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Governance in Water Supply

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Abstract[2]

This paper reviews the institutional framework that governs the supply of water services, with a specific focus on developing countries. It first highlights the main mismatches that plague the water sector, namely those between the nature of resources, functions, jurisdiction and objectives of the different agents involved. It then goes on to address three main issues: the public vs. private provision debate, the design of the regulatory framework, and affordability and the design of subsidies, and concludes by drawing some policy implications and recommendations for case studies.

Keywords: Water, institutions, regulation, subsidies
JEL Codes: L95, D02, L51, H24"

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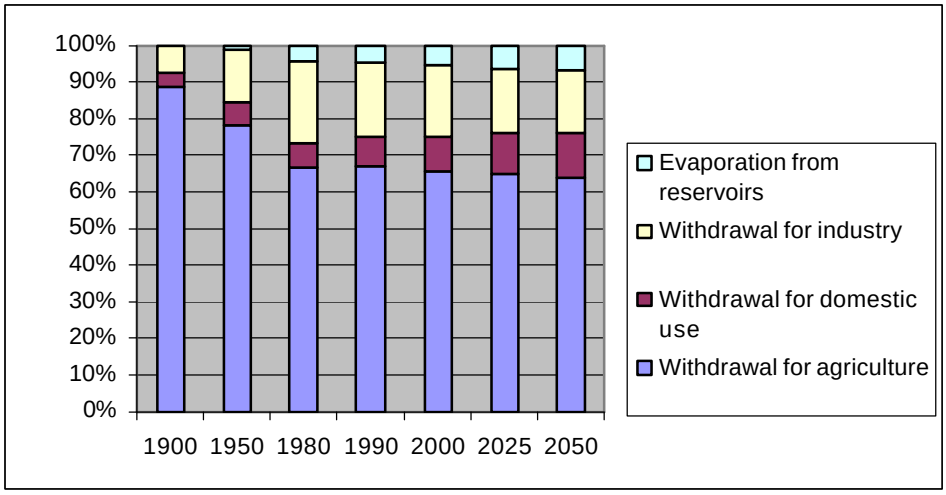
I. Introduction

1. Diagnostic of the Water Situation

Approximately 97.5% of the world's water is salty. Of the remaining fresh water (2.5%, representing 35 million cubic kilometers/year (cukm/year)), only 90,000 cukm/year (0.26% of the fresh water resources) is accessible. Of this, close to two-thirds is green water, which evaporates into the atmosphere. That leaves about 40,000 cukm/year, of which 12,500 can be accessed under prevailing technical and economic conditions (Saleth and Dinar, 2002).

Current withdrawals are close to a one third of this accessible water, and demand is growing faster than supply in many places. The main sources of withdrawals and consumption, shown in Figure 1, are agricultural uses (irrigation), industrial use, and finally domestic consumption. Although small (around 10%), the share of domestic consumption is expected to rise due to population growth (the world's population is expected to reach 12 billion by 2010), and rural-urban migration (the share of urban population, equal to 43% around 2000, is expected to reach 61% by 2025). Total withdrawals could reach 70% of the accessible water by 2025 (Postel, Daily and Ehrlich, 1996), in a scenario where the practical limit to ensure renewability varies between 30 and 60%. Some countries, for example in the Middle East, are already near or above their own renewable water supply limit. Note that there are tremendous inequalities across countries in term of access to water resources. For example, Brazil has about one-fifth of the world's fresh water resources for a population of 190 million, while India and China have only one-tenth of global fresh water resources for a joint population of close to 2.5 billion (Saleth and Dinar, 2002).

Figure 1 : Water Withdrawals by Sectors



Source: World Water Council, 2002.

Moreover, many countries in the developing world are currently unable to respond to the basic water and sanitation needs of their population, as shown by the World Bank development indicators and WHO-UNICEF statistics summarized in Tables 1 and 2 below.

Table 1: Improved water source and sanitation facilities as of 2006 (% of population with access, by geographical regions)

Regions	Improved water source			Improved sanitation facilities		
	Total	Rural	Urban	Total	Rural	Urban
East Asia & Pacific	87,4	80,9	96,3	65,5	58,7	75,1
Europe & Central Asia	95,0	88,0	99,0	88,8	78,9	94,3
Latin America & Caribbean	91,4	73,1	96,9	78,3	51,1	86,2
Middle East & North Africa	89,0	81,4	94,8	74,6	58,7	88,9
South Asia	86,9	83,9	94,0	32,8	23,0	56,7
Sub-Saharan Africa	58,4	45,6	81,3	30,7	24,3	42,3

Source: World Development Indicators, World Bank

In the classification of the WHO, improved water sources are sources "that, by nature of their construction or through active intervention, are protected from outside contamination, particularly faecal matter. These include piped water in a dwelling, plot or yard, and other improved sources". Similarly, an improved sanitation facility

is one “that ensures hygienic separation of human excreta from human contact” (WHO-UNICEF, 2008).

Table 2: Improved water source and sanitation facilities as of 2006 (% of population with access, by level of development)

Regions	Improved water source			Improved sanitation facilities		
	Total	Rural	Urban	Total	Rural	Urban
High income	99,6	98,1	99,8	99,9	99,3	99,9
Middle income	89,2	82,5	96,6	59,2	44,2	76,3
Upper middle income	94,6	83,2	98,4	82,7	63,6	89,1
Lower middle income	88,0	82,5	95,8	54,0	42,4	70,9
Low income	67,7	60,2	83,7	39,5	33,1	54,0

Source: World Development Indicators, World Bank

According to the latest WHO-Unicef figures, as of 2006, 2.5 billion people are without access to improved sanitation (corresponding to a global access rate of 62%), and one billion people in rural areas still practice open defecation. Although a number of developing countries are on track to meet the Millennium Development Goal (MDG) of a 77% rate of coverage, large parts of sub-Saharan Africa and Southern Asia are not, meaning that the world as a whole is not on track to meet the MDG sanitation target.

In terms of drinking water, 87% of the world’s population uses drinking water from improved sources as of 2006 (54% a piped connection in their dwelling, plot or yard, and 33% other improved drinking water sources). This translates into 5.7 billion people worldwide who are now using drinking water from an improved source, an increase of 1.6 billion since 1990. Trends indicate that most countries are on track to meet the MDG drinking water target (89%), except again in sub-Saharan Africa, where coverage is still considerably lower than in other regions (although it has increased from 49% in 1990 to 58% in 2006).

Scarcity is also a threat on irrigation in agriculture, putting further stress on subsistence of the poorest population in particular in Africa and Asia: 40% of all food production depends on (irrigation) water, with peaks at 70% in China and 50% in India, and so does 20% of global fish yields and 20% of global power supply (Saleth and Dinar, 2002).

2. The Nature of the Good.

While (urban) water does not fully qualify as a public good (it is rival and also largely excludable), it still has some public good characteristics that may justify public intervention in its supply. Drinking water is essential for life: the minimum required is between 2 and 4 liters per day of drinking water depending on how hot the climate is, and 20 to 50 liters per day for hygiene and domestic purpose. However, these are lower bounds, and even in very poor areas some usage is not purely for subsistence, implying a price elasticity of demand that, although small, varies for developing countries between -.25 and -.75 (Noll, Shirley and Cowan, 2002). Therefore, the fact that water is essential for life does not make it fundamentally different from any other good. Simply, its value is related to its scarcity as for any standard good.[1]

Water also has large externalities. The first category of externalities is related to the cost imposed on other economic agents (alternative present or future usage) by extraction at a non-renewable rate. The second category comes from usage byproducts in terms of spillage and pollution of water supply sources. Indeed, both improved drinking water quality and waste water treatment facilities have the potential to deliver significant health improvements through the reduction of the transmission of communicable water-related diseases.[2] As a matter of fact, over 12

[1] This is true even in extreme situations, as illustrated vividly in Fischer (2002) in the case of the Middle East water management project.

[2] See for example Esrey (1996) and Galiani, Gertler and Schardgrovsky (2005).

million people, among which a majority of children, still die yearly because of water-borne diseases such as diarrhea or cholera. These aspects have partly fueled the controversy about whether water should be treated as a private good (independently of the fact that it is privately or publicly provided).

Moreover, the water sector is characterized by a number of other important facts.[3] First of all, the availability and cost of good water resources is highly variable between different places. Second, the water sector is in general not competitive. This is due in particular to the fact that the sector has very large sunk cost, with fixed assets having few alternative uses and very long life duration, and large economies of density and scale. As a consequence, the ratio of fixed to variable costs is high, making full recovery water tariffs difficult to sustain. This in turn makes problems of opportunism and expropriation of different types of rent relatively acute. It is also a sector in which innovation, be it technological progress or changes in organizational forms, has been limited. The resulting low return, high risk profile of the sector has meant lower average returns, making it more difficult to attract capital than in other infrastructure sectors.[4]

Finally, because of the massive and partly essential nature of consumption, of the potential of the sector for manipulation through the attribution of favors to particular individuals or groups, of the intrinsically important information problems related to quality, externalities, usage and spillage monitoring, etc., the water sector is almost by essence a very politicized one. Political economy issues therefore weigh strongly on policy making and on the regulatory process and are an essential ingredient of any reform process.

II. The Water Sector: A Sector of Many Mismatches

[3] See a more detailed discussion of these aspects in Savedoff and Spiller (1999), Noll et al. (2002), and Shirley (2007), inter alia.

[4] See for example evidence of this for Latin America in Sirtaine, Pinglo, Guasch and Foster (2005).

By its very nature, the water sector involves, more than any other infrastructure sector, the management of disjoint, yet overlapping geographical and institutional dimensions. Indeed, whatever the choices made in terms of physical supply options, in terms of the degree of decentralization of the many water supply functions (building, operating, regulating), and in terms of the economic organization of the sector (public versus different degrees of private involvement), significant tensions resulting from mismatches of functions, jurisdiction and objectives will occur.

This implies that on top of the efficiency of specific institutional "links" in the water "chain", the overall organization of- and boundaries between these links will matter importantly for the overall efficiency of the water sector. Put differently, it means that policy analysis should be concerned both with prescriptions aimed at maximizing the efficiency of specific institutions (e.g. operators' efficiency, regulators' competence and endowments), but should also, more than in any other sector, consider how the failures associated with externalities and existing geographical and institutional mismatches (these last ones often related to political constraints difficult to move in the short term) will affect the impact of the choices made at the level of individual institutional links.

It also implies that the appropriate institutional arrangements and the reforms of the existing ones will differ greatly across countries, making the water sector almost a paradigm of a case in which cross-country comparability and institutional transplant are difficult, not to say that they are bound to fail. This, together with the sector complexity described above and the politically sensitive nature of the good, explains why reforms are so difficult to engineer and sustain in this sector.

Among the mismatches at the heart of the water sector, the following emerge as most significant.

1. The tension between the characteristics of water resources in terms of ease of access (quality and distance to the resources) and the strength of related externalities on the one hand, and the local nature of the entities responsible for building, and operating water supply systems. The magnitude of the tensions will obviously depend on the degree of decentralization of public services (who is responsible, and with which degrees of autonomy, for the functions mentioned above), and also on the intrinsic cost of water supply that derives from the physical characteristics of the resource. This issue may be particularly acute for large developing countries' cities, which are generally in charge of their water supply systems but may depend on very different types of water resources in terms of cost and sustainability.

   Lima in Peru and Mexico City in Mexico provide examples of cities in which this issue is particularly relevant (Noll, Shirley and Cowan, 2002). Both rely on distant or costly and potentially unsustainable water resources. In the case of Lima, water is extracted from a polluted river and from an aquifer, in both cases at unsustainable rates, causing pollution of the aquifer through sea salt water. In Mexico City, two-thirds is extracted from the city deep aquifer at unsustainable rates, while the rest is pumped from distant rivers (in some cases over 100 km away and below the city level).

   Interestingly, there are examples of countries moving in different directions. While a number of European countries for example are moving towards greater concentration of provision (e.g. The Netherlands, Belgium, Italy), others like Brazil are going towards a more decentralized structure (Barraqué, Formiga Johnsson and Nogueira, 2008). In this evolution, it is likely that path dependency linked to political history plays an important role. Foster (2005)

emphasizes for example that in many developing countries, decentralization of the industrial organization of the water sector has often been the byproduct of a broader decentralization trend rather than a policy designed specifically for this sector.

2. These tensions are exacerbated in a context where integrated management of the different dimensions of water is increasingly sought: demand and supply; economic, public health and environment, etc. (see for example Gleick, 2000, and Barraqué et al., 2008). This is for example particularly relevant in the areas of policy making and regulation in the water sector. Indeed, both activities have to deal with the overlaps between the economic dimension (key public service, component of urban infrastructure), the health dimension (potable water and adequate sanitation) and the environmental dimension (resource exhaustion, pollution). As a result, it is often the case that several ministries are involved in policy making, and several regulatory bodies potentially involved in overlapping tasks (Foster, 2005). Across Latin America for example, economic issues are often bundled with either health or environmental issues as responsibility of the corresponding ministries (Panama, Venezuela). Similarly, economic regulators often assume health-related task such as monitoring of drinking water quality or environmental ones such as the monitoring of effluent discharge from sewers, but are rarely involved in the granting of extraction licenses. The consequences of potentially non-coordinated decisions between the different bodies in charge may imply barriers to entry or cost overruns with important implications on the industrial organization of the sector and the suitability of regulatory decisions on tariffs for example (Foster, 2005).

3. Finally, a further mismatch relates to the fact that the political and geographical jurisdictions of regulators often do not overlap with that of service providers. For example, the increasing decentralization of services to regional or municipal providers coexists in many countries with a centralized regulatory structure, creating political tensions and added complexity to the regulatory process in a context where regulators may already lack material resources and competence. The fact that this evolution has in many cases been one from unregulated centralized (public) provision to regulated decentralized (public or private) provision adds to the difficulties in assessing the merit of different reforms path.

Moreover, this problem is often related to a more classical type of mismatch in sectors in which important reforms are intended, namely the lack of coordination of the relative timings of structural and regulatory reforms. Indeed, structural industrial reforms most of the time preceded regulatory reforms, and these in turn had to deal with new settings that were not designed with the regulatory issues in mind.

The evolution of the Honduran Water sector, described in Walker, Velásquez, Ordóñez and Rodríguez (1999), exemplifies these points. Although a law from the early 1960s pushed for operating centralization, this was never achieved, and in practice tens of municipal water systems are in operation ever since. In 1990, a new legislation established that water and sanitation was of municipal competency, creating a direct conflict with the former law that had not been repealed. On the other hand, a centralized regulatory agency was established in 1991 to regulate water rates (other attributes such as quality control or use and protection of water sources correspond to the ministries of health and

environment and natural resources respectively). The mismatch with the decentralized nature of provision is most evident in rthe direct conflict that arises between the rate setting mandate of the regulator and the municipalities' right, established in the 1990 legislation, to establish their own water rates. These problems, together with the lack of independence of the regulator, result in bad regulatory outcomes and are at the root of what Savedoff and Spiller (1999) call a low-level equilibrium made of politicization of the service, low prices, and bad service of corruption.

Keeping in mind the discussion above on the interrelations between different institutional layers and mismatches, the next sections review three main facets of governance in the water sector, namely 1) the public vs. private provider debate (as well as the issue of different forms of private involvement); 2) the design of an optimal regulation; 3) the problems of access and affordability and in particular the question surrounding the design of subsidies. The issue of the design of incentives for actors of water related institutions (providers' managers, regulators) is addressed as part of sections III and IV.

III. The Public vs. Private Provision Debate

One of the more controversial institutional issues in the water sector has to do with potential private sector involvement in its operations. Obviously, private participation is not a specificity of the water sector, as it has become increasingly common in all infrastructure sectors in the last decades, but probably because of the essential nature of the good (see introduction) and of its high social impact (see section IV below), more strongly polarized views exist here on whether the private

sector should be allowed in any of the segments of water production and distribution.[5]

As in other sectors, organizational structures in the water sector vary widely, often within the same country, ranging from highly organized public utilities, to regulated concessions to private providers and community water supply systems. Private participation itself takes many forms, from outright privatization to concessions, management or lease contracts. The first issue is to understand the existing mix of ownership and control options, which will have in particular important implications for the incentives faced by water institutions managers.

In the public sphere, the corporatization of publicly owned firms make managers less subject to political pressures, in particular if formal rules dictate the grounds for removal or replacement. Private sector managers will naturally be less exposed to political opportunism and be more concerned with efficiency and profit maximization. This in principle should make them more sensitive to high-powered incentive regulatory schemes such as price caps (Foster, 2005).

Table 3: Ownership and Control of Water providers

	Ownership	Control (if different)
Public	State	Public corporation (if corporatization)
Public / Private	State State and private	Private corporation in most cases
Private	Private corporation	
Cooperative	Users	

Source: Adapted from Foster (2005)

In the intermediate category where private participation goes hand in hand with some degree of public ownership, it is important to note that effective control generally remains with the private operators. For example, Hall (1997) notes that in Central Europe, control of shared ownership companies was in the hand of private

[5] See for example Hall et al. (2005).

operators in three out of four of the Hungarian companies, and five out of six of the Czech companies, even though in some cases the private companies had only a minority of shares.

Looking more closely at the nature of the intermediate category of mixed public-private institutional forms, the following table summarizes the spectrum of private participation forms, mostly by transnational corporations (TNC).

Table 4: Forms of Private Involvement

Low → Extent of private sector participation → High				
Work and service contracts	Management and maintenance contracts	Operation and maintenance concessions	Build operate transfer concessions	Full privatization
	Public private partnerships			

Most contracts with TNC participation are concessions or operation and management contracts. Between 1996 and 2006, the shares in terms of foreign investment commitments in the water sector worldwide show that 70% were concessions and 25% management and lease contracts (UNCTAD, 2008).

It is interesting to note that the TNC active in water are relatively few. About 75% (resp. 60%) of all investment commitments in developing and transition countries between 1996 and 2006 correspond to the 10 (resp. 5) major players. The market is dominated by French companies (Suez, Veolia Environnement) and to a lesser extent Spanish and English companies.

Table 5: Private Sector Participation in Water Projects in Selected Developing Countries

Economy	Private sector participation (PSP)		TNC involvement	
	PSP during past 20 years	Share of population served by PSP projects	TNC involvement during past 20 years	Comment
LDCs				
Bangladesh	No	0%	No	
Burkina Faso	Yes	5%	Yes	Limited to operation & management (O&M) projects
Cambodia	Yes	>1%	No	Small local companies gaining concessions
Central African Rep.	Yes	0%	Yes	Civil war led to the SAUR company ending its SODECA concession
Chad	Yes	0%	Yes	Renationalization (2004) as Veolia ended O&M contract
Congo, Dem. Rep. of	No	0%	No	Cascal declined to enter into a management contract in 2004
Guinea	Yes	0%	Yes	SEEG lease contract expired in 2001
Guinea-Bissau	No	0%	No	Suez has provided technical assistance since 1991
Lesotho	No	0%	No	External support for PSP may evolve into a management contract
Malawi	No	0%	No	
Mali	Yes	1%	Yes	Bouygues has a concession for the main towns
Mozambique	Yes	4%	Yes	Bouygues is involved in a management contract
Nepal	No	0%	No	
Niger	Yes	14%	Yes	Veolia has a broadly based O&M contract
Senegal	Yes	32%	Yes	10 year O&M contract was renewed for another 5 years in 2006
Sudan	Yes	0%	Yes	Status of Cascal's water PSP contract awarded in 2007 is uncertain
Tanzania, United Rep. of	Yes	0%	Yes	Cascal O&M contract revoked in 2005
Uganda	Yes	2%	No	Emphasis is on medium-sized local companies
Zambia	Yes	0%	Yes	A short-term contract completed
Other developing economies				
Algeria	Yes	29%	Yes	Desalination and water management contracts underway
Argentina	Yes	11%	Yes	Most major TNC contracts have ended
Bahrain	No	0%	No	PSP under consideration for some years
Belize	Yes	0%	Yes	Cascal has an O&M contract
Bolivia	Yes	0%	Yes	Government policy against private/TNC participation
Brazil	Yes	27%	Yes	Many TNCs have sold project stakes, strong local PSP
Cameroon	Yes	25%	Yes	ONEP won bid on privatization of SNEC in 2007
Chile	Yes	81%	Yes	TNCs have divested some of their holdings
China	Yes	10%	Yes	Market is welcoming to TNCs, albeit competitive
Côte d'Ivoire	Yes	29%	Yes	Bouygues operates a concession
Cuba	Yes	5%	Yes	Agbar is expanding its activities
Dominican Rep.	Yes	15%	Yes	One large O&M contract
Egypt	No	0%	No	PSP laws passed in 2000, no contracts signed
Ecuador	Yes	19%	Yes	Two TNC concessions
Gabon	Yes	44%	Yes	Veolia concession listed on local stock exchange
Ghana	Yes	27%	Yes	Vitens and Rand Water operate a PSP contract
India	Yes	1%	Yes	Supportive environment emerging
Indonesia	Yes	5%	Yes	Major concessions by TNCs, regional players emerging
Iran, Islamic Rep. of	No	0%	No	
Iraq	No	0%	No	
Jordan	Yes	45%	Yes	One water BOT for Amman & Northern Jordan, plans for further contracts.
Kazakhstan	Yes	2%	Yes	Some small O&M contracts
Kenya	No	0%	No	Veolia has a support contract
Korea, Rep. of	No	0%	No	Wastewater PSP with TNCs
Kuwait	No	0%	No	Wastewater PSP since 2001, no water PSP
Lebanon	No	0%	No	Beirut PSP plans postponed in 2002
Malaysia	Yes	64%	Yes	Trend towards concessions run by local companies
Morocco	Yes	22%	Yes	Veolia and Suez operate a series of concessions
Namibia	No	0%	No	Veolia has a wastewater contract, no water contracts
Nigeria	No	0%	No	Little progress on PSP
Oman	Yes	31%	Yes	One desalination and one water contract awarded to TNCs in recent years.
Pakistan	No	0%	No	
Panama	Yes	9%	Yes	One contract (Cascal)
Paraguay	No	0%	No	No formal PSP
Peru	Yes	3%	Yes	Small TNC projects
Philippines	Yes	13%	Yes	Major projects being handed over to local investors
Qatar	Yes	0%	No	Desalination by a local consortium
Saudi Arabia	Yes	15%	No	A series of management projects under development
Singapore	Yes	10%	No	Current emphasis on local players
South Africa	Yes	2%	Yes	Pressure on TNCs to provide free water in contracts
Sri Lanka	Yes	>1%	No	
Taiwan Province of China	Yes	14%	Yes	Major project developed, slow PSP progress
Thailand	Yes	3%	Yes	Shift towards local players
Trinidad & Tobago	Yes	0%	Yes	No contract has replaced Severn Trent O&M contract
Tunisia	No	0%	No	A series of formal PSP proposals are under development
Turkey	Yes	2%	Yes	Small-scale TNCs active, especially in sewerage
United Arab Emirates	No	0%	No	Water and desalination PSP projects being developed
Uruguay	Yes	11%	Yes	Agbar divested to local partners, others continue
Venezuela, Bolivarian Rep. of	Yes	0%	Yes	Low-key PSP presence
Viet Nam	Yes	1%	Yes	TNCs now discouraged
Zimbabwe	No	0%	No	PSP project awards withdrawn

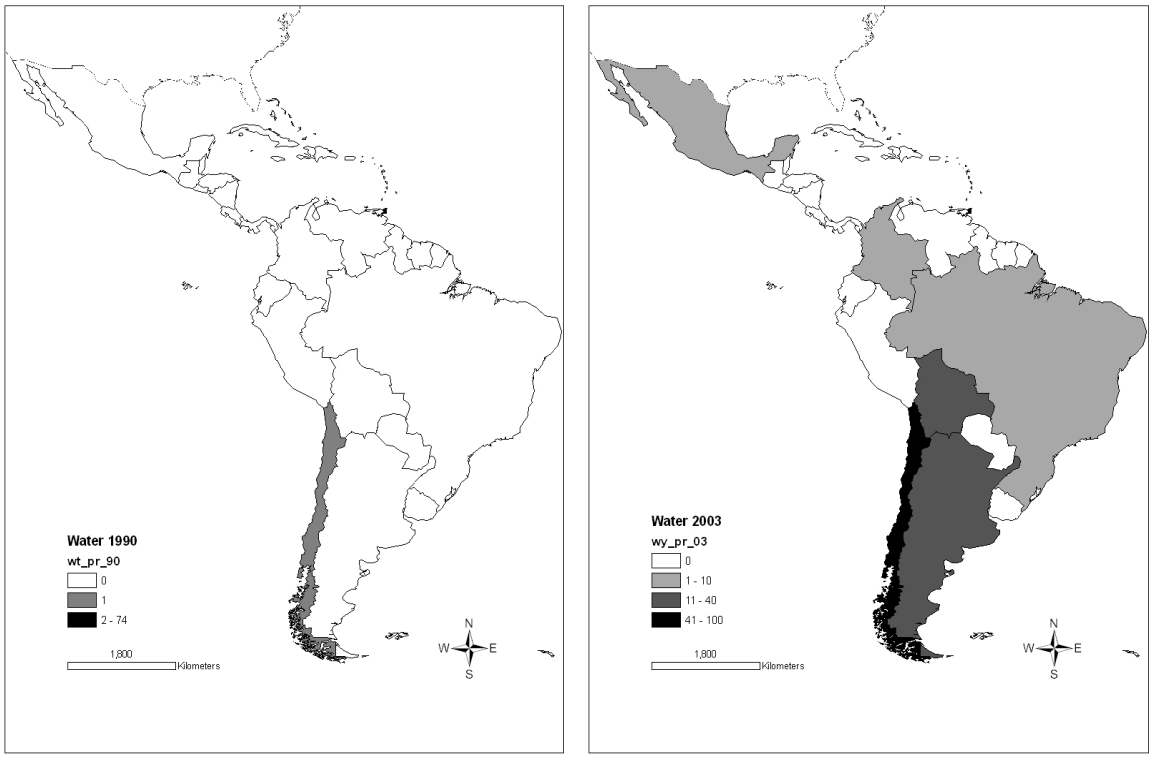
Source: UNCTAD, 2008.

Despite the intensity of the debate on this issue, it is notable that the share of customers served by private providers worldwide is still quite small. The most recent figures show that the water industry is relatively closed to foreign investment and that 90% of all water utilities (at the national or local level) are run by public entities (UNCTAD, 2008). Between 1985 and 2008, TNCs have provided water to over 180 million people in developing countries, almost exclusively in urban areas (the exception is Chile). Table 5 from UNCTAD (2008) shows that the private sector share of supply exceeded 30% of the population in only 6 of the 70 developing countries included, while in most countries, this share was below 5%.

The following map (Figure 2) shows the shares of customers under private provision in Latin America, the region which attracted the bulk of private investments in infrastructure sectors, in 1990 and 2003 respectively. Again, it is apparent that with the exception of Chile, these have remained relatively low.

Figure 2: Shares of customers under private provision in Latin America in 1990 and 2003

Water



Source: Andres, Foster, Guasch and Haven (2007).

Finally, note that small scale service providers are also quite active in this sector. These include community organizations, village administration (some of which receive public funding from governments, donors or NGOs), as well as a majority of small scale private service providers (SPSPs) relying on private resources. A recent review by Kariuki and Schwartz (2005) identified around 10,000 SPSPs in 49 countries, a number that probably represents a lower bound on the actual prevalence of these operators. The SPSPs are generally small units, particularly active in peri-urban, rural or remote regions, as well as in regions with failed public institutions. The World Bank standard definition defines them as units of less than 50 employees, assets up to $3 million and sales of up to $3 million. In this range, Kariuki and Schwartz (2005) indicate that an efficient SPSP will have a staff-to connection ration of up to 4:1000, so that a unit with 20 employees could serve a community of 25,000 people. That means clearly that SPSPs have the potential to become the reference local operators in small and medium developing country towns. The following Table 6 shows the coverage of water SPSPs across selected developing country large cities.

Table 6: Coverage by water supply SPSPs around the world

Africa	***% of population covered***
Benin, Cotonou	69
Burkina Faso, Bobo Diaulasso	33
Niangologo	68
Ouagadougou	49
Ivory Coast, Abidjan	35
Boundiali	50
Ghana, Kumasi	32
Guinea, Conakry	66
Kenya, Nairobi	60
Mandera	90
Ukunda	45
Mali, Kayes	69
Bamako	63
Mauritania, Nouakchott	51
Niger, Guidan Rouondji	40
Nigeria, Onitsha	95

Ibi	40
Dankida	15
Senegal, Dakar	21
Diourbel	90
Sudan, Khartoum	80
Somalia, Ali Matan	10
Tanzania, Dar es Salaam	56
Newala	25
Uganda, Kampala	30
Kasangati	25
Latin America & Caribbean	
Argentina, Cordoba	15 to 20
Bolivia, Santa Cruz	100
Colombia, Barranquilla	20 to 25
Guatemala, Guatemala	32
Haiti, Port au Prince	70
Honduras, Tegucigalpa	30
Paraguay, Asuncion	30
Peru, Lima	26 to 30
East Asia and Pacific	
Cambodia, Ky Cham	50
Indonesia, Jakarta	44
Surabaya	27
Philippines, Manila	30
Cebu	36
Ormoc	10
Thailand, Sawee	10
Vietnam, Ho Chi Minh	19
South Asia	
Mongolia, Ulaanbaatar	5
Nepal, Kathmadu	5 to 7
Pakistan, Karachi	40 to 50
India , Delhi	6 to 47
Bangladesh, Dhaka	14

Source: Kariuki and Schwartz (2005)

The evidence shows that SPSPs generally fill the gap of deficient public providers, at a high cost for end users (Auriol and Blanc, 2008). Indeed, they provide water to the poorest part of the population, while public firms serve the richest part. Moreover, they are often unregulated and apply large markups, while public water is subsidized. As a result, the average price per cubic meter of water from SPSPs is close to ten times higher than that of public utilities.

There are several reasons for the low private participation rate in the water sector. First of all is the controversial nature of the good mentioned above, which results in some well organized lobbying groups campaigning against it (see for example

Lobina and Hall, 2003). Moreover, many developing countries have legal or constitutional restrictions (about 1 in 5 restricts private and foreign involvement in water supply, and 1 in 4 in sewage). These political reasons have been particularly acute in large cities, where consumers and citizen groups face a lower cost of organizing themselves to lobby against private participation in water, fight tariff increase, etc. On the other hand, the low returns inherent to low density and income in small cities and rural areas has impeded private participation from large companies for economic viability reasons, and this vacuum has in many cases been occupied by SPSPs. This combination of facts suggests that the benefits from inefficient subsidized public services have often been captured by the ruling elite and the urban upper and middle class, leaving the poorest part of the population to be served by expensive, unregulated small scale providers (Auriol and Blanc, 2008).

What about the relative performance of private operators? Do they really bring about improvements that justify the emphasis put on them? Some recent contributions include Andres et al. (2007), who look at 181 firms in 3 sectors (telecommunications, electricity distribution, water and sewerage) across 15 countries; Gassner et al. (2008), who analyze 1,200 utilities in 71 developing and transition countries ; and McKenzie and Mookherjee (2003), who focus on households in 4 Latin American countries.

For infrastructure sectors in general, overall most studies find consistent improvements in operating performance and quality, no significant impacts on output and coverage, as well as a reduction in the workforce with related productivity improvements and price increases, although there is quite some variability on this last dimension. In most cases, quality indicators (distributional losses in water and electricity, percentage of incomplete calls in telecoms) improve markedly (see more details in Martimort and Straub, 2008).

More specifically in water, Gassner et al. (2008) reach a number of interesting conclusions. In terms of the relative performance increase of private versus public

companies, over a period of 5 years, they find a 12% (resp. 18%) gain in residential connections (resp. residential sanitation coverage), a 18% increase in water sold per worker (which mirrors a 22% reduction in average employment), and a 41% increase in the number of hours of daily water service. However, no clear increase in investment is apparent, especially for management contracts and concessions, and no significant price changes are recorded. This fuels the suspicion that either the efficiency gains were simply used to get closer to some efficiency frontier (reducing spillages, service underpricing or state subsidies), or they were captured by private operators through higher profits and by governments through higher taxes (or lower subsidies). This implies as a corollary the idea of some collusive behavior to implement lax regulation of tariffs, as argued in Martimort and Straub (2008) and Bonnet, Dubois, Martimort and Straub (2006) to explain the skyrocketing level of dissatisfaction with privatization of public services in Latin America at the turn of the century. Note that in the water sector, the structure of rates before and after the reforms clearly raises specific questions. Tariff rebalancing, from a situation in which prices are well below costs (implying large and inefficient subsidies, see Section V below), implies more than in any other sector that rates have to increase. While the dissatisfaction figures available do unfortunately not distinguish between different infrastructure sectors, it is likely that this aspect would weigh heavily on popular evaluations of water privatization.

In terms of welfare, Noll et al. (2002) summarize calculations of net welfare changes including net consumer surplus and changes in the net welfare of workers, government and buyers over a ten years period in the cases of Buenos Aires, Santiago, Lima and Conakry. They find positive welfare effects in all cases, suggesting potential gains from private participation are high. If one adds to this quite robust evidence of a reduction in health externalities (for example in Argentina, a reduction in infant mortality of the poorest households, as documented by Galiani

et al., 2005), there is little doubt about the economic suitability of private participation in water.

However, as we have seen, the peculiar political economy of the sector has made this difficult to achieve. The politically sensitive nature of water, the high degree of resistance to private involvement, the (sometimes justified) perception that efficiency gains are not passed on back to consumers, have led to increasing difficulties in bringing in new investors, as well as to many cases of operators being expropriated (see for example cases in Argentina or Bolivia recently), and to pervasive renegotiations (Guasch, Laffont and Straub, 2007 and 2008). As a result, private operators are increasingly reluctant to investing in contexts where they perceive high political and regulatory risks.

IV. Regulation

Two main aspects of the water sector need to be addressed at the regulatory level. First of all, because of the non-competitive nature of the sector and of the importance of sunk costs resulting from the very long life span and the specificity of assets, the ability of governments to commit to efficient prices over long enough periods to allow for full cost recovery is problematic. In particular, the high ratio of fixed to variable costs implies that utilities need to collect quasi-rents to recover its fixed cost (see Noll et al., 2002). That makes the government credibility problem a very stringent one, as the expropriation of quasi rents will lead to a gradual deterioration of the network and a lower quality of the service, as well as possibly to growing difficulties in attracting new investors.

This problem is compounded by the specificity of the sector's political economy. First, the sensitivity of the water issue in public opinion is likely to exacerbate

pressures to push prices way below their full cost recovery level. Second, the difficulty in observing the state of the physical network (mostly underground pipes) opens the possibility for operators to underinvest in maintenance, thereby extracting additional rents from the system. Third, the risk of regulatory capture by the operators themselves is also non negligible.

Regulatory agencies should therefore be designed in such a way that they are reasonably free from short-term political interference from politicians and other organized groups (certain categories of customers, suppliers, etc.). Any of these groups with potentially large stakes in the regulatory process has incentives to invest significant resources in influencing it, leading to regulatory rules that extract too much rent from the firms, expropriate the quasi-rents and induce too little investment as a result. On the other hand, the need for credibility and independence should be balanced by the fact that a very independent regulator may be more easily captured by the utilities themselves, leading to high prices, social discontent and political opposition to further private participation (Laffont, 2005). Accountability, through open access to information, transparency of decisions processes and possibilities of judicial review are key aspects in that respect.

The way the regulatory design addresses this first credibility issue depends on a number of features, among which the degree of operational and financial autonomy, appointment mechanisms, resources generation and appeal possibilities. Foster (2005) reviews in the case of Latin American countries, a number of these organizational features.

Regulatory bodies are characterized by different types of leadership and varying durations of term, with consequences on the stability of the process. While in some countries leadership is individual, in others it is collegial. This last type of organization may insure against sudden shift of leadership and also make regulatory capture more difficult, at the cost of making the process more cumbersome.

Appointment and removal mechanisms also have direct consequences for the degree of independence of the regulator: transparent and fair criteria should protect regulators against political opportunism and ensure a professional and independent regulatory process. However, Foster (2005) shows that some gap exists between formal legal procedures and their enforcement. In particular, in most Latin American countries regulators have had shorter average duration in their position than the legal term of reference. Finally, resources are fundamental in ensuring regulatory independence. In Latin America, the principle of financial autonomy is common, and most agencies are financed through a percentage levy on the turnover of the industry (with the exception of Chile that relies on a general tax). Agencies count with staffs of between 20 (Bolivia) and 100 (Peru) employees and budgets of between US$ 2 million (Bolivia, Chile) and 7 million (Argentina, Greater Buenos Aires), this last one being an outlier for its high number of employees.

How do the elements above influence the incentives faced by firms? Andres, Guasch and Straub (2007) develop an index of regulatory quality, based on legal solidity (depending on whether the regulatory framework is established by law or not), financial strength (independence and amount of resources), and decision-making autonomy (independence and duration of appointment, as well as collegiality of decisions). They go on to show that the better the quality of regulation, the closer the alignment between financial returns and costs of capital. In the sample of 34 concessions built by Sirtaine, Pinglo, Guasch, and Foster (2005), including the water sector, the quality of regulation appears to be a significant determinant of the divergence between the overall profitability of the concession and its corresponding hurdle rate.

The second specific problem of regulation in the water sector, mentioned in Section I, is the overlap of different dimensions of regulation. First of all, there is an overlap between the economic dimension (key public service, component of urban infrastructure), the health dimension (potable water and adequate sanitation) and the

environmental dimension. As a result, several ministries are typically involved in policy making, and several regulatory bodies endowed with potentially overlapping tasks. The question is whether regulators should cumulate tasks, as for example price setting and quality monitoring that are commonly bundled into the attributions of economic regulators, or whether there should be specific functional regulators. The United Kingdom is an example of this last approach, with several regulators in charge of the different aspects. The Office of Water Regulation (Ofwat) regulates prices and ensures the viability of providers, the Drinking Water Inspectorate deals with the monitoring of drinking water quality, and the Environment Agency overlooks the quality of water in rivers and basins. While this institutional scheme seems to have been designed carefully enough to avoid overlapping and therefore potentially conflicting regulatory making, the generation of externalities and conflicting investment incentives for the firms is still present, for example between price and environmental regulation (Laffont, 2005).

The other relevant overlap is the geographical one. Again, firms subject to several local regulators, because they rely on water from locations outside the jurisdiction of their local regulator may be less inclined to invest. Such a situation arose in the United States in the nineteenth century (Laffont, 2005). In Latin America, in countries that have moved past the traditional model of publicly provided water with no regulation, most regulatory agencies are organized at the national level, except in some federal states. However, it is often the case that the resulting conflicts between local supply and national regulation result in the regulatory legal framework not being enforced, as in Colombia and Peru. Argentina is a case of mixed national and regional or local regulation in some states.

Assessing the optimality of regulatory decentralization is a complex task. Problems of credibility in committing to regulatory stability in principle argue in favor of some decentralization and delegation at the local level. However, this is weakened by problems of capture and collusion that are more serious in the weak institutional

environments of developing countries (Laffont, 2005). Lets also mention that very few countries have opted for cross-sectoral agencies (Panama and Bolivia, although in this last case sectoral managers enjoy autonomy of decisions).

Finally, in complying with the several tasks they are endowed with (enforce sectoral laws and compliance of operators with legal and contractual obligations, determine tariff levels, assist the resolution of conflicts), regulatory design also face a trade-off between ensuring independence from the many existing interests and accountability about decisions made. Accountability depends on the nature of the appeal and complaint processes, as well as on consumer involvement (Foster, 2005).

V. Affordability

In a context of reform of water systems, with its corollary of prices increasing towards cost recovery levels, issues of affordability become crucial. Foster and Yepes (2006) show that in most developing countries, these concerns should not be downplayed. For example, in India and Africa, they report that approximately 70% of households could be expected to face difficulties if full cost recovery tariffs were applied. In Latin America's lower income countries (Bolivia, Honduras, Nicaragua, Paraguay), cost recovery tariffs would similarly generate affordability problem for around half of the population.

As a result, water subsidies, in one form or another, are very prevalent around the developing world, where most tariffs are well below full cost recovery levels. This is apparent in the large correlation that exists between per capita GDP and average residential tariffs, as well as the in the fact that average tariffs in low income countries are about one tenth of those in high income countries. Moreover, adding to this distorted price structure, there is differential pricing between residential and

industrial users in close to 90% of water utilities (Komives, Foster, Halpern and Wodon, 2005).

Quantity-targeted subsidies, either in the form of either increasing block tariffs (IBT) or volume-differentiated tariff (VDT), are the most prevalent ones (80% of cases). However, Komives et al. (2005) show that they are always regressive. The "quality" of subsidies in term of how well they target needy populations can be assessed using a "benefit targeting performance indicator", denoted by ? , which measures the share of subsidies received by the poor relative to the share of poor in the overall population. This indicator is equal to 1 for a randomly distributed benefit, while a value above (resp. below) 1 indicates a progressive (resp. regressive) subsidy.

For quantity-targeted subsidies, Komives et al. (2005) find an average of ? =0.62. This type of subsidies do better if a high proportion of poor is connected, but rarely exceed ? =1. The main problems appear to be the low access rate of poor households, the fact that the difference in quantity consumed between poor and non-poor households is smaller than usually assumed, and the fact that the structure of tariffs often includes large fixed fees, which disproportionally penalize poor households, sometimes even precluding access.

Other forms of subsidies have the potential to do better. Geographical targeting typically leads to ? ˜1, while means testing implies an average targeting performance of ? ˜ 1.3. Finally, subsidy mechanisms based on self-selection, such as public standposts, are even more progressive, with an average performance of ? ˜ 1.8. However, this last situation refers in general to rather small subsidies, with a consequent limited impact, and the benefits must be qualified because of the welfare cost of the lower quality associated to the service. Finally, in low coverage areas, connection subsidies might be more progressive, but this will depend on the fact that all household take up connections at the same rate in response to subsidies.

Overall, the results in Komives et al. (2005) lead to the conclusion that means-tested subsidies are more efficient. On the other hand, they also imply a cost linked to significant errors of both inclusion (giving a subsidy to non-poor households) and exclusion (not giving it to a poor household) (Estache, Foster and Wodon, 2002). Another conclusion is that differences in access rates across regions or countries are an important driver of differences in the effectiveness of different types of subsidies.

Finally, it is interesting to note that utility subsidies generally perform significantly worse than a large variety of social programs, and the difference is mostly due to the more systematic use of administrative household targeting in these programs. This raises the policy question of the suitability of subsidies versus other redistribution mechanisms, like conditional cash transfer programs (CCTs), which will be addressed in the next part of the paper.

VI. Conclusion: Policy Issues and Guidelines for case studies.

This section first briefly summarizes the most salient policy issues discussed above. It then identifies a couple of key issues that should be the focus of case studies and offers suggestions related to the choice of (group of) countries as well as to the methodology.

1. Summary of Policy Recommendations

A number of broad policy conclusions emerge from the review above. In all cases, a major common theme that cuts across the different issues appears to be the political dimension. Indeed, for each of the issues below, it could be argued that politics looms larger than specific design issues, making the mitigation of political obstacles

the crucial policy challenge once the reforms needed are identified. The suggestions for case studies below take special note of this aspect.

Private Participation

First of all, in terms of private participation, it is apparent that the presence of private operators has in many cases been instrumental in bringing about increases in coverage and quality improvements. However, it has clearly failed to induce either large flows of investments or significant price reductions. This problem seems to have two complementary explanations.

- First of all, a selection effect, by which only countries, areas or groups of consumers with suitable return profiles are able to attract private investments. The complementary effect is to search on the side of SPSPs, which have filled the gap for the low profitability segments of the water market in some developing countries. Finally, public entities appear to have concentrated on relatively wealthy consumers, often providing hidden subsidies to this category.

- Second, there is a political economy dimension, linked to the rebalancing of tariffs, as well as sometimes the capture and corruption problems inherent to private sector involvement. Because this has often impeded the transfer of efficiency gains to consumers, it has generated widespread opposition to private participation and the beginning of a move in the other direction.

- This support the idea that attracting private investment to the water sector should still be on the agenda of policy makers, but that more care should be given to avoiding the pitfalls mentioned above. Doing so is likely to involve a good policy combination of increasing coverage and well designed, progressive subsidies, addressing in particular the issue of connection rates for poor households.

- Greater involvement of efficient SPSPs in medium size cities should also be sought.

Regulation

- Similarly, general recommendations on the design of regulation for main providers, public or private, should include the issues mentioned above: independence, stability, financial strength. It is very likely that the way to address mismatches, be they functional or geographical, will depend heavily on the local specificities, including political constraints, demographic characteristics, nature and cost of access to the resources, etc.

- An almost untouched agenda includes the design of guidelines to bring SPSPs, catering for the poorest populations, into the realm of regulation. In contexts where SPSPs provide water to otherwise unserved market segments, policy makers and regulators should look for way to stimulate their activities as a mean to provide investment in infrastructure serving poorer users (Estache, Foster and Wodon, 2002). However, if this is to be a solution to address service deficit towards households unconnected to the main network, regulators should also worry about tighter regulatory oversight to avoid virtual monopoly pricing by such providers.

Subsidies

Finally, regarding the question of subsidies and social policies, it is unclear whether these need to be infrastructure-specific and whether water regulators should be involved in designing or administering welfare program. The evidence on the efficiency of direct consumption subsidies through utilities prices tends to indicate that it would be better to integrate them into governments' general welfare and poverty alleviation policies, as was done in Chile and Colombia for example (Estache, Foster and Wodon, 2002). In any case, the right solution should depend on

the balance between the cost of raising taxation on the one hand, and the potential distortions induced by direct subsidies on the other hand.

2. Selection of Issues for Case Studies.[6]

Based on the discussion above, two specific issues, which are both of crucial importance to improve water delivery in places it is failing and have been relatively understudied to date, appear to deserve more analysis. These are:

- The access of the poor to piped water and/or small scale service providers;
- The conflicts of jurisdiction among providers, sources of water resources and regulatory agencies:

As for the first aspect, it would be interesting to gain more knowledge on a number of institutional interactions. These include first the way the supply of water to the poor varies, in terms of access, cost and quality, between large regulated water networks and small scale private water providers, and how additional institutional aspects, such as the geographical coverage of regulated providers (national, regional or local), their ownership structure (private or public), specific aspects of regulation and pricing (level of tariffs, subsidies to connections or by consumption levels), alter this picture.

As for the second aspect, the objective is to gain more knowledge on how and why problems of jurisdiction among providers and water resource management and regulation (e.g., local providers and sources of water outside their jurisdiction; local providers and regional or national regulators) affect the coverage and quality of water provision. Additionally, related issues include the accountability of regulatory agencies, as well as the overlaps between multiple regulatory agencies (e.g., for

[6] A review of existing case studies and methodology is in the Appendix.

pricing, health and environmental aspects), and how these aspects affect the coverage and quality of water provision.

Moreover, as mentioned at the beginning of this section, political issues appear to weigh heavily on most institutional aspects in the water sector. Case studies should therefore devote special attention to the politics of water. This includes, the analysis of which political factors limit the possibilities or effectiveness of private sector participation in water supply (e.g., political ideology, clientelistic politics, corruption and lack of transparency, expropriation and regulatory risks due to the lack of checks and balances, accountability, or autonomy of regulatory agencies), and this both for large scale regulated operators and small scale unregulated ones.

Another important aspect has to do with the way different political actors interfere in the water sector, influencing for example the operation of public providers, the decisions of regulatory agencies, the selection of concessionaires and allocation of contracts, the allocation of subsidies, the operation of large or small private providers, the viability of particular reform initiatives, etc. In each case, it will be interesting to determine the channels of this influence (for example, is there capture of regulatory agencies?) and the effects on access, cost and quality of water for different categories of the population. Political actors of interest here include in particular political parties and special interest groups related to public or private providers, construction firms, business associations, environmental and other civil society groups and, of course, consumers. Regarding this last category, a related aspect that has a non negligible impact on accountability of providers and regulators has to do with the nature and quality of information available to citizens about the delivery of water services (quality of water supplies and its consequences, costs and subsidies, etc.).

3. Suggestions of countries and methodology for further case studies

Subject to the general guidelines included in the terms of reference, an obvious challenge is to generate more country studies on regions that have not been covered extensively: Middle East and North Africa, Sub-Saharan Africa, Asia, transition countries. More specifically, the choice of countries could be geared towards:

- Sets of countries with high decentralization in which there are wide governance/institutional differences across subnational units (e.g., in the degree and form of private participation or in the way public provision is organized). These could be large, federal countries such as Argentina (which, however, has already been the object of several studies), or possibly Brazil or India. It is likely that in these two last cases, good microeconomic household-level data should be available to analyze the reasons and apparent effects on service delivery (coverage, efficiency, quality) of such differences within countries.

- Pairs of similar countries (in terms of level of development and size) with different degrees of decentralization or with different levels of private participation, in order to examine, through a descriptive approach, the political economy or other reasons for the institutional differences and the impact on service delivery (coverage, quality, etc.). These should probably be chosen among a subset of small countries in a geographic area such as the Middle East, North Africa or South-East Asia for example.

- Countries in which major institutional changes have taken place, e.g., a major drive for privatization or decentralization. These could be chosen among the set of countries already responding to some of the criteria above, to gain multiple focus on specific cases. In such a case, the approach is likely to remain a descriptive one, focusing on the evolution in time, unless a natural experiment across subnational units can be identified for example.

- For case studies focusing specifically on SPSPs (or, in broader terms, small scale providers including public ones), a suitable set of countries could include a Latin American one (e.g., Paraguay, which is a country in which small scale providers are active both in the capital city Asunción and in small/medium size rural localities), an Asian one (e.g., India) and an African country (e.g., Mali or Burkina Faso). A further criterion could be to compare the behavior of SPSPs in a country not having experienced large scale privatization (e.g., again Paraguay) versus one that has (e.g., Guinea). Here again, various methodological approaches could be followed, but a combination of descriptive work, as this is an area where more details on institutional organization would be welcome, and quantitative analysis, based for example on the application of small scale surveys similar to those in Galiani et al. (2008), could be fruitful.

- Finally, depending on the choices made above, it may be possible to generate regional comparisons of water system characteristics, similar to Foster (2005), on a subset of Asian or African countries. This remains mostly a descriptive task that could probably be best achieved as a result of pooling information from a set of individual countries descriptive studies. It is however unlikely that the sample size (at most a few dozens countries) will be large enough to allow for econometric analysis.

As for data collection and methodological issues, general guidelines are again included in the terms of reference. For water specifically, projects should aim at filling information gaps on specific issues including:

- Sector outputs and outcomes, such as coverage and quality of water services by socio economic groups. In particular, it would be interesting to document differences of access of the poor (urban and rural) to regulated

water network systems versus small scale private providers, as well as differences in cost and quality among these different providers.

- Issues of client use and satisfaction through household and client surveys, expenditure track surveys, etc

Finally, as documented in the Appendix below and in the terms of reference, there is a large array of methodologies, both quantitative and qualitative, that can and have been used to perform case studies on water sectors. The projects should select the relevant methodologies, according to the specificities of the country or countries under study, the (planned) availability of data and the strength of the researchers involved. Obviously, greater added value would obtain from using microeconomic data (either household- or firm-level). The sample size and characteristic would have to be determined according to the ease of collecting such data and the nature of hypotheses to be tested. If necessary, teaming up different competences, for example by adding an outside microeconometrician to the local team, could be envisioned.

Appendix: Review of existing contributions and methodology

A number of country or city case studies already exist. Most of them have focused on Latin America and, to a lesser extent, Africa.

- Savedoff and Spiller (1999) include chapters on Honduras, Peru, Mexico, Chile and Argentina.[7]

- Noll et al. (2002) include chapters on Santiago (Chile), Buenos Aires (Argentina), Mexico City (Mexico), Lima (Peru), Abidjan (Cote d'Ivoire) and Conakry (Guinea).[8]

- McKenzie and Mookherjee (2003) review welfare and poverty implications of utilities privatizations, including water, in four countries: Argentina, Bolivia, Mexico and Nicaragua.[9]

- Chong (2008) presents case studies of privatization in the water sectors of Colombia, Ecuador (Quito and Guayaquil), as well as one on the expansion of water services to shantytowns in Argentina.[10]

- Seroa da Motta, Thomas, Saade Hazin, Feres, Nauges and Saade Hazin (2004) analyze more general water management systems in France, Mexico and Brazil.

[7] Chapters authored by Walker, Velásquez, Ordóñez and Rodríguez (Honduras), Tamayo, Barrantes, Conterno and Bustamante (Peru), Ozuna and Gómez (Mexico), Morandé and Doña (Chile) and Artana, Navajas and Urbiztondo (Argentina).

[8] Chapters authored by Shirley, Xu and Zuluaga (Santiago), Alcázar, Abdala and Shirley (Buenos Aires), Haggarty, Brook and Zuluaga (Mexico), Alcázar, Xu and Zuluaga (Lima), Ménard and Clarke (Abidjan and Conakry).

[9] Chapters authored by Ennis and Pinto (Argentina), Barja, McKenzie and Urquiola (Bolivia), López-Calva and Rosellón (Mexico), and Freije and Rivas (Nicaragua).

[10] Chapters authored by Galiani, González-Rozada and Schargrodsky (Argentina), Barrera-Osorio and Olivera (Colombia) and Chong, Galdo and Torero (Peru).

- On the other hand, Foster (2005) is an example of a cross-regional comparison of water supply systems, based on 17 Latin American countries, focusing particularly on the modalities of private participation and of regulation.

The review of these contributions reveals the different methodological approaches available to develop case studies. First, a number of studies adopt a purely descriptive approach of the water system, focusing on the state of its different institutional components and on specific outcomes of interest. The explanatory power of these papers is based either on the analysis of the evolution of a water system over time, sometimes including the coverage of a major reform, so that variations in outcomes, possibly before and after the reform, can be observed (e.g. Mexico City or Abidjan, in Noll et al., 2002, or Chile, in Savedoff and Spiller, 1999), or on the comparison of the institutional framework and outcomes of different subnational units at one point in time (e.g. Quito vs. Guayaquil in Chong, 2008, Peru or the study of the Buenos Aires vs. the Corrientes concession, in Savedoff and Spiller, 1999). Additionally, some studies (the cases of Buenos Aires, Lima, Santiago and Chile, in Noll et al., 2002) perform welfare calculations to assess the impact of reform, based on a partial equilibrium, cost-benefit methodology à la Jones, Tandon and Vogelsang (1990). The advantage of the descriptive approach is the richness it allows in terms of the details concerning historical background, institutional details, or political economy constraints for example. Additionally, this is an aspect that usually plays on local researchers' strength, as they tend to have in depth knowledge of relevant institutional details and evolutions and good access to corresponding data and anecdotal evidence. Its main weakness is linked to the fact that the focus on a single national context (or on subunits within that context) does generally not allow researchers to control for all the relevant parameters of the environment that may affect the outcomes of interest. Equally worrying is the fact that it is not possible in such cases to address the non-randomness of reforms along dimensions such as timing, placement and intensity.

Second, some studies have attempted to make more systematic use of data of different kind.

- The most prevalent methodology is the reliance on household survey data to analyze a number of outcomes such as coverage, quality, demand, fraction of household budget allocated to the service, poverty and welfare. Examples are found in the study of Colombia, included in Chong (2008), which implements a difference-in-differences approach, and best practice is found in McKenzie and Mookherjee (2003), for four Latin American countries. The advantage of such studies is that high quality microeconomic data provide a very accurate picture of the effect of different institutional options in water delivery across different population groups, as well as a way to assess precisely the impact of subsidy schemes. The disadvantages lie in the stringent data requirements, which may often not be fulfilled, and the technically complex nature of the econometric techniques to be used.

- Firm level data, generally across local geographical units, such as the Mexico City case study in Savedoff and Spiller (1999), which relies on a cost function econometric approach across 46 firms. Pros and cons are broadly similar to those mentioned in the previous point.

- Own designed surveys, on selected samples, meant to capture comparisons between specific institutional settings or the effect of reforms affecting well-defined groups. An example is found in the study of water expansion in Argentinean Shantytowns, in Chong (2008), where the authors apply a difference-in-differences approach to analyze the effect of new water connections on household level outcomes (diarrhea, water-related expenses) in specific neighborhoods. The technical difficulties of such studies are rather concentrated at the design stage (either using non-random data and addressing the resulting problems econometrically, identifying a natural

experiment, or designing the framework for a randomized trial), but they can benefit from the specific knowledge of local researchers, ideally combined with the input of someone familiar with the technical aspects involved.

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