation of a regulatory regime were hindered by the fact that the responsibility, instead of being in the hands of a specialized regulatory agency, was shared, or at times totally taken over, by the government. This was the most serious drawback with ENTel's privatization, and provided a valuable future lesson for the reform of energy utilities.

Reorganization of the electricity sector began in January 1992 with Electricity Law No. 24,065 and certain accompanying norms. By that time, government-owned public utilities dominated: Servicios Eléctricos del Gran Buenos Aires (SEGBA), a generation and distribution company, served the country's largest urban conglomerate, and Agua y Energía Eléctrica (AyE) operated numerous generation plants, transmission lines, and distribution systems in the provinces. In addition, Hidronor, managing large hydroelectric stations in the Comahue region, transported energy to Buenos Aires. The government also operated nuclear power plants and participated in some important international hydroelectric ventures.

The reform of this sector, oriented toward fostering competition in the generation markets and regulation for transmission and distribution, produced two main results. It created, on the one hand, a wholesale electricity market, a regulatory framework and a new regulatory office, the Ente Nacional Regulador de la Electricidad (ENRE). On the other hand, companies being transferred to the private sector were split into smaller units. Thus, SEGBA was dismantled with the sale of five firms specializing in generation only and three in distribution, including Edenor SA and Edesur SA These two companies were privatized in September 1992, and their sale value accounted for more than one-third of the proceeds from the entire sector**;** currently these firms serve the Gran Buenos Aires area. Privatization of AyE started a few months later when the first of its 16 power stations was transferred. Hidronor was next, with the transfer of four generation plants in the middle of

[3] These two firms have also been entrusted, in equal parts, with the shares of two new companies (later denominated Startel and Telintar) created to provide value added services and to operate international services, respectively.

1993. Privatization of the national grid company and five regional firms was launched almost concurrently. Thermal power stations were sold and hydroelectric ones as well as the transmission lines were granted in concession.[4]

Privatization and the new regulatory framework seem to have had favourable effect on the electricity market. In generation, there are currently more than 40 companies operating across the country (80 percent are privately owned). In electric transmission, the national grid is covered by one high-voltage company, as well as numerous regional ones. Firms are forbidden to trade electricity and have to operate under an open access regime. In distribution, there are more than 30 companies (although 40 percent are still managed by provincially-owned enterprises) enjoying monopoly rights in their concession area. Competition is limited to large customers who buy directly on bilateral contracts or from the bulk market.

Prior to restructuring, the natural gas industry consisted of two companies: YPF SA, the single upstream company with a gas exploration and production monopoly, and Gas del Estado, a monopolistic transmission and distribution company which originated in 1945 with nationalization of Compañía Primitiva de Gas, a British-owned company founded in the middle of the nineteenth century. Concurrently with the electricity sector, the restructuring of the gas industry began in June 1992, when the Natural Gas Law (No. 24,076) opened the way for privatization and complete deregulation of the extraction and production of gas, allowing private companies to manage all gas fields in Argentina. However, the price of natural gas at well-head was not liberalized until January 1994.

Gas del Estado was reassembled on broadly geographical basis into two high-pressure transmission companies and eight regional distribution firms which were franchised a concession area in December 1992.[5] Distribuidora de Gas Metropolitana S.A. (Metrogas) and Distribuidora de Gas Buenos Aires Norte S.A. (BAN), currently serving the Gran Buenos Aires, represented about 40 percent of the total value of gas distribution firms at the time of reform. Concessions were granted for thirty-five years with an option of another ten and were preceded by the creation of a new regulatory institution, the Ente Nacional Regulador del Gas (ENARGAS). Since privatization, high-pressure gas transportation has been handled by transmission companies that are prohibited from trading gas. These companies must ensure free access without discrimination and must subject their tariffs to regulation. Distribution firms, on the other hand, are responsible for both low-pressure transmission and gas supply in their franchised areas but, as competition is limited to large consumers, they also enjoy a *de facto* monopoly in retailing gas to small customers.

Water and sewerage services in the country's major cities were traditionally provided by the state-owned enterprise, Obras Sanitarias de la Nación (OSN). In some provinces, however, these services were, and still are, run by municipalities and co-operatives that have always operated their own systems. In 1980 the national government decentralized

---

[4] In all cases, the economic units resulting from the splitting up of the public enterprises have been organized under limited liability (Sociedad Anónima SA). 10 percent of the shares were granted to the employees under the 'Programa de Propiedad Participada' scheme, and the rest transferred to the private sector.

[5] The operation of a ninth distribution company was authorized six years later.

the control of water and sanitation systems under its management by delegating responsibility to the provinces, retaining, however, control of the remnants of OSN to serve the Gran Buenos Aires metropolitan area. Privatization in the early 90s, within the context of structural reforms, initially focussed on OSN, but expanded to water and sanitation services operated by local authorities. In fact, the largest and best-documented incident is the May 1993 transfer, in which OSN's responsibility for Buenos Aires' water and sanitation services was handed over to the Aguas Argentinas SA consortium under a thirty-year concession contract, with the main objective of reducing the government's operating costs and minimizing consumer tariffs. No cash outlay was needed and once the technical and financial qualifications were complied with, the concession was awarded to the consortium offering the largest reduction over the prevailing public tariffs. The government's regulatory role is now in hands of the Ente Tripartito de Obras y Servicios Sanitarios (ETOSS), an independent regulatory agency responsible for monitoring the concessionaire and enforcing the contract and regulations.

Since 1993 reforms have been extended to other activities, including postal services, national savings and insurance companies, as well as airports. Others are being contemplated. There are plans to include nuclear stations, and to open the telecomunications market to full competition. Provincial authorities, guided by the experience at the national level, have embarked on plans to privatize water and electric companies and power stations. In gas, reforms are being extended to the more remote areas. But the fact remains that at the present time, basic telephony is provided by Telefónica de Argentina and Telecom, and water and sewerage services by Aguas Argentinas. Regulation is weak on the part of telephony service, but it is more elaborated for water and sanitation. The splitting-up of publicly-owned generation plants and deregulation of markets at the well-head may well have induced a competitive environment for the generation of electricity and gas production. Transmission and distribution are carefully regulated, and in many cases tariffs across firms seem to converge.

3. The evolution of residential tariffs for privatized utilities

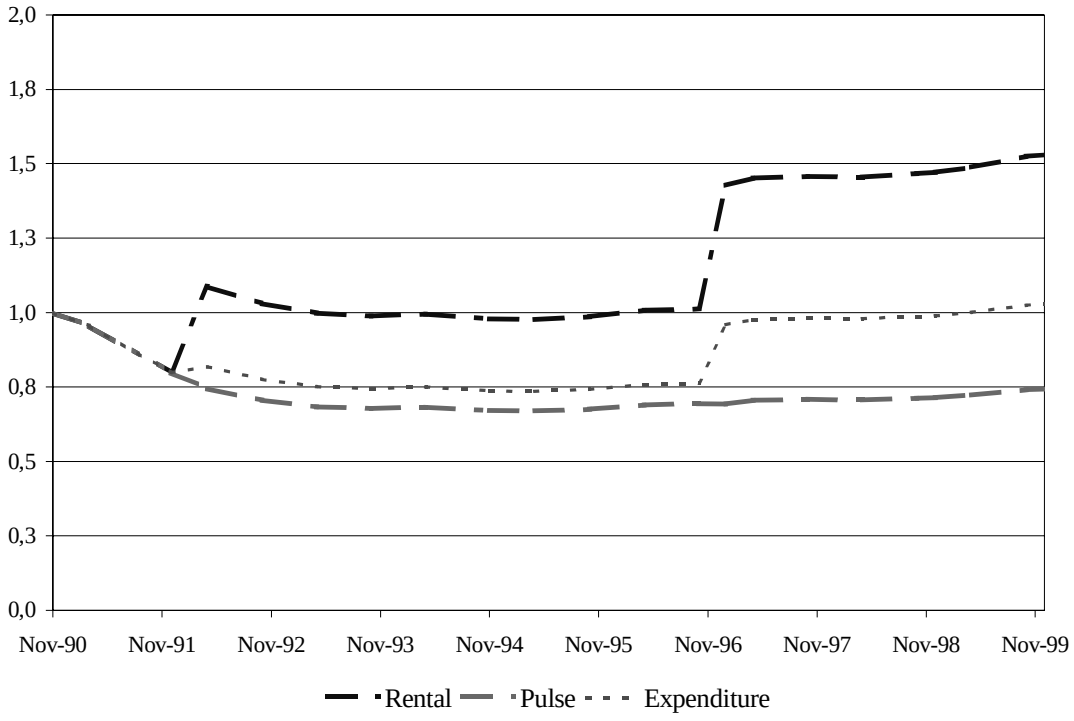
In the prereform period, pricing policies of traditional utilities in Argentina were motivated by the political goals: improving income distribution through public service tariffs, containing the impact of inflation on the cost of living, and facilitating access to the services for low-income households. The negative effects of this policy on the financial situation of the enterprises were offset with allocations from the national treasury, taxes and cross-subsidies between customer categories, as well as the continuing neglect of the quality of the services. Consequently, privatization of public utilities introduced changes both in the level and the structure of tariffs. These sought to formulate more cost-reflective schedules, to eliminate the complex range of taxes and, in general, to adopt some form of price cap regulation.

In the case of telecoms, during the period between January and November 1990, when the rules and timetable governing ENTel's privatization were being approved, tariffs were adjusted on a monthly basis to reflect changes in the domestic CPI. The pricing policy applied afterwards was based on a price cap scheme that went through different phases that became known as transition, exclusivity and extension. During the transition phase, the price cap was established with an X factor equal to zero and a clause to adjust tariffs every

six months according to the evolution of the CPI. During the exclusivity phase from November 1991 to November 1996, the X factor was set at 2 percent per year, the cost of the pulse was fixed in dollars, domestic CPI was replaced by that of the US, and firms were allowed to compensate reductions in tariffs for long-distance calls (national and international) with increases in the tariffs for local calls. These adjustments increased rentals by about 50 percent in March 1992.[6] During the last phase starting in November 1996 with the liberalization of the international calls market and authorization to rebalance tariffs, companies reduced long-distance and international call rates but also eliminated free pulses and increased the value of rentals by over 40 percent.

It is relatively complicated to analyse the development of basic telephony costs from the time of public ownership to the present because the two-part tariff is based not only on the price of the pulse, and of the rental (proportional to the former), but also on the existence and the number of 'free' pulses and the 'speed of computation'. The latter, depending on traffic congestion and the distance of the call, determines the number of pulses consumed per minute. Therefore, the analysis of residential tariffs considers not only the rental and the price of the pulse but also the expenditure of a typical consumer, which is obtained by adding to the rental the price of the pulse, multiplied by the average consumption (minus the number of pulses supplied free of charge).

Figure 1
The evolution of rental and pulse rates, and expenditures for residential telecom consumers (before taxes) at constant prices of December 1999

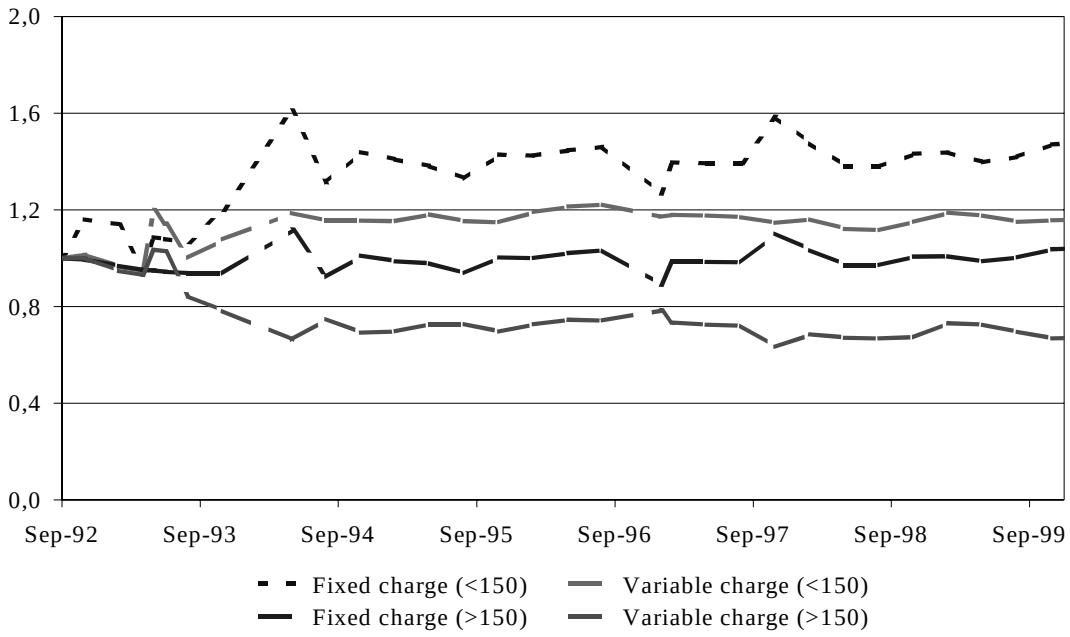


Note: prices = 1 at the date of transfer.

6 No index corrections have been made since March 1991 because the convertibility law precludes inflation adjustment clauses in contracts.

Figure 1 shows the evolution of the rental, the price of the pulse and the expenditure of a typical consumer, in all cases deflated by the CPI. The reduction in real tariffs achieved during the first year of the postprivatization period (explained by a significant increase in retail prices) was corrected with an adjustment to the rental at the start of the second phase. Despite maintaining these tariffs in real terms, a new increase in the rental at the very beginning of the third phase brought about, in the presence of stable consumer prices, another real tariff increase. As a result, since privatization, the real cost of rental has risen more than 50 percent and expenditure of the typical consumer has increased about 3 percent, though pulse price has fallen almost 25 percent (or only 10 percent considering the elimination of free pulses and some changes in the speed of computation).

Figure 2
Evolution of the fixed and unit charges (before tax) for residential consumers of electricity
date of transfer = 1, in constant prices December 1999



In the case of electricity, the regulatory body is responsible for setting tariffs at different levels. At the wholesale level, generators supply distributors and large consumers in the term contract and spot markets.[7] Regulations enforce a maximum price for the transmission stage, which is adjusted with an index to reflect fluctuations in wholesale and retail US prices, as well as changes in the operating conditions. Finally, tariffs charged by distributors to final consumers are calculated on the basis of the wholesale energy price (although firms can also pass-through power charges and spot-price changes to tariffs), the transmission charge and their distribution costs. As power contracts for residential consumers do not exist, distribution costs at this level are recovered through a standing as well as a unit charge. Moreover, energy tariffs are set in US dollars and adjusted every three months to correspond to changes in both the US wholesale and consumer price indexes, and also to changes in seasonal prices. The current pricing scheme was

[7] At wholesale level, firms enjoy agreements that allow uncontrained free price negotiations, whereas in the spot market hourly tariffs are established according to the marginal cost of the optimal dispatch.

established in the regulatory framework at the time of concession and was to last for ten years.

Figure 2 shows the impact of adjustments in Edenor's residential tariffs (which are almost identical to Edesur's) for two types of consumers: those with an average maximum consumption of 150 kWh per month and those exceeding this amount. In both cases, charges have been deflated by the CPI. As can be seen, from 1993 to 1994, tariffs charged to low-demand consumers rose due to increases of more than 20 percent in both fixed and unit charges. However, unit charges for high-demand consumers decreased. Since then, real tariffs have stabilized, even though few smaller adjustments have been necessary because of US inflation and also because of the seasonality of electricity prices on the wholesale market. Consequently, a comparison of initial and final real consumer tariffs shows that the fixed and unit charges for low-demand consumers rose by 50 percent and by 17 percent respectively. In contrast, fixed charges for high-demand consumers increased only slightly, while variable charges decreased by about 33 percent.

Since privatization, tariffs charged by distribution firms in the gas industry are subject to regulation with a RPI-X+K-type price cap system, where RPI is the consumer price index of the US, X the efficiency factor, and K the so-called investment factor.[8] Price reviews are scheduled every five years, tariffs are converted into US dollars and adjusted every January and July to reflect US inflation. These adjustments do not include gas price deviations at well-head because these have already been introduced from 1994 directly to tariffs in May and October (that is, at the start of the winter and summer seasons). This means that tariffs are adjusted four times a year. Furthermore, the X and K were set equal to zero at privatization, although the first factor was reset at the 1997 price review to less than 1 percent per annum.

The evidence available for this industry suggests that Gas del Estado's tariffs were insufficient to recover its operating costs and that cross-subsidies between different classes of customers and across regions in all probability existed. It is therefore not surprising that privatization was accompanied by changes in the level as well as in the structure of tariffs. In fact, a new system, which classifies consumers according to consumption characteristics (frequency and volume) replaced the earlier categorization of commercial, industrial and general consumers.[9] In the case of residential consumers, the two-part tariff with a standing charge and unit charge was maintained but a uniform unit charge replaced the earlier charge made of four increasing blocks. In addition, a minimum payment was introduced. This may have discouraged moderate users from connecting to the system because the effect replicates that of a higher rental charge.[10]

---

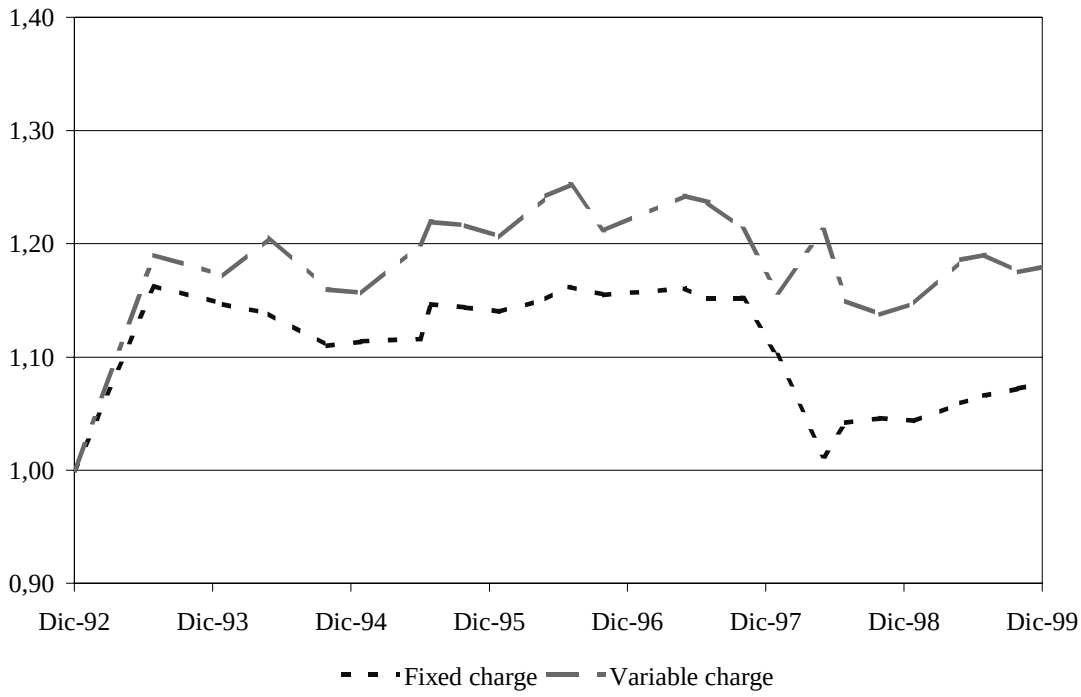
[8] The aim was to provide financing for improvements in the service and to reflect, in the tariffs, the cost of new investments in expansion and operation of the system.

[9] Some of these changes had already been adopted before privatization.

[10] The minimum bill exceeds the fixed charge by an amount which is equivalent to $18m^3$ of gas, while average consumption during a period of minimal demand is about $30m^3$ per month. The piped gas service is the only utility to impose a minimum bill.

Figure 3 gives the evolution of gas prices (fixed and the unit charges) for Metrogas (which are similar to BAN's prices), deflated with the CPI. As is shown, during the first year of private management, these charges rose between 20 percent and 17 percent, respectively. Both charges increased again in 1994. The increases in the variable unit charge are mainly due to fluctuations of well-head prices post-liberalization. Price fluctuation has stabilized since then, in spite of small changes resulting from the semi-annual adjustment based on US inflation and developments in seasonal gas prices. Finally, the resetting of the X factor is probably responsible for the considerable drop in variable charges in 1998. Overall, these factors add up to an increase of about 10 percent in the standing charge and of 20 percent in the unit charge of gas in average during the postprivatization period. This outcome could have been expected because the alignment of tariffs to economic costs had benefited large customers and interruptible users at the expense of the small domestic customers who had enjoyed subsidized rates.

Figure 3
Evolution of the fixed and unit charges (before tax) for residential consumers of natural gas (date of transfer = 1, constant prices december 1999)



Water and sanitation services provided by Aguas Argentinas to residential customers are charged according to a flat-rate tariff which applies to 90 percent of users, whereas the rest pay according to their metered consumption only. The flat-rate tariff scheme resembles a property tax because it is based on a 'general tariff' plus certain property criteria (size of lot, roofed area, location and quality of dwelling). The second type of arrangement, metered consumption, consists of two elements: the fixed charge and the unit charge, which becomes applicable once the customer exceeds the free consumption threshold. The tariff level, set in May 1993, has been adjusted only twice: in June 1994 with a 13.5 percent increase and in May 1998 with a 5.31 percent increase. Both increases were the

result of tariff reviews undertaken in accordance with the terms of the concession contract.[11]

At the beginning of the postprivatization period, residential consumers incorporated in the network were billed for an 'infrastructure' charge plus a second amount for the connection itself. However, since these access payments were obstructing expansion of the network into the poorest areas, the contract was renegotiated in November 1997. The former 'infrastructure' payment was replaced with a 'charge for universal services' (SU) which was applied to all users. The 'connection charge' was transformed into a 'charge for joining the service' (CIS) and was payable in instalments.[12] As a result, the bimonthly expenditure for a typical consumer for non-metered water and sewerage service, which at the time of the transfer was US$25 rose to US$29.84 at the end of 1999.[13]

The aim of this paper is to analyse the impact of the private management of utilities on consumer welfare. Table 2 shows the initial and final tariff levels. The initial tariff level corresponds to the tariff applied during the month the private takeover took place[14]. This information is used to examine changes in the welfare of residential consumers and in the monthly expenditure for a 'typical consumer'. The selection of the index for deflating the tariffs constitutes an additional difficulty because retail prices increased much more than wholesale prices, and wholesale prices increased much more than the nominal exchange rate. Nevertheless, in spite of the fact that wholesale prices would probably reflect the evolution of the costs of the services more accurately, consumer prices are used here.

The first two columns show the nominal levels of the fixed and variable charges, the third column shows the level of expenditure for a typical consumer, while the last column summarizes the evolution of the CPI. Nominal prices rose from a minimum of 19 percent for water and sewerage (reflecting an increase from $0.0279 to $0.0333) to a maximum of 289 percent in the case of the telecoms' rental charge (climbing from $3.40 to $13.23 per month). As the adjustments made to the fixed and unit charges were of a varying intensity, they also triggered an important change in the composition of the tariffs. The share of fixed

---

[11] The basic bimonthly tariff for the non-metered service is calculated making TBB =TG·K·Z·(SC·E+ST/10), where TG is the tariff value, K a coefficient used for its adjustment (and equal to 0,731 at the time of the reform), Z and E coefficients that correspond to the zone where the property is located and its quality, ST the size of the lot and SC the roofed area; the resulting figure must exceed a minimum. The tariff for the metered service is TBM = TBB/2+K·TU·(Q – Q_B) where K has the same meaning as before, TU is the price for each cubic meter of water, Q the number of meters consumed and Q_B the number of free meters allowed. In May 1993, TG and TU were set at US$0.0279 and US$0.33 perm3 for the water only service, and to double amounts when both services are provided.

[12] The SU was set at US$2.01 per each 2-month period for each service and for all customers, whereas the CIS was set at US$4 for each service, applicable only to new customers and, although included in the bill, is payable for five years. New negotiations on the expansion of the services incorporated a 'charge for environmental improvements' (MA) of US$1.98 per each 2-month period (for water only or both services) from November 1998.

[13] It is assumed here that the typical consumer's dwelling is located on a 400m^2 lot, has a roofed area of 150m^2 and with average location and quality coefficients of 1.51 and 2.20, respectively.

[14] The initial tariff level may reflect changes introduced during the public ownership to reflect economic costs prior to the transfer.

charges for a typical expenditure rose from 23 percent to 33 percent for telecoms, from 17 percent to 21 percent for low-demand electricity consumers and from 29 percent to 40 percent on the part of high-demand electricity consumers. The share for gas, however, declined slightly, going from 27 percent to 25 percent.

Table 2
Nominal tariffs for privatized utilities per each 2-month period in pesos without taxes

Dates	Rates in $				Total expenditure (1)		CPI
	Fixed (bimonthly)		Per unit				
Telecoms			(pulse rate)				
November 1990	6.80		0.02479		30.10		0.393
December 1999	26.46		0.04690		79.93		1.000
Percentage change	289%		89%		162%		154%
Electricity (2			(kwh)				
September 1992	2.54	13.04	0.061	0.056	14.74	44.40	0.872
December 1999	4.30	15.58	0.080	0.042	20.30	39.10	1.000
Percentage change	69%	19%	31%	-25%	38%	-10%	15%
Natural gas							
December 1992	6.29		0.1080		23.57		0.890
December 1999	7.61		0.1432		30.52		1.000
Percentage change	21%		33%		29%		12%
Water and sewerage			(m^3)				
May 1993			0.0279[3]		25.00		0.932
December 1999			0.0333[3]		29.84		1.000
Percentage change			19%		19%		7%

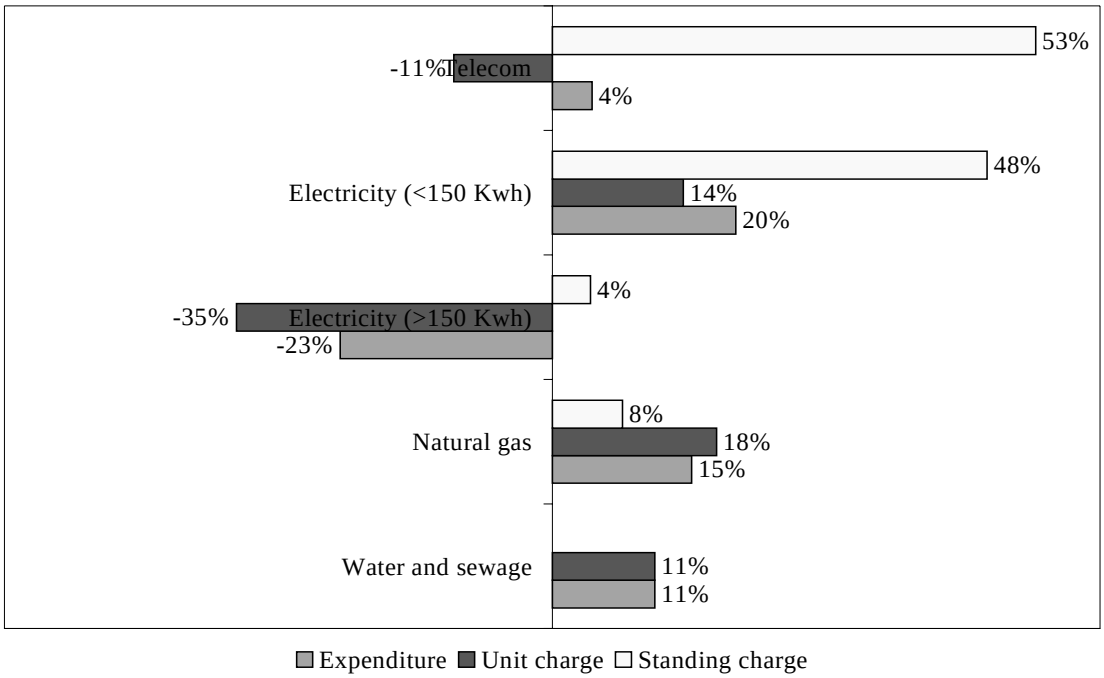
Source: ENARGAS (2000), ENRE (2000), ETOSS (2000), Ferro (1999), FLACSO (1998) and Secretaría de Energía y Minería (2000).

Notes: (1) Typical bimonthly consumption is estimated at 1140 pulses for telecoms, 200 and 560 kWh for small- and large-demand users of electricity, respectively, and 160m3 for gas (electricity and gas tariffs at the initial level are valid for both firms, but final tariffs are representative of Edenor y Metrogas, even though they are identical with the rates of the other firm);
(2) Both rates are given: low-demand residential rate (first figure) and the high-demand rate (second figure).
(3) Basic bimonthly tariff for water or sewerage.

Finally, Figure 4 summarizes the changes in real utility tariffs obtained with the CPI deflation. The Figure shows that (i) for telephone services, the fall in the pulse was linked to a notable increase in the rental value; (ii) the pronounced increase in the fixed charge for electricity was accompanied by a significant rise in the variable rate for low-demand customers; (iii) real changes in gas have been less significant but that the evolution of the unit charge was more dynamic than that of the fixed charge, and (iv) the lowest tariff adjustment (although new charges were added) was in water and sanitation services. The figure shows that real increases have been less severe for the utilities most recently affected by reforms. This is probably due to the fact that the continually decreasing inflation rate enabled the state-owned utilities to recover their real tariffs. It is worth

mentioning that if, instead, nominal tariffs had been deflated with the wholesale price index or with the exchange rate, real increases would have been higher than those given above. For example, with the wholesale price index, the standing charge and the pulse increased 123% and 30 percent, respectively.

Figure 4
Changes in utilities' real tariffs from date of privatization to December 1999



4. Changes in the economic welfare of residential consumers

The results of the analysis in the previous section suggest that privatization has been associated with a significant increase in the level of tariffs that varies across sectors. In addition, the reforms seem to have affected some consumers more severely than others.[15] In order to measure the impact of these adjustments on the well being of residential consumers in general and on certain specific groups, households were grouped according to their income and then changes in consumer surplus, following Waddams Price and Hancock (1998), were measured as:

$$dS = (P_1 - P_2)Q_1 + \tfrac{1}{2}(P_1 - P_2)(Q_2 - Q_1)$$

where P_i and Q_i, for i = 1,2 are the prices and quantities consumed before and after reforms. Multiplying and dividing the first term of the right hand side by P_1, and replacing $(Q_2 - Q_1)$ by dQ, it is possible to obtain:

[15] It is important to note that significant improvements in service quality were obtained during private management. For example, the communications network was completely digitized and delays for repairs were reduced from 23 days in 1991 to 2 days by the end of 1999. Interruptions in electricity were shortened considerably, the pipe pressure for gas and water lines increased, and the duration of claim adjustment cut to half (Fiel, 1999).

(1) $dS = E_1 [(P_1 - P_2) / P_1] \{1 + \frac{1}{2} \cdot \varepsilon_D \cdot [(P_1 - P_2) / P_1]\}$

where $\varepsilon_D = (dQ / dP)(P_1 / Q_1)$ is the elasticity of demand and $E_1 = P_1 Q_1$. Equation (1) can be used to measure changes in consumer surplus assuming different demand elasticities. If demands were perfectly inelastic ($\varepsilon_D = 0$), which would mean that quantities had remained unchanged, consumer surplus could be estimated as the difference in expenditure by means of $dS = E_2 - E_1$ (where $E_2 = P_2 \cdot Q_1$).

4.1 The data used in the estimates

The data used in the estimates come from the Household Expenditure Survey (EGH) carried out by the National Institute of Statistics and Censuses in the Gran Buenos Aires area between March 1996 and March 1997 (INDEC 1998).[16] This survey contains normalized monthly information on the income and expenditure of about 5,000 households, as well as demographic and personal characteristics of the family members, availability of the utility networks and the use of these services by all the families surveyed (the sample is representative of a population of 12 million people).[17] This is the only household expenditure study conducted in the country during the 1990s, and in the preceding decade, there was only one completed survey (1986-7). In our case, it was not feasible to use the 1986-7 survey because of data discrepancies, resulting presumably from that year's high rate of inflation.

With the aim of measuring changes in the welfare of consumers with varying living standards, households were first categorized according to their total family income. This was corrected according to OECD methodology, which adjusts for economies of scale in consumption to reflect the size and composition of each family. The households were then grouped into income quintiles. The poorest and richest families are concentrated in the first and the last quintiles, and intermediate income families are represented by the middle quintiles.[18] Next, quantities consumed per each household (not reported in the survey but needed for calculating pre and postreform expenditures) were estimated by making $q=\{E \cdot [1/(1+t)]-0.5 \cdot F\}/V$, where E refers to monthly expenditure, t are tax rates levied on the services and F and V the (bimonthly) fixed and unit charges.[19] Furthermore,

---

[16] The EGH 1996/7 includes the population of Capital Federal and that of the following Partidos of the Gran Buenos Aires: Almirante Brown, Avellaneda, Berazategui, Esteban Echeverría, Florencio Varela, General San Martín, Hurlingham, Ituzaingó, José C.Paz, La Matanza, Lanús, Lomas de Zamora, Malvinas Argentinas, Morón, Quilmes, San Fernando, San Isidro, San Miguel, Tigre, Tres de Febrero and Vicente López.

[17] Food consumption data were collected on a weekly basis, whereas other utilities, electricity for example, bimonthly. Therefore, the normalized monthly expenses for food correspond to the costs tallied during the week of the household survey, and electricity to the amount recorded for the 2-month preceding the survey.

[18] Total adjusted household income was obtained by multiplying total family income by a coefficient calculated as the ratio of total quantity of declared and corrected members of the household. This last quantity is a weighted sum in which the first adult equals 1, the other adult members 0.7, and 0.5 if they are minors.

[19] However, as the actual billing date of the reported expenditure is not known, tariffs used in the estimations represent the averages for the quarterly period when the family was surveyed. Price changes throughout the survey period were small and errors from this approximation are unlikely to be significant. In the case of

expenditure for electricity and gas was adjusted according to Hancock and Waddams Price's proposal (1995) for correcting seasonal variations which may occur in conjunction with the timing of the survey.[20]

The first three columns of Table 3 (which group households by income quintiles) show a noticeable unequal income distribution. Half of the total income (48 percent) is concentrated on the richest households, whereas the poorest receive only 5 percent of the total. However, before evaluating the impact of the reforms, it should be noted that at the time of the survey, about 12 percent of the households had unsatisfied needs, 19 percent were below the poverty line, the unemployment rate was 18 percent, while GDP was rising at a 5 percent rate annually and consumer prices at less than 1 percent annually.[21] The other columns in Table 3 and Figure 5 show the distribution of services and the level of households' consumption and expenditure on utilities.

Beginning with telecoms, this service reaches two-thirds of the households and the average consumption is about 6.8 thousand pulses a year, which translates into an annual cost of US$424, or 2.8 percent of the total family income. Income limits access to telecom services—only 33 percent of the poorest families have a telephone at home compared to 66 percent of the middle income group and 90 percent of the richest quintile. Consumption for the richest group is two and a half times higher than for the poorest households. Expenditure is also more than double. Expenditure in telecom services for the richest households represents 1.4 percent of total income, but in the case of the poorest families it jumps to 5.9 percent.

Electricity service is 'almost' universal, 94 percent of the households are connected to the grid (Figure 5). This ratio essentially highlights the small proportion of users in the lowest income group and suggests that the main constraint to access is affordability. The average annual consumption is 2.3 Mwh at an average cost of US$263, or 2.2 percent of the family income. As with telecoms, the relationship in consumption between income groups and

---

pensioners with monthly incomes below US$150 (Decreto 679/95), the estimations also include the 50 percent discounts enforced with Decreto 532/88. This was applicable until 1997 when Decreto 319/97 replaced the discount with a direct payment to these beneficiaries. A 21 percent value added tax rate is levied on all services. There is no other tax on telecom and water utilities, although water bills include an additional 2.67 percent charge to finance the ETOSS. In electricity, however, additional taxes for consumers residing in the Partidos include 10 percent for the *Impuesto de la Provincia de Buenos Aires al Servicio de Electricidad* (Laws 7,290/67 and 8,016/73), 5.5 percent for the *Fondo Especial para Grandes Obras Eléctricas Provinciales* (Law 9,038), 0.6 percent aimed at financing the Santa Cruz utility (established by Law 23,681), 6.424 percent for the municipal sales rate and another 0.6424 percent for the provincial sales rate. For residents in the Capital Federal, only municipal sales tax and the tax stipulated by Law 23,681 apply (although in this case the rate for municipal sales tax is 6.383 percent). Taxes for piped gas consist of VAT and a 9 percent charge for households in the Partidos (Law 9,266).

[20] To that end, annual consumption for each family was estimated with $Q = q \cdot (Q_T / Q_E) \cdot 12$, where q stands for the unadjusted quantities obtained as described earlier, Q_T is the mean unadjusted consumption over all families with recorded expenditure on the service, and Q_E the mean for those interviewed during quarter E.

[21] A household has 'unsatisfied basic needs' if there are more that three individuals living per room; there is no lavatory or it does not flush water; the family has a school-aged child but he/she does not attend school, and the like. The 'poverty line' is the value of a foodbasket (consisting of goods selected for their capacity to adequately satisfy nutritional needs at minimum cost) and non-food goods and services that are normally consumed by households (education, health and housing, for example).

between the extremes is 2:1, but in this case expenditure differences are only 50 percent, which translates into 0.8 percent and 4.5 percent of household incomes, respectively.

The gas network covers 83 percent of the households and a similar proportion of families utilize the service. This implies that natural gas is used by 69 percent of the population. The grid covers only 61 percent of the poorest households. In contrast, almost all the rich have access to the network and a significant proportion are connected. Average household consumption is 951m3 per year and the average expenditure US$248 representing 1.8 percent of total income. Furthermore, consumption and expenditure of the richest families are double that of the poorest. Gas expenditure absorbs 0.7 percent of income in the richest and 3.6 percent of the income of poorest households, respectively.

Finally, data for sanitation services show that water and sewerage networks reach 76 percent and 58 percent of the households, respectively, and that access increases with income. Only 69 percent of the poorer families benefit from these services in contrast to 89 percent of the rich; proportions also fluctuate between 44 percent and 76 percent in the case of sewerage. Furthermore, only 55 percent of the households declare expenditure on these services, a proportion that varies between 43 percent for the first quintile and 73 percent for the fifth. The average annual expenditure on these services was US$141 at the time of EGH and fluctuated slightly because most users pay a flat rate. The expenditure for poorer families was on average US$110 and for the richest households US$170, constituting 0,5 percent and 2,7 percent of their income, respectively. Unfortunately, the prevailing tariff scheme for this service precludes the calculation of the quantities consumed.[22]

---

[22] We have verified that the number of customers and the consumption levels recorded by the EGH are consistent with the information provided by the privatized companies. By the end of 1996, Telefónica de Argentina and Telecom had registered 2.526 million residential customers, the electricity companies Edenor and Edesur 3.195 million customers and Metrogas and BAN 2.737 million. Aguas Argentinas was providing water and sewerage services to 6.6 and 5.2 million inhabitants, respectively. Electricity data reported by the EGH and the companies is almost consistent, but moderate differences exist for other services, which seem to be explained by the fact that coverage areas for the companies do not exactly match the area surveyed by the EGH. A comparison of the information as given by the utilities companies and by the survey, indicates firms reporting 10-15 percent higher coverage for telecom and gas, but 20 percent lower in water. This seems to be explained by similar discrepancies in the population of the covered areas. Finally, with regard to households' annual consumption, the mean levels of 2.3 mWh for electricity and of 951m3 for gas calculated from the expenditure data in the survey are very similar to the 2.2 and 1.029 registered by the firms.

Table 3
Household consumption of public services per income level in Buenos Aires metropolitan area(1) March 1996 to March 1997

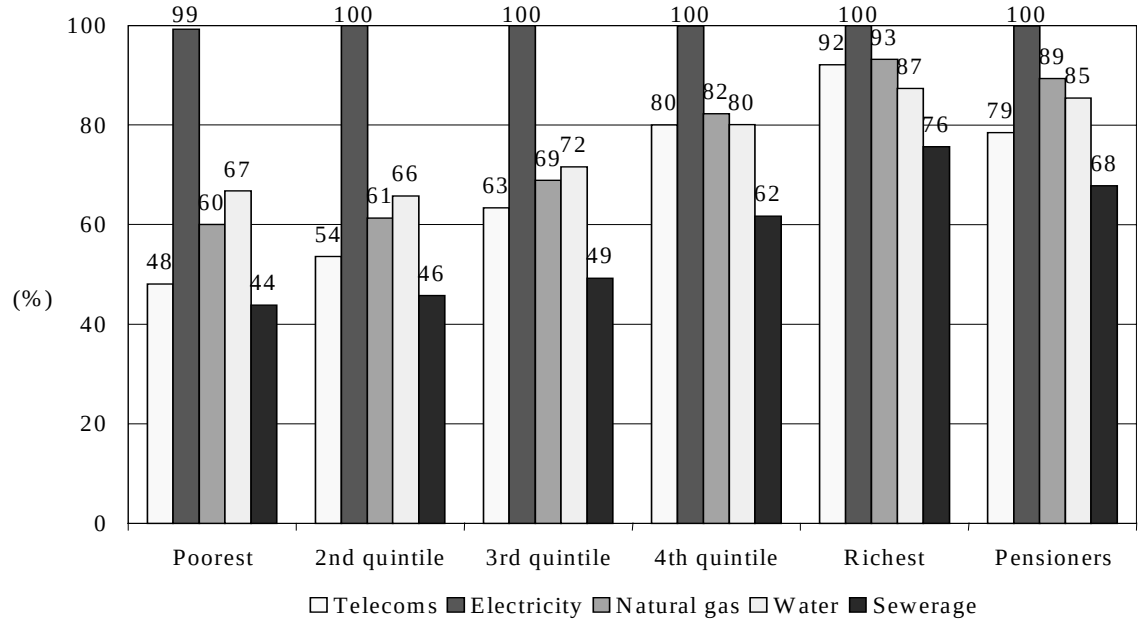
Quintiles	Total income(2)		Telecom services				Electricity				Piped gas				Water and sewerage			
	(mill $)	(%)	Households ('000	Quantity (pulses)	Expenditure ($) (3	E/Y (%)	Households ('000	Quantity (kWh)	Expenditure ($)	E/Y (%)	Households ('000	Quantity (m^3)	Expenditure ($)	E/Y (%)	House	Quantity (m^3)	Expenditure ($)	E/Y (%)
Average(4)	4,188	100	2,295	6,841	424	2.8	3,158	2,348	263	2.2	2,381	951	248	1.8	1,868	–	141	0.9
Poorest	216	5	306	4,383	295	5.9	581	1,654	218	4.5	371	658	191	3.6	298	–	110	2.7
2nd	418	10	367	6,031	382	3.5	622	2,056	253	2.4	392	813	224	2.1	305	–	125	1.6
3rd	592	14	429	6,428	402	2.5	624	2,300	273	1.7	437	946	248	1.6	332	–	136	1.2
4th	904	22	551	7,561	462	2.0	651	2,594	293	1.3	538	1,053	269	1.2	416	–	138	0.8
Richest	1,899	48	642	10,928	639	1.4	680	3,349	343	0.8	642	1,297	317	0.7	517	–	170	0.5
Pensioners	655	16	348	4,207	286	3.3	640	1,682	213	2.7	411	766	209	2.5	342	–	104	1.0

Source: Own elaboration based on data from INDEC (1998).

Notes: (1) The survey covers 3,424,000 households which represent 11.8 million people;
(2) Total family income per month ($1 = US$1);
(3) Current annual values, after taxes;
(4) Total for income and households.

17

Figure 5
Service access offered by utilities Gran Buenos Aires, March 1996-March 1997 (%)



A final look at the data also shows that the combined expenditure on all services appears moderate for the rich, but represents a heavy burden for the poor, as it absorbs 4 percent and 17 percent of their respective annual incomes. Moreover, average consumption in all utilities increases with income but at a lower pace. In the case of natural gas, for example, the poor consume only 658m3 per year while the rich use double the amount, even though their income is ten-fold. This relationship of about ten-to-one between the percentage change in household income and the quantities consumed seems to suggest that the demand for natural gas has a significantly low-income elasticity. Finally, pensioner households enjoy access to the services in similar proportions as the rich, but consume quantities comparable to the poor. Despite pensioners benefiting from a reduced tariff scheme, their expenditures in utilities still represented a significant proportion of their income.

It is important to note that universal service obligations are not imposed on privatized companies. Also no evidence of voluntary disconnection was found. Electricity and telecom utilities have the obligation to supply but connection is not mandatory. Connection to the sanitation network is compulsory, and complete coverage of the sanitation network by the end of the concession is specified in Aguas Argentinas' contract. In gas, connection to the grid is not mandatory, and extension of the system is not compulsory for distribution firms. When potential entrants need additional gas lines, the distribution company operating in the area has the primary responsibility for carrying out the necessary expansion. However, if the primary company reneges on its responsibility, ENARGAS authorizes another one interested in doing the work, and stipulates the rules of operation and linkage to the existing distribution or transportation grid. This option has created many co-operatives and local firms that service small towns and rural areas, and tariffs in these locations are regulated by ENARGAS according to the same principles applied to other distribution firms.

4.2. Changes in consumer surplus

The first step in the analysis was the calculation of the initial and final levels of expenditure on each service and for each household in the sample using pre- and postreform tariffs (Table 2) and the quantities consumed (which were estimated as described earlier). Then, changes in consumer surplus were measured using equation (1) for different three scenarios, based on the assumption that the price elasticities of demand ranged between 0 and –1, as supported by the limited evidence that is available. Table 4 gives the results in terms of estimated expenditure on each service for December 1999 and consumer surplus changes for each group, measured in pesos ($1 = US$1) and as a proportion of the total adjusted household income. (These expenditures differ from those reported in Table 3, which include taxes and were directly obtained from the EGH).

The results for the first scenario on telecoms show that the average welfare gain for consumers is US$53 per year, which equals to 0.18 percent of the family income. These welfare changes, however, are unevenly distributed because the rich have gained US$109 or 0.24 percent of their income while the poor have lost US$8 or 0.16 percent of theirs. This can be explained by the fact that the fall in the pulse, compounded by the rental increase, triggered a reduction in the average tariffs for high-demand users, but an increase in the tariffs paid by the low-demand users. The results for the second scenario are different, as welfare changes for all consumers are positive. As the demand is more elastic, price-induced changes in consumption patterns are greater and consequently, as prices fall or rise, the same do welfare changes. For the same reasons the direction of the results in the last scenario is similar to those of the second, although the gains are larger and in almost all cases proportional to household income.

Results for the electricity sector are similar to those of the telecom sector, and the progression of tariffs has benefited all residential customers except low-demand customers. This effect is probably associated with the development of competition in generation and the adoption of a suitable regulatory framework prior to the reforms. In fact, Table 4 shows that in each scenario, average consumers not only spend less than prior to reforms, but that they also enjoy an increase in welfare that ranges from US$26 to US$33, depending on the elasticity of demand. As gains increase with income, they basically favour the higher-income groups. However, when compared to income, welfare changes are relatively similar across all income groups, except for the poor. Overall, this suggests that the losses of the poor induced by the significant increase in real tariffs for low-demand customers can be amply offset by the gains—achieved from the reduction in the variable charge—of the richest quintile with high demand.

The increase of US$24 in the annual expenditure for the average natural gas consumer would have provoked a welfare loss equivalent to 0.17 percent of its income. But the impact has been different between groups because the loss represented less than 0.07 percent of the rich's income, but it jumped to 0.37 percent of that of the poor, for example. Those results suggest that the changes brought with the reforms imposed a relatively higher burden on the low-income groups, which are moderate consumers, in relation to that placed on the high-income groups, who are the most intensive users. In the other two scenarios, the costs as well as the welfare losses would be lower because consumers are more price responsive and would therefore transfer consumption to other energy goods.

Table 4
Changes in consumer welfare (based on estimated consumption for 1996/7)

Income level	Average family expenditure ($)(1	Changes in consumer surplus εD dS ($)	= 0 dS/Y(%)	εD dS ($)	= -0,5 dS/Y(%)	εD dS ($)	= -1 dS/Y(%)
Telecoms							
Average	480.71	52.56	0.18	63.71	0.28	70.59	0.33
Poorest	323.96	-7.59	-0.16	5.99	0.18	9.56	0.27
2nd quintile	376.58	14.32	0.14	25.58	0.26	30.05	0.31
3rd quintile	440.20	38.56	0.27	49.00	0.35	54.82	0.39
4th quintile	493.38	58.95	0.27	68.11	0.31	75.52	0.35
Richest	637.01	108.91	0.24	121.04	0.27	131.45	0.30
Pensioners	357.21	13.72	0.03	18.31	0.08	22.51	0.13
Electricity							
Average	179.44	25.82	0.10	29.23	0.12	32.64	0.15
Poorest	133.56	-1.14	-0.10	0.40	-0.06	1.94	-0.03
2nd quintile	158.51	12.08	0.12	14.55	0.15	17.03	0.18
3rd quintile	177.55	23.64	0.17	26.88	0.19	30.13	0.21
4th quintile	195.49	35.52	0.17	39.57	0.19	43.61	0.21
Richest	227.01	55.94	0.13	61.46	0.15	66.98	0.16
Pensioners	147.87	7.48	-0.02	9.61	0.00	11.73	0.02
Natural gas							
Average	182.16	-23.74	-0.17	-22.81	-0.16	-21.88	-0.15
Poorest	130.61	-15.79	-0.37	-15.22	-0.35	-14.65	-0.34
2nd quintile	152.56	-19.21	-0.21	-18.49	-0.20	-17.76	-0.19
3rd quintile	173.83	-22.50	-0.16	-21.63	-0.15	-20.75	-0.15
4th quintile	191.49	-25.18	-0.12	-24.18	-0.11	-23.19	-0.11
Richest	227.61	-30.70	-0.07	-29.46	-0.07	-28.22	-0.07
Pensioners	154.46	-19.46	-0.23	-18.73	-0.22	-17.99	-0.22
Water and sewerage							
Average	159.19	-48.56	-0.10				
Poorest	132.11	-45.80	-1.85				
2nd quintile	145.44	-47.16	-0.97				
3rd quintile	154.53	-48.09	-0.66				
4th quintile	156.78	-48.32	-0.44				
Richest	184.55	-51.15	-0.22				
Pensioners	147.56	-44.67	-0.74				

Source: Own calculations based on data from INDEC (1998).

Note: (1) Using December 1999 tariffs, before taxes ($1 = US$1);

Finally, users of water and sewerage services have experienced an average welfare loss of US$49 during private ownership, a loss equivalent to 0.10 percent of their total annual income (although it needs to be said that Aguas Argentinas, at the time of transfer, reduced prevailing tariffs by 26.9 percent, which was the winning bid). Furthermore, losses have been more or less even across groups, fluctuating from US$46 for households of the first quintile to US$51 for the fifth (which is explained by the fact that prices are unrelated to consumption). Therefore, tariff adjustments and the introduction of additional charges (oriented to finance universal service and environmental improvements and named SU and

MA, respectively) constituted relatively a heavier burden for users with limited resources, for whom these tariff changes represented 1.85 percent of their income, but only 0.22 percent for the rich.

Considering all four utilities together but focusing on the scenarios that correspond to the most plausible demand elasticities (-1 for telecom, -0.5 for electricity and piped gas, and 0 for sanitation services), tariff changes of privatized utilities have meant for the average consumer of the fifth quintile an annual welfare gain of US$112, but a welfare loss of US$51 for the poorest quintile. These constitute a gain of 0.25 percent of the annual income of the rich, but an income loss of 2 percent for the poor. Furthermore, to examine the joint impact of these reforms on the economic welfare of all residential consumers in Gran Buenos Aires area, the number of consumers recorded at the inception of private management (Table 5) was multiplied by the welfare changes of the average consumers for the most plausible scenarios mentioned above. This calculations yielded a total welfare gain of US$90 and US$103 million for the telecom and electricity services, but a loss of about US$58 and US$80 million for gas and sanitation services, respectively.

4.3 Consumer surplus for the newcomers

The welfare changes presented so far are based on households already utilizing the utilities at the time of reforms. Thus, the analysis in this section attempts to measure benefits to new consumers accessing the services during the expansion triggered by private management. These benefits can be approximated by deducting the cost of access to the network (net of other costs associated with an alternative service) from the present value of consumer surplus. Alternatively, the benefits can be approximated as the difference between annual consumer surplus less the annualized value of corresponding access costs. Information on the income of the newcomers by quintiles was not available; therefore to measure total benefits related to privatization, we just multiplied the results obtained for a typical user by the number of new entrants.
Continuing with the assumption of a lineal demand function of the form $Q = b_0 + b_1 \cdot P$, the consumer surplus for the newcomers is calculated using the following expression:

$$S = \tfrac{1}{2} \cdot (P_M - P_1) \cdot Q_1 = - [1/ (2 \cdot b_1)] \cdot Q_1^2$$

where P_M is the maximum price when the quantity is zero, P_1 the tariff paid and Q_1 the quantity consumed by the newcomer.[23] But recalling that the elasticity of demand could also be expressed as $\varepsilon_D = b_1 \cdot (P_1 / Q_1)$ and substituting b_1 in the last expression, it becomes:

$$(2) \qquad S = - (P_1 \cdot Q_1) / 2 \cdot \varepsilon$$

which can be used to estimate welfare gains for the newcomers in scenarios with different price elasticities.

The number of new customers whose enlistment into the system can be attributed to the reforms have been estimated under two scenarios. The first assumes that newcomers represent the total number of entrants achieved by the private firms from the time of the transfer to the end of 1999. The second is a ‘counterfactual’ scenario which estimates the

[23] The corresponding inverse demand function is $P = (b_0 / b_1) – (1 / b_1) \cdot Q$ and consequently $P_M = - (b_0 / b_1)$.

potential increase in customers on the assumption that public firms had expanded at historical rates but without the effects of privatization. The number of customers thus estimated is then subtracted from the total number of subscribers assumed to have resulted from privatization. The first three columns of Table 5 show the number of residential customers calculated according to these scenarios. The last three columns show access costs, as well as a summary of consumer surplus as obtained with equation (2). Additional details for each utility are given below.

Private *telecom* companies have installed more than 1.5 million lines since the transfer to accommodate the increase in the area's total number of residential customers from 1.3 to 2.9 millions. However, had ENTel expanded at the earlier rate, its residential customer-base would have reached 2 million by the end of 1999. Thus, according to these calculations the number of new entrants attributed to reforms is only 909,000. Either way, the annual consumer surplus for a 'typical newcomer' (based on the average expenditure given in Table 4 and on the assumption of an unitary elasticity of demand) is US$241 (-$481/2-1.0). When this is corrected by the annualized cost of access of US$234 (Table 5), consumer surplus falls to US$7.[24] However, it should be mentioned that this gain should be further adjusted to consider that new entrants might have used public phones as an alternative, though lack of data prevented this calculation.

Table 5
Consumer surplus for the average newcomer in the Gran Buenos Aires consumer surplus and costs per year(0)

Utility	No. of utility subscribers ('000)			Counterfactual final users(2)	Access costs(3)		Consumer surplus
	At transfer(1)	As of Dec. '99	New entrants		Fee	Rental	
Telecoms	1,274	2,920	1,646	2,011	75	159	241
Electricity	3,516	3,997	481	4,055	17	26/93	179
Gas	2,550	2,955	405	3,310	97	38	182
Water(4	5,758	7,669	1,911	6,435	32	12	175
Sewerage(4	4,663	5,744	1,081	5,735	32	12	175

Source: Aguas Argentinas (2000), Colomé (1996), ENARGAS (1999), INDEC (2000) and Secretaría de Energía y Minería (2000).

Notes: (0)Measured in pesos ($1 = US$1). (1)Initial users of telecom services as of Nov. 1990; electricity as of Dec. 1991, gas as of Dec. 1992 and water and sewerage as of May 1993. (2) Annual growth rate of the public utilities (estimated for the decade before their privatization): ENTel 5.2%, SEGBA 1.8%, Gas del Estado 3.8% and OSN 1.6% for water and 3.0% for sewerage. (3) Connection fee and rental charge. (4)Per 1,000 (on average, three members per household).

[24] For basic telephony, connection costs are calculated from the average connection charge of US$750 (established by the Secretaría de Comunicaciones) and using an annual discount rate of 10 percent yields US$75. For piped natural gas, it is estimated to be the sum of the cost for an internal installation of two appliances US$919 and the connection rights (US$50) in 1999. Based on the presumption that an external grid already exists and using same the opportunity costs, then we would get US$97. In electricity, the connection charge varies between US$50 and US$490, depending on whether the connection is common or special, if the area is single-phased or three-phased, and if it is an underground connection or not (Estache and Chisari, 2000).

In comparison, there seems to be no welfare gain for 481,000 new *electricity* subscribers, a fact that reflects its wide coverage before reforms and the existence of numerous illegal connections at the time of the transfer. The magnitude of the latter problem encouraged private companies to draw up a four-year agreement with the provincial government and municipalities to normalize the situation. This resulted in 10,000 new electricity metres being installed a month (Estache and Chisari, 2000) and the signing-up of 436,000 illegal entrants as regular subscribers.[25] Although efficient from an allocative point of view, the change merely generated a welfare transfer from the new paying customers to those who had financed the deficits of the public utilities (taxpayers and customers with tariffs above economic costs). The new subscribers, of course, were no longer at risk from precarious, limited and unsafe service. The number of legalized connections basically corresponds to the number of new entrants, and this can be interpreted as there being no significant welfare change in either scenario.[26] Table 5 summarizes the consumer surplus and access costs.

The development of piped gas distribution is similar to electricity, in that the 405,000 new customers registered under private ownership could have been enlisted by Gas del Estado in the counterfactual scenario. But in that event, there would have been no welfare gain for new entrants. The potential benefits of entering the network would have been offset by the loss of consumer surplus from consumption of bottled gas. In fact, when one takes into account that the average annual gas expenditure per consumer is US$182 for piped distribution versus US$135 for bottled, and assuming further that there are no access costs on bottled gas, and that demand elasticities are -0.5 in both cases, the substitution of bottled gas by piped gas provides an annual net welfare gain of US$47 (US$182–US$135).[27] However, when network access costs of US$135 are included in the analysis, the result becomes negative. Nevertheless, it is possible that the entry of new customers can be explained by the fact that quality gains were perceived to exceed, or at least equal, the negative welfare effect. Furthermore, an alternative estimate of welfare gains based on the savings derived from such a substitution produces a similar result.[28]

Water and sewerage services have had uneven behaviour pattern throughout the period of private take-over because the growth rate for the water customer base was similar to that of

---

[25] If one assumes that one-third of the reduction in grid loses reflect better technical efficiencies and two-thirds the conversion of illegal connections into regular subscribers, the 18 percent observed drop (for example, Edesur reported a 26 percent decrease in 1992 and 8 percent in 1999, for example) applied to the 5.6 thousand Gwh sold by SEGBA to its residential customers in 1991 would equal to a 'recuperation' of 636 Gwh. This surplus power, if sold to customers with an average consumption of 1.6 Mwh, would account for the 398,000 'new users'.

[26] Although a reduction of demand for those users whose willingness to pay is less than the opportunity cost of providing the service would increase social welfare.

[27] This calculation assumes that 'gas demand' moves upwards or to the right due to an improvement in the quality of the good; as shown by Spulber and Sabbaghi (1996) for water.

[28] Replacing bottled gas with piped gas would enable the average 'bottled' consumer to reduce his costs up to 40 percent for the same calorific value, implying a savings of US$54 a year (the price of bottled gas with tax is US$1.10 per kilogram versus US$0.32 for piped gas. A kilogram of bottled gas equals 1.4m3 of piped gas). These facts help to explain why about 25 percent of the families with possibilities for connecting to the natural gas network still use bottled gas.

OSN, albeit with a higher rate for sewerage. As previously, the welfare change for a typical newcomer is calculated by comparing the consumer surplus net of access costs against an alternative service, which is assumed to consist here of a pumped well, or cesspool and septic tank. Similarly, the net welfare gain of a connection to water or sewerage network can also be calculated by subtracting the surplus of alternative services from that of the new ones, and correcting the result for access costs. If the average Aguas Argentinas customer spends US$105 a year on water and US$45 on sewerage, and the annual cost of a pumped well and septic tank is US$30 and US$80, respectively, access to the water network would give a net benefit of US$81 assuming a demand elasticity of -0.3 but a welfare loss of US$86 for sewerage, because in this case the net surplus is eroded by the access costs.[29]

Although evidence suggests that the welfare increase for new residential telephone users in the Gran Buenos Aires area have been important, it reached only US$12 million per year in the first scenario and less than one million in the second, probably because rental adjustments captured the consumer surplus. Changes in the electricity sector have also been minimal because of the universal nature of the service before the reform and because reform converted, to a great extent, illegal users into regular customers, which merely implies interpersonal welfare changes (although social welfare may have increased). Welfare gains in the piped gas sector have diminished because consumers giving up the benefits of bottled gas were faced with large access costs. Finally, benefits from the sanitation services were mixed. Rapid expansion of the water network had provided to more than 0.5 million households a welfare gain fluctuating between US$52 million a year in the first scenario to US$33 million in the second, but significant access costs to the sewerage network caused important losses to the new users.

6. Conclusions

The privatization of public utilities in Argentina can be explained—as in many other countries—by the negative impact that these services had on some macroeconomic variables which provoked the frequent need to use public funds to finance operating deficits. This was accompanied by a general dissatisfaction with management performance, and by the difficulties governments faced in controlling such firms which translated in their resistance to competition to improve their economic efficiency. The adoption of a privatization programme was possible due to the transformation of monopolistic activities into competitive ones thanks to developments in technology and more importantly, because public opinion was more liable to believe that the state should leave market oriented activities to the private sector and concentrate on areas where private involvement could not be possible.

Privatization, as implemented by the Argentinean government at the end of the 1980s mainly involved authorization from the congress, the splitting up of the state-run companies and the design of regulatory frameworks. However, as reforms were introduced in an era characterized by hyperinflation, recession and a significant fiscal deficit, initial

[29] The construction cost of a pumped well is US$2,500 and that of cesspool US$1,000, whereas the annual operating costs (for the electricity to operate the pump and for removals) reaches to US$30 and US$160, respectively (Abdala, 1997).

transfers were motivated by fiscal concerns without sufficient attention to the structure of the markets. For all these reasons, telecom services operated under monopolistic conditions, under a weak regulatory regime. Later, a more active participation by the congress and the design of more elaborate regulatory norms paved the way for a more competitive environment. This appears to have been the case for the energy utilities. The water and sanitation services concession that took place under the urgent need for private involvement seems to be an exception.

During private management, companies changed their sources of revenue by restructuring the two-part tariff scheme, usually with a rise in the fixed charge. In telecoms, the rental increased 50 percent whereas the price of the pulse fell by 10 percent. In electricity, both fixed and variable charges rose 50 percent and 17 percent for low-demand customers, while corresponding fixed charges for high-demand consumers remained almost unchanged and variable charges declined by 33 percent. Tariff increases in piped gas were less important but the unit price was more dynamic that the standing charge. They increased less than 20 percent and 10 percent, respectively. Tariffs for water and sewerage services were more stable because the tariff structure was maintained and prices only rose 10 percent. During this period, however, the number of customers increased and some quality improvements were observed.

The impact of the reforms upon consumers welfare was measured in this paper by considering the changes in welfare of the initial consumers and the surplus of the newcomers. Results suggest that the direction as well as the magnitude of residential consumers' welfare changes vary across services (as evidenced by the welfare gains achieved in telecom and electricity services, but losses experienced in gas and sanitation). Magnitudes, in all cases, also change according to demand elasticity. Furthermore, although the effect varies in the different groups, reforms seem to have affected vulnerable households more severely, or provided the least benefit to this group, perhaps because of changes in fixed tariffs. For all users as a group, gains would have represented 0.04 percent and losses 0.03 percent of total income.

Benefits to newcomers also seem to vary across services. The expenditure level of the average consumer and the relative importance of excess demand prevailing at the time of the reform have had little significance in telecomunications because the substantial rental increase captured almost all the surplus of the new consumers. Gains would also be minimal in the case of electricity because of the universal character of this service and because most newcomers were illegal users converted into regular customers. It appears that gains in gas have not been important because for the majority of new users the benefits from lower unit prices for piped gas were offset by high access costs to the network. In water and sanitation services, in contrast, the rapid expansion of the water network induced important welfare gains, and according to simple calculations, the benefits to new users vary between 0.03 percent and 0.02 percent.

References

Abdala, M.A. (1997) 'Welfare Effects of Buenos Aires Water and Sewerage Services Privatization', *Anales de la Asociación Argentina de Economía Política*, IV: 285-310.

Aguas Argentinas SA (2000) 'Población servida', internet http//:www. aguasargentinas.com.ar

Colomé R.A. (1996) 'Privatización y marco regulatorio de las telecomunicaciones: Experiencia argentina', *Revista Actualidad Económica* (3): 13-19, Córdoba: Argentina.

ENARGAS (1999) *Datos operativos de las licenciatarias de gas*, ENARGAS: Buenos Aires.

ENARGAS (2000) 'Cuadros tarifarios', internet http://www.enargas.gov.ar

ENRE (2000) 'Cuadros tarifarios', Internet http://www.enre.gov.ar

Estache A., and O. Chisari (2000). 'Regulation and the Needs of the Poor: Quality, Standards and Measuring Performance', paper presented at the meeting on The Social Impact of Privatization and Regulation of Utilities in Latin America, 6-7 October, UNU/WIDER, Helsinki.

Ferro, G. (1999) *Evolución del Cuadro Tarifario de Aguas Argentinas: financiamiento de las expansiones en Buenos Aires*, Centro de Estudios Económicos de la Regulación, Instituto de Economía, Universidad Argentina de la Empresa: Buenos Aires.

FIEL (1999). 'La Regulación de la Competencia y de los Servicios Públicos. Teoría y Experiencia Argentina Reciente', Buenos Aires.

Hancock, R., and C. Waddams Price (1995) 'Competition in the British Domestic Gas Market: Efficiency and Equity', *Fiscal Studies*, 16: 81-105.

Instituto Nacional De Estadistica y Censos (2000) *Sinopsis estadística 2000*, INEC: Buenos Aires.

Spulber, N., and A. Sabbaghi (1996) *Economics of Water Resources: From Regulation to Privatization*, Kluwer Academic Publishers: Boston MA.

Waddams Price, K., and R. Hancock (1998) 'Distributional Effects of Liberalising UK Residential Utility Markets', *Fiscal Studies*, 19: 295-319.

UNU World Institute for Development Economics Research (UNU/WIDER) was established by the United Nations University as its first research and training centre and started work in Helsinki, Finland in 1985. The purpose of the Institute is to undertake applied research and policy analysis on structural changes affecting the developing and transitional economies, to provide a forum for the advocacy of policies leading to robust, equitable and environmentally sustainable growth, and to promote capacity strengthening and training in the field of economic and social policy making. Its work is carried out by staff researchers and visiting scholars in Helsinki and through networks of collaborating scholars and institutions around the world.

UNU World Institute for Development Economics Research (UNU/WIDER)
Katajanokanlaituri 6 B, 00160 Helsinki, Finland

Camera-ready typescript prepared by Lorraine Telfer-Taivainen at UNU/WIDER
Printed at UNU/WIDER, Helsinki

ISSN 1609-5774
ISBN 952-455-272-8 (printed publication)
ISBN 952-455-273-6 (internet publication)