

Regulating Water and Sanitation Network Services Accounting for Institutional and Informational Constraints

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Abstract

The main purpose of this paper is to argue that the optimal design of regulation of water and sanitation monopolies should be the outcome of a detailed diagnostic of the institutional constraints impacting the ability of the operator—whether public or private—to

deliver the services. Tailoring the regulatory processes and instruments to account for institutional and informational weaknesses stands a better chance of improving the performance of the sector than the adoption of imported standardized or pre-packaged regulatory tools.

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Regulating Water and Sanitation Network Services
Accounting for Institutional and Informational Constraints¹

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² This paper will be a chapter of the forthcoming World Bank publication Uncharted waters: the economics of water scarcity and variability.

1. Introduction

This paper shows that, when the most cost-effective technology to deliver water supply and sanitation (WSS) services is offered by a monopoly, the sector's institutional characteristics should drive the design of regulation much more than they currently do. This is necessary to ensure that much needed investments take place, that costs are minimized, and that financing strategies are realistic. For any given country, region, or city, the balance between sticks and carrots built into the design of regulation should be the outcome of two diagnostics. The first being an assessment of the specific *institutional* constraints on the ability of the public sector agencies to implement and enforce regulation in the interests of all stakeholders. The second being the importance and nature of the *informational* advantages enjoyed by the regulated operator on its costs and customer base.³

Observed regulatory designs too often ignore the relevance of these institutional and informational constraints in the early days of reforms, out of sheer obliviousness to their relevance, and, in general, for sector-based or broader political economy reasons.⁴ The result is that current regulatory institutional choices are now the outcome of an increased standardization of formal regulatory arrangements.

Given that countries, regions, or cities will often differ along several dimensions, in addition to these two constraints, the adoption of standardized designs has often failed to deliver expected performance. For instance, for the last 25 years, the prevailing assumption in policy circles has been that the creation of a regulatory agency separated from the Ministry would make it easier to improve the accountability of the state and of the operators for their performance. About 45% of countries from a sample of 123 developing and emerging economies have followed this approach (see Bertomeu and Estache (2017)). This has become the main alternative to the historical model in which the sector Ministry instructs the operator on key decisions such as staffing, pricing or technological choices, with or without supervision from a specialized unit within this Ministry. In many countries, the lack of transparency in this historical model has been blamed for underinvestment, excess costs, or delays in the adoption of more cost-effective management solutions. The reasoning is that it minimized accountability and increased the scope for political interference in key operational decisions in the sector.

³ There is evidence that, in many smaller cities, small-scale providers can be quite competitive, and there is a growing support to include them in the regulatory agenda. They are however not covered here.

⁴ For discussions of the impact of policies on institutional choices in the sector, see for instance, Gerlach and Fraceys (2010), Teisman and Edelenbos (2011), Herrera, V. and A.E. Post, (2014) or Estache, Garous and Seroa da Motta (2016).

After 25 years of experience, there is now enough evidence that this specific institutional change and many of the other standardized changes brought by the reforms of the 1990s may have been useful but have not been a sufficient condition to guarantee an acceleration of improvements in sector performance. For instance, progress rates in water access have been slow considering the acceleration of urbanization and the continued strong population growth rates.⁵ Progress rates have been better in sanitation but disappointing considering the size of the access gap. As for the ability of the standardized institutional changes to attract private participation in the operation and financing needs of the sector, the evidence is also disappointing. In a recent institutional snapshot of the sector, Bertomeu et al. (2017) show that the creation of an independent regulatory agency (IRA) is uncorrelated with a country's ability to attract private participation in WSS.⁶ Performance improvements can be observed with and without such an agency. Success depends more on whether regulatory processes match the institutional constraints and preferences of a country.

To ensure a better match between the design of regulation and these institutional and informational constraints and preferences, details matter. And these details will matter whether the country has adopted a regulatory agency or not. Failing to account for these details is largely why some countries with separate regulatory agencies have underperformed, and why some other countries more aware of their limitations have been able to attract private investment, speed up access rates, or improve water treatment, whether or not they had created separate regulatory agencies.

To highlight the main components of the necessary institutional diagnostic, the very broad range of relevant characteristics can be grouped in the following four categories (Estache and Wren-Lewis (2009)):

- (i) *Technical and legal capacity* of the staff of the institutions, which measures the extent to which the regulators or the Ministry staff have the information, the technical tools, the skills, the financial resources or the mandate to supervise all aspects of the operators' performance.
- (ii) *Credibility of the officials*, which measures the political will of the authorities to make and enforce long term contractual commitments without unjustified renegotiations. This is particularly important when long lived investments require long amortizations periods to be covered by tariffs or subsidies.

⁵ The difference between investment growth and population growth has generally been below 0.4% per year in South Asia and below 0.2% in Sub-Saharan Africa from 1991 to 2015—according to the World Bank Development Indicators. It has been negative in the Middle East and North Africa during most of the period.

⁶ The odds of an impact are, however, significantly higher for Latin American and Caribbean countries and to a lesser extent Eastern European countries, than for any other region.

- (iii) *Accountability*, which measures the extent to which the actors of the sector, whether consumers, operators, financiers (including donors), regulators, Ministry bureaucrats or politicians, can be held responsible for their obligations. This is largely linked to the information flows between actors since it is through misuse or lack of transparency of this information that the potential for abuses leading to underperformance in costs, quality or price can take place.
- (iv) *Fiscal efficiency*, which measures the extent to which governments are able to collect adequate revenue when they commit to direct subsidies. These are quite common in the sector as a way of ensuring that the limited ability of consumers to pay for services does not lead to the exclusion of the poorest, or as a way to reduce the financial risk that operators are expected to take on when investing in a project.

The detailed evidence collected over the years by various studies of the sector taking different perspectives shows that the particularly large number of failures in WSS contractual arrangements between public and private players, as well as across government levels within countries or across government agencies and ministries, can be correlated with a poor appreciation of at least one of these four sources of institutional weaknesses (Estache and Wren-Lewis (2010) provide a survey of the empirical evidence).

The empirical indicator that has enjoyed the highest visibility of the risks linked to institutional standardization is the rate of contract renegotiation. This is a reasonably credible indicator of the time inconsistency of the contract, which tends to be bad for reforms demanding long term commitments by governments (e.g. to fair rates of return or to the payment of subsidies if these are part of the contractual promises) and in particular for investment. Between 1990 and 2010, according to Guasch et al. (2015), over 90% of the water Public Private Partnership (PPP) deals, supported by a largely standardized contractual and regulatory packaging, have been renegotiated. The most interesting observation is that the usual outcome of renegotiation has been a redesign of contracts and regulation to better match the various risk drivers linked to a wide range of institutional weaknesses that have only been recognized during the renegotiation process. For instance, the widely popular price caps, built in the original designs of the 1990s, have been replaced by de facto cost-plus regulation to reassure investors, since it guarantees a minimum return.⁷ Similarly, investment subsidies have now

⁷ The shift to a cost-plus regime has sometimes been explicit but more often the result of the identification of a growing number of costs items for which an automatic cost pass-through in prices or subsidies was allowed. These are now known as hybrid regulatory models. When over 50% of costs are passed through, they are close to cost-plus regimes.

often replaced private financing. In other words, regulation adjusted *ex-post* to the constraints imposed by institutional weaknesses that were underestimated upfront.⁸

The main lesson from 25 years of trial and error is that there is a strong case for the up-front explicit internalization of a broad range of institutional constraints and opportunities in the choice of regulatory goals and tools.⁹ This *ex-ante* institutional diagnostic has to identify legal, bureaucratic, cultural, capacity, political, and other bottlenecks or hurdles because they characterize the commitment ability (and hence the credibility) and the technical capacity of regulators.¹⁰ Many of these dimensions have already been documented in the legal and public administration literature, and economists are now starting to factor them in when assessing the best matches between regulatory options and institutional constraints.¹¹ This includes, for instance, the opportunity to make the most out of “nudges” to “trick” key actors into making the right decisions, and to account for the religious and non-religious motivations for caring about basic public goods or services. The accumulated evidence points to the necessity of accounting for the multi-dimensionality of the hurdles and catalyzers of effective regulation, which had largely been ignored in the 1990s and most of the 2000s.¹² The remaining challenge lies in the willingness to build these insights into policy implementation.

To be able to provide a broad picture of the operational and policy implications of institutional weaknesses in the sector, this paper is organized as follows. Section 2 discusses the main stylized facts which motivate the rejection of a business-as-usual approach to regulation in the sector. Section 3 reviews the main implications of the diagnostic for the regulatory governance of the sector and the design of regulation. It emphasizes the informational and institutional dimensions of regulatory design and its enforcement, and offers suggestions to address the weaknesses. It also highlights the importance of matching regulatory options with institutional and information constraints. Section 4 concludes.

⁸ Many more deals did not go through but there is only anecdotal evidence on the importance of these failures. In most of these cases, the failures to reach deals reflected a negative evaluation of the prospects for sustainable long-term commitments, given the way the regulatory design reflected the various sources of risks, most of them institutional.

⁹ The argument was made over 25 years ago by Ostrom (1990) and recently Edelenbos and Teisman (2011). In practice, it has been partially internalized in toolkits used by international organizations to structure the technical assistance to their clients considering private participation in their sectors (e.g. PPIAF and The World Bank (2006)).

¹⁰ This is also part of the suggestions made by Kayaga et al. (2013) for general institutional diagnostics of urban water utilities reviewed and Frulong et al. (2016) for a planning perspective. Berg (2013) raises the issue in the context of state-owned enterprises regulation.

¹¹ See Baker (2010) for instance for a useful overview of the various academic approaches to challenges in urban water management.

¹² See Estache (2016) for a recent survey.

2. What do institutional weaknesses imply for regulation?

Theory and practice offer concrete suggestions to produce an optimal answer to each type of institutional weakness. Solutions can and should indeed be tailored to allow regulation to match institutional constraints and do so with the information collected from a systematic regulatory diagnostic. This diagnostic should clearly start with a sense of the absolute and relative importance of institutional, legal, cultural constraints and needs to document it as precisely as possible. But the real challenge is the second step. This involves matching the constraints with tools and ensuring an overall regulatory framework that is coherent, financially sustainable and flexible enough to be able to adapt fairly to shocks hitting the countries and/or the operators.

Coherence ensures that the speed at which investment is made matches the evolution of the size and composition of demand in the sector. It also ensures that the choices of technologies are coherent with the urgency of needs as well as with the ability of the users to pay for the services. Financial sustainability ensures that investors can recover their costs and that public investors or authorities can afford the subsidies required. Flexibility implies that the regulatory system is built around rules that allow a fair treatment of all players when unexpected changes hit the firm or the sector such as sudden input price shocks. These concerns appear in the negotiation of a contract, which have become important regulatory tools, in particular in countries with private sector participation. The following discussion only aims at illustrating how they are likely to come up in institutional and regulatory diagnostics.

2.1 What happens when technical, budgetary or legal capacity to implement regulation is limited?

Almost three decades after the first reforms started, the sector continues to suffer from significant technical and informational capacity constraints. When conducting an institutional diagnostic, in most countries, the inventory of institutional constraints starts with human capital and related capacity dimensions. This was a concern 25 years ago and remains so today. Technical assistance is, indeed, still needed in many countries to organize tariff revisions or assess costs, illustrating the continued human capital limitations of the sector. This has created a dependence on external advice which is of a very unpredictable quality. There are many instances in which these experts essentially import processes and tools without concern for the local needs and learning curve.

Technical assistance (TA) is a business like any other and it has been a very sound business, largely because the transfer of knowledge is not taking place and TA contracts are simply relaunched and often simply renewed. Outsourcing regulatory work was a useful option initially; it is now the

reflection of a legacy which though institutionalized is showing signs of diminishing returns. The standardization of advice has become damaging.

With respect to the quality of information available to make the right technical and financial decisions, progress has been made and there are now comparable monitoring indicators of the commercial, financial, operational and technical performance of the sectors for a large number of operators. Most regions have now organized regional water regulators and operators' associations. Moreover, initiatives such as the International Benchmarking Network for Water and Sanitation Utilities (IBNET) promoted by the World Bank, the OECD Water Governance Indicators or the more commercially-oriented platforms, such as the Global Water Intelligence (GWI) or the International Water Association (IWA), all produce useful partial data sets allowing some degree of benchmarking. But none of them accounts for all of the relevant dimensions and most of them have an incomplete country or operator coverage. All these sources have their fair share of critics because the data collected are often incomplete or of poor quality.¹³ But despite their limitations, they already provide a solid basis to conduct some of the necessary policy work. However, more and better data are needed.

The main information gaps concern costs which, in regulation, is a significant gap as it impacts the scope of accountability as discussed later. It results from a failure to adopt standard regulatory accounting practices which are essential to be able to compute tariffs, rates of return or financing requirements in a rigorous way which accounts not only for financial concerns but also for social concerns. This is an illustration of what technical and capacity constraints mean in practice. Lots of data are missing to be able to make the right regulatory decisions.

In many countries, this is the result of a wrong skill mix or level among the staff of the agencies and the ministries. It can also often be due to a lack of budget capacity needed to outsource or acquire technical assistance or put in place an information collection system which could be used to measure performance, forecast needs and assess the real financing and technological options at the city, regional or national level. It also reflects incomplete or uncertain mandates. And maybe just as importantly, it reflects a significant lag in adopting and or implementing the most basis tools to conduct fair cost and pricing diagnostics.

The main outcome is that the regulators are less likely to be able to observe costs and distinguish between the extent to which high costs are linked to the operators' technological constraints, inefficiencies of information or their efforts to make the most of the technology available. This lack of access to correct cost information is what leads to increased firm rents, possibly lower supply and lower social welfare.

¹³ See van den Berg and Danilenko (2011) for a description of the IBNET data set.

In theory, the solution to this problem is to come up with a regulatory model that minimizes the information requirements. This is what regulation such as price caps or comparable tools deliver, at least until prices need to be revised for any reason. They also provide a strong incentive to operators to cut costs since the difference between actual costs and the price cap defines the rate of return. When technical, legal or financial capacity to regulate is limited, in the short to medium run, these regulatory approaches are usually preferable to rate-of-return or cost-plus regulation. They are easier to implement without initial access to serious cost accounting. Their starting point could take the form of a benchmarking exercise relying on comparable operators in comparable contexts.

In practice, the simplest solution is thus to allow authorities to buy time to put all the regulatory tools in place (i.e. accounting system, asset valuation, cost of capital assessment and efficiency measurement methodologies and matching databases). These are needed to compute a fair average price and/or subsidy and it can be done with a reasonably modest amount of basic cost accounting data. The approach also reduces the risks of corruption allowing artificial cost inflations to justify higher prices and profit sharing between corrupt officials and operators.

2.2 What happens when credibility is limited?

Government and regulatory credibility is an issue in the water sector. Of all infrastructure sectors, water is the one in which contracts are most frequently renegotiated, indeed over the last 25 more than 85 percent of contracts have been subject to changes, demonstrating the limited ability of all parties involved in a large-scale water transaction to make a long-term commitment. Contract renegotiation may be desirable when new information is identified that deserves a different treatment. However, in most cases, this information should have been identified before the contract was awarded, suggesting a strategic use of information gaps by one or more parties involved. Operators complain that renegotiation is evidence of a non-respect of promises to firms. Users argue that it reflects the regulators' limited willingness to enforce contracts.

The real issue is the fact that when commitment and credibility are low, all firms will have an incentive to pretend to be of the high-cost variety, even if they are not. For the good firms, the main outcomes are higher risks of underinvestment, higher scope for rents and higher than required average prices. There are also higher risks of a "ratchet effect" (that is, if the firm reveals its type to be low cost, it knows the regulator will be more demanding, so there is an added incentive not to reveal information).

Empirical evidence suggests that price caps are more highly associated with renegotiation than cost-plus regulation. This is also the prediction of theory and hence cost-plus regulation may seem to be the best form of regulation. This is because higher risks linked to a lower credibility and commitment

capacity demands a higher guaranteed rent to get firms interested in the business. But focusing on the degree of incentive of the regulation may not be the only tool. Nationalization is an option allowing governments to control the rent. This is perhaps why average prices may be higher under public provision.

2.3 What happens when accountability is limited?

Accountability does not mean the same thing to all WSS actors. For politicians, the next election is when accountability is possible. For regulators, the rules are more ad-hoc. This increases the risks of arbitrary and/or corrupt decisions. De facto, it reduces the sense that regulatory interactions with government and regulators are subject to checks and balances. The outcomes are again quite predictable. Lower accountability translates into higher risks which show up as higher average prices and rent as well as lower outputs and, usually, quality. Lack of actual (vs formal) checks and balances increases the cost to the government to cut the ease with which bribes can be made, making corruption problems more likely. One of the interesting but daunting results of theory is that when corruption becomes too big, it is too costly to try to fix, which may explain why some governments may seem sanguine about the issue (Estache and Wren-Lewis (2009) and Soreide et al. (2014)).

When the accountability problem is both with the politicians and the regulator, theory suggests that it is best to also consider reducing the payoffs to information asymmetry favoring any of the actors. This reduces incentives to renegotiate on either side as new information is being generated and the size of potential rent is re-evaluated. It also reduces the scope for corruption since it reduces the margin for cost padding by allowing cost benchmarking. This is usually best achieved by adopting a cost-plus regulatory regime anchored in a rigorous baseline benchmarking exercise to track the evolution of costs. In the process, it reduces the perception of risks and hence expected return (and average tariff) since expected return is driven by risk perception, but this may require a trade-off of efficiency gains, as discussed below.

But cost-plus may not be the best solution when the problem is largely driven by weak regulators. In that case, the most obvious solution is actually to out-source partially, at least enough to increase the transparency, the quality and the accountability of specific regulatory functions. But there are often political limits driven by sovereignty concerns to this option. In which case, the best solution is linked to the specific source of the regulatory weakness.

If the main issue is that regulators do not have the necessary information (e.g. because accounting practice are poor or because willingness-to-pay or household consumption surveys are not available), or if these regulators are not yet expert in processing this information, it seems reasonable to pick a

regulatory system that will limit the use of information or skills. This can be achieved by setting a maximum price, informed by the cost information available and international benchmarking. This price cap gives a strong incentive to the operators to minimize costs since the difference between the price cap and the actual cost defines their profit margin. And while doing so, it buys time for the regulator to learn more about these actual costs.

If instead, the main weakness is an excessive risk of political interference or of corruption, price caps may be risky since the initial price cap may be manipulated. In this case, it may be better to use a cost-plus approach that limits explicitly the rate of return by defining the allowed maximum mark-up over audited costs and to complement it with an international cost benchmarking.¹⁴

When both concerns apply equally, offering a menu of choices may be the best solution. One of the choices links output or investments with a set fixed price cap (i.e. fixed price regulation) and the other links it with rate of return over investment or a set profit margin over costs (flexible price regulation or cost of service regulation) with corresponding bidding rules that can help in selecting the better performer, even if this comes at the cost of sacrificing efficiency (intuitively it helps reveal information about costs).

In practice, the experience suggests that the actual choice between the various regulatory regimes is mostly skewed by a lack of access to much needed cost accounting data. Regulatory reforms continue to be victims of the lack of desire for accountability of many of the key actors. Data on operational and technical performance are relatively easy to obtain. But data on the financial and commercial management of regulated industries are much more difficult to access. Few developing countries have adopted minimal standards of a regulatory accounting system that would allow this accountability on cost, prices and financing strategies. As long as this is remains unaddressed, the scope for improvements in accountability will be limited.

2.4 What happens when the fiscal efficiency is limited?

For the water sector in general, fiscal constraints tend to be quite binding and since the private sector has not delivered as much financing as initially expected in the poorest countries, it is easy to see that progress in meeting the needs of the poorest was inevitably to be slow. Fiscal constraints can indeed be partially credited with the limited progress achieved in reaching the desired access rate for the lower income groups. Fiscal constraints can also be blamed for the failure to ensure reasonable affordability since the margin to provide connection or consumption subsidies is limited.

¹⁴ See for instance Auriol and Blanc (2009).

Conceptually, this should not be too hard to deal with. If the public or private operators have only limited access to capital markets and if some users have limited ability to pay, rationing or postponing investments and some maintenance are rational solutions. And rationing is indeed the most common solution when there are uniform pricing restrictions (i.e. all regions and all users have to pay the same price). An alternative conceptual option is to rely on cross-subsidization. This has long been rejected in the sector because of well-known perverse effects. It distorts consumption and may lead to mis-targeted investments. Yet, when the size of the network is slow to progress and scale economies matter, increasing access can help cut average costs, even when some new users pay a fraction of the marginal cost of expansion. And this can help reduce the long term need for direct and cross-subsidies and at the same time be good for affordability. There is the risk, however, that service costs associated with too large a network can be higher than the cost reduction due to scale effects. In this case, it may also be rational for an operator to bet on a smaller scale. Thus, the issue is the outcome of a trade-off between access and affordability. More access means less affordability. These are the very subtle outcomes of the complexity of the sector.

Many countries, de facto, bet on cross-subsidies (across people or across regions). Low cost users subsidize high cost users. If high cost users are also the poor users, cross-subsidies can help finance the service needs of the poor when fiscal constraints limit the scope for direct subsidies. There is an efficiency cost since some users may consume more than they would otherwise do, but this cost comes at an equity or fairness gain and if the loss is not significant (simply because the elasticity of demand to prices is very low), the country is better off (i.e. social welfare improves). This can be measured in practice. But the additional payoff that tends to be ignored is that cross-subsidies may reduce the sense of commercial risk by operators if it allows them to rely less on uncertain subsidies when governments face fiscal uncertainty. This also illustrates how regulation can be tailored to improve financing.

Cross subsidies may be easier to work with when the sector is under a price cap since it gives more for discretion to the operator to manage them. In practice, this has seldom been debated in the context of reform, since reform teams often ignore the details of regulatory processes and their interactions with multiple dimensions of financing. The attractiveness of the approach also depends on the importance of regulatory capacity and accountability limitations since they tend to make price caps less desirable. In other words, with weak institutions, the need to rely on cross-subsidies for fiscal reasons, may imply a stronger tolerance for cost padding by the natural monopoly. But in this case, the higher rent allows the financing of equity considerations.

3. Consequences of the regulatory mismanagement of institutional weaknesses

Besides the choice between rate of return/cost plus and price caps, or hybrid regimes which combine the two, there are other ways of targeting institutional weaknesses. Targeting should focus on strengthening the specific regulatory processes and tools which limit WSS policy financing, monitoring, implementation and enforcement, while accounting for the context in which these processes are being used. The following discussion focuses on the main policy concerns for which regulation and regulatory processes matter explicitly: the efficiency of investment, production and costs decisions, their equity, their financial viability, and the accountability of the decision makers.

3.1 Impact on efficiency

Efficiency is measured along several dimensions. This section discusses the extent to which regulatory processes provide the right incentives to operators to make investment decisions at the speed required to meet demand, to minimize costs and to participate in procurement auctions designed to increase competition for the right to provide services in the sector. The first is a measure of dynamic efficiency, the second is a static cost efficiency. The third one deals with various dimensions of efficiency, with an emphasis on the extent to which limits to competition impact cost efficiency.

a. On the inefficiency of current investment levels

The problem? Investment gaps are a clear indicator of a regulatory failure. Table 1, reporting the access rates across regions for both water and sanitation, shows that not all regions are managing to cater to the needs of a growing urban population fast enough. Moreover, it points to a major sanitation issue. Only one in three Africans and two in three South Asians living in a city benefit from proper sanitation infrastructure. To close this gap, investment levels would, within the next 10-15 years, have to speed up significantly. At the current growth rate, it would take another 59 years to ensure that 1 in 2 African living in a city would have access to appropriate sanitation facilities. To close the gap by 2030, access rates would have to increase by 8.5% annually, about 10 times greater than the average of the last 15 years. But the challenge is broader than this. In 2010, 54% of the world's population was urban. Within the next 15 years, urban population will represent 60% of total population. This corresponds to a growth rate of 0.525% per year. Without an acceleration of investment, none of the developing regions will be able to achieve full water and sanitation coverage by 2030. Regulation has not been able to get operators to anticipate these needs.

Table 1: Basic stylized facts on urban water and sanitation access in developing countries				
	Urban access rates to improved water sources		Urban access rates to sanitation	
	Access rate as % pop (2015)	Average growth rate in access rates (1991-2015)	Access rate as % pop (2015)	Average growth rate in access rates (1991-2015)
East Asia & Pacific	96.9	0.09%	74.9	1.8
Europe & Central Asia	98.5	0.07%	93.7	0.4
Latin America & Caribbean	97.3	0.15%	80.6	1.0
Middle East & North Africa	94.9	-0.05%	89.7	1.0
South Asia	95.3	0.26%	64.6	0.9
Sub-Saharan Africa	86.8	0.18%	29.7	0.9

Source: Authors' computation based on World Bank Development Indicators data

The most obvious institutional weakness explaining the issues is a lack of fiscal capacity. What the table does not show is that when the private sector does not deliver, the public sector needs to step in with subsidies. Since 2008, this has been a problem. Almost all countries have seen fiscal constraints reduce governments' ability to take on the investment responsibility to reduce the gap between demand and supply in the sector in the poorest regions for water, and across regions for sanitation.

A related explanation is that investment financing prospects have not met with optimistic predictions. For almost 30 years, the assumption has been that the private sector would replace the public sector as a source of financing for WSS. In practice, this assumption slowed total investment because public sector cuts were not compensated by private investment (e.g. Estache and Fay (2011)). The hardest hit by the slowdown in investment were the poorest countries, despite the strong political support for investment in the sector resulting from the adoption of the MDGs in 2000.

An additional driver of underinvestment in WSS is the fact that the responsibility for investment decisions in the sector is often a mandate shared across various levels of government. With uncertain local commitment to respect weakly enforceable joint or interrelated contractual obligations (i.e. little accountability), shared mandates lead to a moral hazard issue resulting in service under-provision. A recent case study of the shared responsibility for water pollution in the state of Sao Paulo (Brazil) shows that enforcement of commitments works only reasonably well when there is political alignment between the various government levels sharing the mandate for sanitation (i.e. when they all belong to the same party or the same coalition). In other cases, investment in water treatment is lower than

committed or needed (Estache et al. (2015)) since no government level has an incentive to try hard to address the problem as responsibility for failure is shared.¹⁵

A fourth explanation is related to a lack of credibility of government which increases the risk of renegotiations which expose investors to higher risks than they anticipated. This loss of credibility can be seen in the changes in the risk allocation characteristics of the contracts signed since the early 1990s. Private operators are no longer signing concession contracts as easily as they did then. New contracts are typically management contracts in which the public sector picks up all commercial risks. Even when concession contracts are signed, most large firms in the sector have enough bargaining power to decide who to exclude from service obligations, even when they are subsidized. This is what happened in some of the Argentinean provinces where the operators were willing to cater to the urban users, but managed to exclude rural users or users in secondary cities. This exclusion is rational and based on their assessment of commercial risks associated with some groups of users. More specifically, it is linked to the perception of a limited ability or willingness to pay of some users, associated with low income levels and the pro-cyclicality of risks.¹⁶ This risk is not unrealistic according to a survey conducted by Hulland et al. (2015); relying on a meta-analysis of studies measuring households' willingness to pay for cleaner water, they find that it is often less than the cost of providing the service. This also should be factored into the design of regulation.¹⁷

So what? Whether the service providers are public or private, the failure to get operators to invest reflects a failure to provide the right incentives to do so or to work with the government to mobilize the resources needed to finance investments. When the operator is private or public but commercialized, investment does not happen because the return to the financial investment is not guaranteed. When the operator is not even commercialized, investment is usually simply an ad hoc decision reflecting opportunities rather than strategic planning.

Contracts can be used to deal with investment obligations. However, the fact that the operators will usually have more information on the business costs of the sector, as well as on its environmental impacts, than the regulator or the public officials in Ministries makes it quite hard to implement the well-intended push for increasing coverage where large shares of the population still do not have access to piped water. Governments and/or regulators can indeed try to deal coverage concerns through service obligations and specific demands on the timing of these investments built into the

¹⁵ Lipscomb and Mulbarak (2017) find similar results.

¹⁶ Pro-cyclicality of risks results from the fact that in good economic times, poor consumers have a better chance of making enough income to pay their bills while in bad economic times, when unemployment is higher, their non-payment of bills is more common.

¹⁷ Additional insights on the relevance of the willingness to pay are provided by Null et al. (2012).

contracts. But this is easier said than done because these plans are usually linked to cost information controlled by the WSS operators, whether public or private. Operators have good reasons to be reluctant to share the information needed to assess whether annual investments and maintenance costs are efficient. Information will not be forthcoming if the possible regulatory tricks available to force better information sharing are not implemented.

But the investment challenge is not only a technical one, it is also a political one. The need to improve regulation to reduce the extent to which the level of investment and output do not meet demand touches upon a number of politically-sensitive issues. Investment is not just about ensuring fair access. It is also about fair returns to private or public providers and minimizing the burden on taxpayers if subsidies are needed. If regulation is ineffective, the sole supplier (i.e. the monopolist) will always have an incentive to run the business to maximize its returns rather than the service level in the public interest.¹⁸ This politically-sensitive observation is predictable from theory but also well validated in practice.¹⁹

For the typical cost structure characterizing a monopolist (i.e. average declining costs), the return is maximized with an output (and often a quality) level lower than the level that ensures the best use of resources to match demand and with a targeting of investment plans and quality management that caters to commercially or politically important users.²⁰ It should not be a surprise that, in WSS, poor regulation is matched by coverage levels below what they should be, and prices higher than they need to be. Indeed, the existence of scale economies in the water sector generally lead to lower average costs and hence lower average prices as output increases to increase coverage levels. Indeed, this is what has been observed in many developing and some developed countries. The MDGs helped reduce the gap between supply and demand, but failed to eliminate it. But targets are indeed hard to enforce when institutions are too weak to push the operators' incentives in the right direction.

For instance, a detailed empirical study has demonstrated that during the 4 years that a private company operated the Malian Water company in the 1990s, investment delivered were well below the contractual commitments. Operational costs were reduced during that period but very little of the

¹⁸ The rent is essentially the return to its investment over and above a socially acceptable return to capital in the case of a private monopoly, and a wide range of political and similar payoffs in the case of a public monopoly, ranging from the ability to overstaff the service, to pad costs to finance political activities or simply increase the bank accounts of corrupt politicians.

¹⁹ According to Bank of America/Merril Lynch (2014), investors are increasingly looking at water as a long-term investment theme because it offers steady inflation-protected returns less linked to economic growth than other infrastructure investments, and acts as an alternative to low bond yields and volatile equity markets. The S&P Global Water index (SPGYAQD) - of 50 global companies involved in water related businesses - has consistently outperformed a range of sample benchmark indices with a 5 year annualized return of close to 20%.

²⁰ This is why many studies of the efficiency of water providers find that many do not minimize costs. See Bel et al (2010) and Carvalho et al (2012) for recent surveys.

cost saving was passed on to users because the regulator was initially unable to force the operator to do so. The experience ended with the renationalization of the service.²¹ Similar evidence is available for various Latin American countries. For example, the experiences of Argentina and Bolivia have been amply documented. Regulation is indeed a challenge and a common source of conflict when it is not well designed.

When the pricing process does not lead to full cost recovery for the operators, with or without subsidies, slower investment or investment rationing are the expected outcomes. The core underlying issue is the extent to which the combination of prices, surcharges, or subsidies agreed upon as part of regulation should provide timely returns, cover depreciation, capital investments, and replacement or rehabilitation (of mains, pumps, valves, service lines, hydrants, meters, as well as water mains cleaning and main relocations). In addition to the speed and costing problems linked to the procurement process discussed later, the limited ability of the regulatory regime to generate enough revenue to cover costs in a highly politically-sensitive sector is at the root of investment under-performance.

Note that although regulatory processes and tools have a role to play in this, they will often not be enough. For instance, closing the investment needs in Sub-Saharan Africa – the region where they are the strongest - will not be solved by a change in the regulatory regime. The ability to pay and to subsidize will continue to be too small in the short to medium term in most countries. This means that closing the gap faster in the poorest countries implies providing more targeted international aid faster in the short to medium run.

In practice, many countries may want to step back and re-assess the way investments (capex) are dealt with in their regulation when the technical capacity of the regulators and the commitment ability of the government are limited. One of the ways in which it may have to be improved is by rethinking the extent to which the contractual obligations can be designed, and how investment and increased access performance are assessed. Simpler contracts may be more transparent and hence improve accountability on investment levels, quality, and costs, while more complex approaches are constrained by accounting, legal or technical capacity constraints. Simpler may not mean perfect, but it is likely to mean simpler to enforce in a fairer and more financially sustainable way. Another way is to return to more systematic investment planning to anchor the design of regulation in more transparent decisions on the investment targets and costing.²² This implies a more strategic vision of

²¹ There is enough evidence to suggest that the reforms of the last 25 years have often managed to deliver efficiency gains. There is however also a lot of evidence that these gains have not really been shared fairly as a result of poor regulation of monopolistic providers. Abuses along those lines have fueled the image problem monopolists tend to suffer from. See Estache and Grifell-Tatje (2013) for a detailed quantitative diagnostic.

²² See Sheely (2015) and Furlong et al. (2016) for additional insights on the underestimated importance of planning for the sector from both a purely sector performance, and from a political economy perspective.

the sector recognizing the interactions across all public sector functions (i.e. budget allocation stage, procurement, regulation, ...). At the national, regional and sometime city level, it may be useful to consider the consolidation of policy evaluation into a single institution, equivalent to the National Infrastructure Commission created in the United Kingdom in 2015, and staffed with independent experts. This should help enable a transparent long term strategic decision-making process with a mandate to find ways to speed up investment at realistic costs and to increase the visibility of progress. Note that underinvestment is not just a developing country issue. Similar regulatory conflicts are also arising in many European countries. Investments have not been delivered by regulated companies in spite of increasing average WSS prices justified by the need to finance investment. Over the last 10 years, the British water regulator has had to fine operators who failed to comply with investment obligations, including some who were blamed for similar failures in developing countries (Byatt (2011)). In Canada and the United States, the most recent deals have seen the public sector take on most, if not all, of the investment risks as part of public private partnerships (PPPs). Contracts are increasingly simply management contracts (i.e. contracts without any investment commitment).

b. On the inefficiency of current cost levels

The problem? To appreciate the strength of the incentives to maintain opacity on costs, it is useful to keep in mind that any monopolist has an incentive to adjust production within the limits of the regulatory boundaries. This includes costing strategies. For instance, when investment budgets are allocated annually, inflating investment costs is equivalent to slowing efforts to cut costs.²³ This works quite well, including when service obligations are imposed and tariffs cannot be increased. For a monopolist, maintaining information asymmetries (i.e. the control of all relevant information) is thus a reliable way of inflating returns when the regulator has a limited capacity to regulate for technical reasons or when the legal set up does not allow the regulator to impose a transparent regulatory accounting system. The efficiency literature suggests that regulators have not been as effective as they should have been in providing the right incentives and the anti-corruption literature points to reasons to be concerned with their capture by investors and/or operators.

²³ One of the main insights of the modern theory of regulation is that the recognition that costs (C) are a function of technical characteristics of the production process (θ) and efforts undertaken to cut costs (e) or $C(\theta, e)$. High costs can thus reflect a poor technology or a lack of effort and operators have an incentive to hide both. Regulatory design will be different depending on which one of the cost drivers is the main issue. When there is uncertainty about technology the risks linked to information asymmetry is called adverse selection and is an ex-ante risk. When there is uncertainty about the effort level (e.g. lack of maintenance), the literature talks about moral hazard. This is an ex-post risk, since this happens once the monopolist has been awarded the right to provide the service.

To assess the extent to which regulation delivers on current (static) cost efficiency, an easy approach is to rely on the estimation of cost or production frontiers which estimate the lowest cost at which a specific water service can be achieved or the highest level of service for a given cost or revenue.²⁴ This approach has been adopted by a growing number of regulators and government auditors to assess the extent to which costs are minimized and/or production maximized for the input levels and prices and the technology available. This has proven to be useful to identify potential cost drivers as diverse as the scale, scope or density economies, ownership, governance, regulation, regulatory agencies and other exogenous variables.

The most recent systematic overviews of these studies have been produced by Bel et al. (2010) and Carvalho and Berg (2011). According to Carvalho and Berg (2011), by the end of 2010, over 250 studies had looked at efficiency levels and many had analyzed their drivers. This has produced important insights into how much the institutional organization of regulation impacts prices, cost or quality of service.

The first insight highlights lasting cost inefficiencies despite improvements brought about by standard regulatory reforms. This can reflect a poor use of the assets linked to mis-management or similar issues. But it can also reflect lack of efforts to do as well as possible or cost padding – i.e. artificially inflating the costs. In these cases, inefficiency is a reflection of the ability of operators to create extra-profits (i.e. a rent) in the sector.²⁵ In other words, regulation is underperforming more often than not since inefficiencies last.

The second insight is that there is no evidence on the existence of: (1) a general optimal production scale of water utilities, (2) systematic scope economies between different types of services, (3) the desirability of vertical integration, (4) the desirability of privatization and (5) the relevance of legal and cultural norms. This suggests that the performance needs to be assessed on a case by case basis which accounts for a wide range of variables characterizing the market itself (in terms of size, location, ability and willingness to pay).

The third insight is that some of the cost drivers are predictable and include some institutional dimensions. Some variables relate to the natural environment. They include geography, hydrology, topography. Others are institutional and include the legal origins, and level of corruption. Any of these

²⁴ The estimation (for econometric approaches) and computation (for non-parametric approaches) techniques for these types of frontier analysis have improved significantly and can be quite effectively used to reduce information asymmetries on the level of efforts made by operators to optimize the use of their resources to meet their service obligations. For a detailed discussion, see Cherchye et al. (forthcoming).

²⁵ Cost padding or exaggeration is quite common. This can be achieved by outsourcing some inputs to parent companies in a system in which the parent companies charge high prices and pays taxes in a country where effective tax rates are low and the utility can claim high cost in the regulated part of the activity in which these padded input costs are billed.

can make a difference to the optimal size, scope, vertical integration and privatization level as measured by the degree of inefficiency associated with each characteristic. Once more, the evidence suggests that one-size institutional design does not fit all in the water sector and that non-institutional dimensions may matter more than legal origins, market structure or ownership to the performance of the sector.

The fourth main insight is that the overall institutional governance matters to the impact of regulation. The governance of the water sector covers the rules, norms, actions and actors of the sector. It defines how these are structured and sustained and how responsibilities are distributed and shared. It also specifies how each actor is held accountable for its contribution to the delivery of the service. Carvalho and Berg (2011) provide, at least partial, evidence of this importance, by showing that regulation is effective only as part of a sound governance package. For instance, the quality of the match between ownership, regulation, contract types, and decentralization has an impact on the cost and production efficiency, and hence on the size of the profit margin allowed to the operator. But the outcome is actually often driven more by basic institutional characteristics than the high-profile characteristics such as ownership. In the case of the Sub-Saharan WSS sector for instance, cost effectiveness is found to be more of a matter of skills, regulatory contract designs and transparency issues, than one of ownership or of the existence of an independent regulator. This is explained in some detail in Box 1.

Box 1: How much do water institutional reforms matter to costs in SSA?

A recent paper by Mande Bafua (2015) relies on a production frontier to analyze the impact of reforms in SSA. In that region, between 2000 and 2005, private participation increased efficiency on average but with such a wide variance that it cannot be considered a safe reform bet. However, when privatization does help, his results suggest that it is due to better know-how (managerial competence) and the ease with which indicators or targets can be monitored.²⁶

Moreover, his evidence suggests that the effectiveness is not driven by some of the common arguments covered by the general policy debates. For instance, the performance is not influenced by the existence or absence of an independent regulator. The creation of an independent regulatory agency was, on average during that period, actually associated with loss in technical efficiency under all ownership and contractual models. This would be consistent with an unclear mandate, and a monitoring and enforcement capacity constraint for these regulators. Finally, he finds that desirable outcomes would result from contractual arrangements between public authorities and (public or private) water utilities designed specifically to promote productive efficiency. This is particularly robust for performance contracts (in sharp contrast with similar contracts during the 1980s). This could be interpreted as evidence that under weak institutional characteristics, a simpler and more focused regulation and incentive structure may have higher payoffs, at least in the short run. But this may come at the cost of underestimating other dimensions such as financial viability, quality or affordability.²⁷

So what? The more general interpretation of the accumulated evidence is that the impact of regulation itself on cost efficiency is also related to its compatibility with most of the institutional characteristics of the sector including the legal, cultural and normative context.²⁸ This largely validates the insights provided by the more theoretical research discussed earlier. But it also implies a number of very concrete interventions that could help minimize costs.

The first pragmatic implication of the empirical literature on costs is that efficiency and equity outcomes of regulation are driven by the specific administrative and legal rules of engagement between

²⁶ Similar conclusions have been reached for other cases studies. See for instance Costa Carvalho and Menezes Bezerra Campiao (2015) or Barbosa et al. (2016) for Brazil who blame regulatory standardization and weak implementation capacity or willingness for efficiency underperformance.

²⁷ For example, in the affermage contracts, the operator remuneration is subject to achieving clear performance objectives defined for agreed periods of time while in most concession contracts the main focus is on cost minimization (with the scope identified in the auction organized to award the contracts). In both cases, however, the packaging of the areas to be served may be managed ex-ante to maximize the chances of attracting private operators by reducing the high-risk service areas.

²⁸ From a more technical viewpoint, it is quite important to appreciate the extent to which the conclusions differ according to the modeling methods (e.g. focus on partial performance indicators or efficiency frontiers; concern for partial equilibrium vs general equilibrium effects), on the estimation or computation methods (which deal more or less well with the identification issues that allow a convincing distinction between causality and correlation) as well as on the specific sample composition in terms of time and country coverage (regionally heterogeneous samples (which tend to be largely biased towards Latin America and somewhat Eastern Europe) vs region specific samples; short vs long periods of analysis).

the operators and the regulators, as well as by the specific instruments used to organize and guide the interactions. The rules and instruments need to be designed specifically to minimize costs and maximize their transparency in a way that accounts for local legal traditions, technical skills and expertise, rather than relying on imported toolkits. For instance, assessing assets in developing countries cannot rely on as many techniques as in a developed economy. The due diligence is another example illustrating that importing regulatory processes anchored in a common law tradition is going to lead to tensions. Guidelines on the nature, timing and decision rules for interactions with stakeholders to ensure that supply matches demand are an underestimated part of this due diligence. They need to reflect local commitment, credibility, technical capacities and preferences.

The second pragmatic insight is that the most effective approaches to structure the quantitative interactions between stakeholders on costs are built around accounting rules. Solid cost and regulatory accounting are necessary to reduce information gaps. When general regulatory practice in countries is not strong enough, regulatory accounting guidelines specific to the utilities can be introduced and be required as part of the contractual obligations of the operators. In most cases, this is not much more than forcing the operator to rely on modern cost accounting techniques with clear cost allocation rules and transparent input pricing information, to minimize the serious risks that firms manipulate costs.²⁹ This is not a fool proof tool but, for many countries, it provides regulators with much more data. Without data, regulation cannot define the relevant rules that drive incentives, accounting for all the institutional constraints discussed so far.

The introduction of cost and regulatory accounting processes is largely justified by the difficult access to appropriate cost related data, as revealed by empirical research on efficiency measurement for instance. Regulatory accounting increases the transparency needed to cut information asymmetries and/or to increase the possibility of accountability from all “cheating” players. Since accountability for costs and efforts under any scenario starts with measurement, regulation should start with a requirement to comply with the basic cost accounting rules needed to produce the data that allow a fair assessment of the average tariff. A lack of accounting reporting requirement makes it easier for the operators to pretend that costs are higher than they actually are and that demand is lower than it really is. This is not an unrealistic practice to consider when there is a serious desire to reduce information asymmetries and to increase accountability. Yet in many developing countries, this is not requested from public or private regulated operators.³⁰

²⁹ See Rodriguez-Pardina, Schlirf-Rapti and Groom (2008) for a detailed discussion.

³⁰ There are, however, also many OECD countries in which this practice is not enforced. In Belgium, for instance, the management costs of the regional public enterprises responsible for water and electricity distribution are not public.

The third pragmatic insight is that given the multiplicity of cost drivers, it is important to be able to separate controllable cost drivers from those imposed by the natural environment. In that context, cost benchmarking by regulators is useful as a complement to the more technical and operational benchmarking increasingly common among operators. It passes on some of the burden of proof to the operators on a dimension that is critical to tariff setting. Unless costs are measured, tariff setting is likely to be controlled by the operators with little substantive margin of negotiation for the regulators. Not measuring cost efficiency, directly or indirectly, is giving up on a tool that can structure the process of interactions between the government/regulator and the operator. Cost performance benchmarking may be one of the most underestimated tools to minimize information asymmetries on costs. Operators, whether public or private, should see their cost performance compared to the performance of comparable firms operating in comparable markets. Unjustified cost differences should then not be considered in the computation of the average tariff. The evidence suggests that it improves cost efficiency relative to public enterprises that escape all forms of competition. Despite this evidence, benchmarking has only been paid lip service in most countries. The main argument is that measurement is imperfect. But this runs counter to two observations. First, the measurement techniques used do not reflect the significant improvements achieved by academic research. Second, it ignores that in a world of information asymmetry, benchmarking can be used as an instrument to shift the burden of proof on costs onto the regulated operator. Processes matter a lot when information is limited and this is a perfect illustration.

The final pragmatic insight is that details matter and it is essential to compare quantitatively the relative effectiveness of the various contractual and institutional options in terms of their effectiveness in stimulating both cost reduction efforts and investment efforts. It is just as important to recognize that investment efforts are stronger under regulatory systems that guarantee cost recovery (e.g. rate of return regulation) while cost cutting efforts are stronger under regulatory systems that limit prices (e.g. price or revenue cap regulation). This may lead to trade-offs between cost-cutting and increased investment. In many weak institutional contexts, performance contracts or hybrid models combining regulatory contracts under the supervision of a contract-enforcing institution may work just as well or better than an agency with too broad a mandate.

c. On the inefficiency of procurement processes

The problem? Procurement is one of the instruments governments have to ensure that costs are minimized and/or that supply matches demand as much as possible at the lowest possible costs. Most countries have now adopted relatively standard procurement rules. They are quite transparent and hence minimize corruption risks. But there is a trade-off. They do not guarantee that competition is

maximized and costs minimized because the current practice is not matched to local institutional characteristics.

Competitive bidding is indeed often the aim when designing procurement precisely because it is expected to cut public procurement costs. It is also expected to further reduce the risks of collusive bidding behavior and corrupt practices. However, the design of the bid needs to recognize that water and sanitation works are often significant in size. It seems thus reasonable to consider the scope for economies of scale and scope in procurement. It could impact the bidder's costs and entry strategy. Consider treatment plant construction (including water supply treatment plants and wastewater treatment facilities) and network installation (including the water distribution network as well as the waste water collection network). Regardless of whether water supply or sewerage, the first component mainly consists of receiving and mixing wells, ponds, clarifiers, and chemical injection facilities. On the other hand, the network component basically includes water or sewer mains, house connections, reservoirs and tanks. Thus, the main activity is the same: install pipes and tanks under the streets.

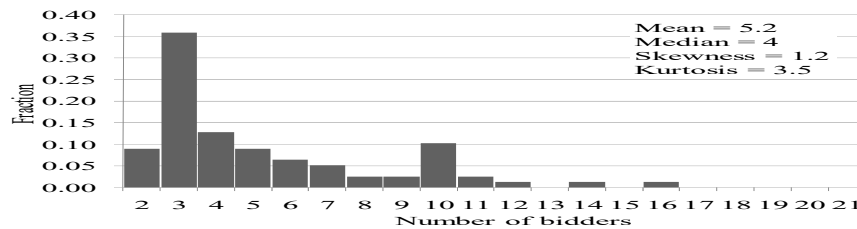
Box 2 illustrates why a good appreciation of the suppliers' market for each of the components may matter more than implicitly assumed by procurement processes favoring bundled activities. In a sample of ODA (Official Development Assistance) sponsored projects between 1997 and 2007, bundling activities reduced the number of bidders and increased the costs. The optimal decision should have been tailored to the local circumstances and local specializations rather than driven by a standardized decision to bundle activities to make the most out of assumed scope economies.

Box 2: How much does procurement impact regulated costs in water and sanitation?

One of the key decisions in organizing bids in the WSS sector is whether to bundle a treatment plant and a network component. The evidence from a sample spanning over 10 years (1997-2007) suggests that this decision impacted both bidder participation and bidding strategies. If works on a treatment plant was solely put out to tender, the average number of participating bidders was 4.4, and the relative bids averaged about 90% of the engineering cost estimate. Similarly, if only a network component was contracted out, about 5.8 bidders participated. Their bids were also about 90% of the expected cost, on average. However, when the two tasks were procured simultaneously under a single contract, the bidder participation dropped to about 3.3 firms. And the realized bids more than doubled (2.3 times the engineering cost).

There are two possible reasons for high costs of the bundling approach. First, the bundling might increase the entry costs of potential bidders and the resulting limited participation could further increase the equilibrium bid. This appears consistent with Fig. 1. Second, from the technical point of view, there may be no cost advantage for a firm to engage in the two different activities simultaneously. Therefore, the firms' cost structure exhibits diseconomies of scope, i.e. being required to take on the two tasks as part of the procurement process may lead to higher costs which a regulator would have to recognize.

Figure 1: Levels of competition in ODA-financed water projects
(78 contracts between 1997 and 2007)



Source: Estache and Iimi (2011)

An additional constraint on the effectiveness of the procurement process in the water sector is the concentration of the number of large players in the sector, and the fact that many of these large players enjoy the support of their governments keen to defend national champions as part of an industrial policy that increasingly open to the international diversification of risks. This concentration has an impact on the bargaining power of governments of countries with a much lower legal capacity to interact with operators in the context of conflicts for instance.

A recent study of local water contracts in France illustrates the institutional importance of this concentration nicely. Chong et al. (2015) show that municipalities differ in their ability to control the providers' profits. They find that smaller municipalities (less than 10,000 inhabitants) pay a significant price premium for water provided by private operators as compared to those providers by public operators. There is no such premium for larger municipalities. Although there is no equivalent formal

evidence for developing countries, there are many anecdotes of conflicts escalating between operators and regulators/governments in various Latin American and African countries as a result of aggressive bargaining strategies³¹ (some of Argentina’s provinces, Bolivia, and Mali come to mind). To get a sense of the main private actors and their global market size, Box 3 provides a snapshot of those who have delivered large scale projects between 1991 and 2015.

Box 3: How concentrated is the water operators market?

The following is a list of the top 10 players in the sector between 1991 and 2015. They control 25% of the private projects and 60% of the investments made. France, Spain, Brazil and Malaysia, each have two firms in the top 10. The Brazilian firms are mostly present in Latin America while the Malaysian firms focus on Asia. The French and Spanish firms are the only global players among the top 10. The variance in average project size is quite remarkable. The “Other” category delivers 75% of the projects but their projects are usually smaller. It includes, notably, Chinese constructions companies which are present in Asia and SSA.

On the face of it, there is no concentration since the top 10 firms share 60% of the business. In practice, the situation is more complex. There is a regional specialization of actors as already noted in Benitez et al. (2005). The Asian companies are mostly active in Asia, the Brazilians focus on Latin America (and to a lesser extent the Portuguese-speaking African market). The French companies are the only ones to be present in all markets over time. They have taken over some of the main global competitors (mostly Spanish firms). Although only two firms are needed to ensure competition, with the benefit of experience, we know that the market concentration at both the local and global level has limited the number of bidders in many of the deals. Big markets attract interest. Small and poor markets do not.

	Investment (Billion US\$)	Number of projects	Average project size	Share of total projects	Share of investment
Suez (France)	14.5	73	198.6	7.7%	17%
Ordebrecht (Brazil)	7.2	27	266.7	2.9%	9%
Aguas de Barcelona (Spain)	7.1	25	284.0	2.6%	9%
Construtora Queiroz Galvao (Brazil)	3.9	16	243.8	1.7%	5%
Puncak Niaga Holdings (Malaysia)	3.3	5	660.0	0.5%	4%
Veolia (France)	3.3	58	56.9	6.1%	4%
Abengoa (Spain)	3.1	10	310.0	1.1%	4%
Benpres Holdings (Philippines)	2.7	4	675.0	0.4%	3%
Ranhill Bhd (Malaysia)	2.4	6	400.0	0.6%	3%
Mitsui (Japan)	2	10	200.0	1.1%	2%
Other	33.54	712	47.1	75.3%	40%
Total	83.04	946	87.8	100.0%	100%

Source: PPI database

³¹ See for instance the many papers on Argentina, Bolivia or Mali’s experience.

So what? The specific design of procurement processes clearly matters. But to be as effective at cutting costs in the WSS sector as they could be, they need to make better use of the significant progress that has been achieved in research and other sectors. There is indeed a significant margin to improve the design of procurement auctions to increase the number of actors, including local actors to promote local development, and cut costs.

These improvements are particularly important in view of the high concentration of the WSS sector in which most of the large operations are under the control of a few large international actors. Even if there are many small operators and a growing number of African, Asian and Latin American actors with an increasingly strong presence in their regions, their market shares in terms of project numbers, investment levels and population coverage remain modest. Changes in procurement rules, increasing the scope for specialized activities, could increase the role of local smaller actors and, in the process, help cut costs based on the evidence available.

Second, since procurement rules can be designed to reveal costs, in order to ensure a fair distribution across stakeholders of the efficiency gains that can be achieved from a lower standardization of rules and regulation, procurement processes need to be more transparent. In too many instances, details of the financial and technical components of the bids are not passed on to regulators or independent observers. The main argument against transparency is the concern for commercial confidentiality of some of the information. This needs to be balanced against the evidence of the excess rates of return observed when transparency is minimized. Smoothing exchanges of information across public sector agencies can maintain confidentiality and yet allow much fairer and more efficient regulatory decisions based on more precise cost information. They would also help deliver the right service levels and quality at the right price.

3.2 Impact on financial and fiscal viability

The problem? The quantitative evidence on the limited financial and fiscal viability of the sector is surprisingly scarce for a sector reputed to be quite dependent on subsidies. According to the IMF, in 2012, water subsidies provided through public utilities were estimated at about \$456 billion or 0.6 percent of global GDP, varying from 0.3% to 1.8% across regions.³² Developing Asia has the largest subsidies in absolute terms, with China accounting for the largest share of the Asian total. For some countries, they amount to over 5% of GDP (Azerbaijan, Honduras, Kyrgyz Republic, Mongolia,

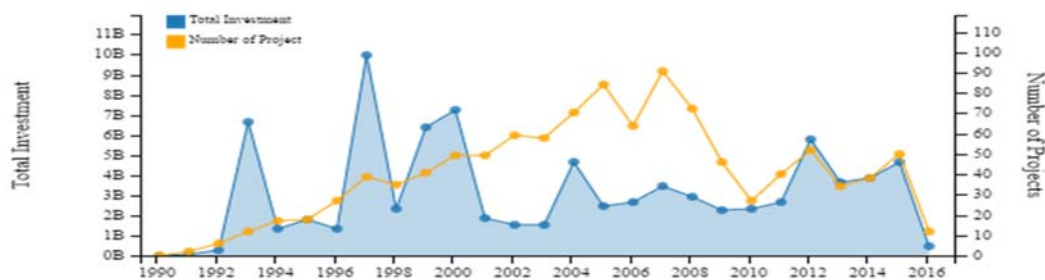
³² Kochbar et al. (2015).

Tajikistan, Uzbekistan, and Zimbabwe). While these data are reasonably recent, they are occasional and not updated regularly. Similarly, there is very little recurring, detailed, and country-specific information that is collected systematically at the firm level and that is available publicly. And this points to a major accountability issue.

The public sector will continue to be the main source of financing of WSS, even if subsidy requirements drop. According to the Global Water Fund, the private sector is expected to account for 30% of water investments in the foreseeable future.³³ This implies that around 70% of these investments will have to be financed by the public sector. In poorer countries, this share is likely to be much larger. This is related to the fact that the reforms launched in the 1990s have not done as much as expected to stimulate private investment.

The private participation in infrastructure (PPI) project database hosted by PPIAF (Public-Private Infrastructure Advisory Facility) suggests that less than 50% of the developing and emerging economies have benefited from private investment. Between 1990 and 2015, according this database, only 64 countries attracted private investment in water or sanitation. There were less than 40 projects per year. Almost half of these projects were in China. The top 10 beneficiaries accumulated 85% of all deals. South Asia and SSA got less than 5% of the number of projects. In terms of investment shares, about half of the investment benefited Latin America and 38% went to East Asia. Most of the poorest countries failed to produce any deals. South Asia and SSA got less than 1% of the total investment commitments. Figure 2 shows that private investment in the sector has never really recovered from the 2008 crisis.

Figure 2: Evolution of PPI in Water and Sanitation
(Investment and Number of Projects)



Source: World Bank PPI database

³³ See website www.globalwaterfund.com.

The downward trend in the number of deals that involve private financing—documented on the PPI database- shows that governance preferences may also evolve over time according to circumstances, including concerns for commercial, economic or political risk. The 2008 crisis and the large number of failures have increasingly switched the public and private preferences towards management contracts, illustrating, once more, that markets adjust to evolving institutional constraints revealed by regulatory conflicts. Many governments are increasingly reluctant to try to get private operators to provide financing to the sector, focusing instead on their ability to improve the management of the sector and cut costs.

To be fair in the discussion of the regulatory challenges of the sector, it is important to note that similar regulatory conflicts are also arising in many European countries. Investments have not been delivered by regulated companies in spite of increasing average WSS prices justified by the need to finance investment. Over the last 10 years, the British water regulator has had to fine operators who failed to comply with investment obligations, including some who were blamed for similar failures in developing countries (Hall (2015)). In Canada and the US, the most recent deals have seen the public sector take on most, if not all, of the investment risks as part of public private partnerships (PPPs). Contracts are increasingly simply management contracts (i.e. contracts without any investment commitment).

From the partial evidence available on the details of the financing strategies of the sector, a few other insights serve as evidence of regulatory institutional issues. They reveal some of the macroeconomic and firm-specific consequences of the limited ability of the sector to generate revenue from the business. They also reveal the importance of tracking the ways in which firms finance their investment and price their services. They point to underestimated perverse effects of an institutional inability to anticipate the consequences of investment packaging designed to leverage private sector financing. Finally, they show how the limited capacity of regulators to monitor the financial performance of the actors largely explains the other main financial issues.

The first observation is more of a stylized fact on the financing strategy bias of the sector. The WSS industry has been financing its huge capital expenditure needs from public debt rather than from revenue. And this has been internalized by many regulatory decisions. The consequences of this regulatory bias are that it allows the sector to accumulate debt to finance the continuous increases in consumption, including in regions under water stress. Unless revenue eventually catches up, or the consumption continues to be rationed, some countries could be exposed to a debt crisis within the sector.

The second observation is that the debt bias does not change with an increase in the role of the private sector. When the private sector has been involved, public debt has been replaced by private

borrowing/debt rather than by private equity.³⁴ The main difference is that the chances of consumers rather than taxpayers reimbursing the debt are higher and hence demand management easier to implement since the tariff will eventually reflect, at least some of, the cost of private debt. This trend has been encouraged by very low interest rates for some time now and has accelerated since the mid-2000s, but makes the tariff quite sensitive to fluctuations in interest rates and inflation.

The third observation is that underpricing in a commercial sense is the main driver of the increasing debt stock needed to finance subsidies in the short run. Even if excess costs revealed by the efficiency studies mentioned earlier are also inflating the financing requirements of the sector, pricing continues to be an issue as it reduces the ability of the sector to finance its investment and operational needs. Underpricing of water by utilities when matched against their excess costs implies high quasi-fiscal deficits or QFD (i.e. the comparison of observed excess costs and revenue gaps with the costs and revenue that would be prevailing if the utilities were performing well). The African Infrastructure Country Diagnostic estimated in 2008 that QFD reached 0.6% on average in the region, based on a large sample of countries. This represents close to 50% of the financing needs of the region and underpricing accounted for almost 55 percent of this QFD.

The fourth observation is that the fiscal pressure in the sector may be an unexpected side-effect of the packaging of investment projects made to attract private operators. This packaging may indeed lead operators to “cream skim” the best investment opportunities, leaving the ones with low or negative returns to the public sector. This is because the packaging is usually done to minimize the dependence on public subsidies and, to do so, it needs to focus on regions or customers capable of ensuring the financial autonomy of the investors. This generally means that the high cost, low revenue activities are left with the public sector, which adds to the fiscal constraint since it lowers the margin to rely on cross-subsidies. This has the perverse effect of reducing the financial sustainability of the sector by contributing to a higher public debt financing requirement.

This is one of the underestimated consequences of project finance techniques focused on the deal, rather than on the sector in risky environments. It is also one of the main sources of difference in assessments of the sector-wide outcomes and of the project-specific transaction designs. More private financing may thus mean a higher fiscal cost for a given service coverage target. And this is in addition to the many instances in which project finance results in a renegotiation resulting in explicit or implicit subsidies. In sum, scarce public resources end up captured rather than allocated efficiently or fairly to address the needs of the poor or less attractive service areas.

³⁴ Equity has in general been doing quite well in the sector. By mid-2014, the S&P Global Water index of 50 global companies involved in water related businesses had delivered a 10.4% annualized performance over 10 years. This includes regulated and unregulated water businesses.

The fifth observation serving as evidence of the risks linked to the financial management of the sector is the poor awareness demonstrated by procurement agencies and regulators of many basic financial considerations at the project preparation stage or when defining the financial monitoring components of regulation needed to assess financial sustainability. Many of the related issues are often ignored in policy circles and not accounted for in the design of the overall governance of the sector. Yet they can explain the deterioration of a contract or of an operator. Flyvbjerg (2014) for instance, shows how poor demand forecasts or costing has been a recurring driver of financial problems across infrastructure sectors. And Guasch et al. (2014) show how the poor design of procurement processes can explain higher than expected costs which end up driving the renegotiation of processes on the grounds of their financial unsustainability in LAC.

This poor monitoring can be seen in many dimensions and applies to both public and private operators. For instance, very low interest rates have encouraged borrowing and increased the leveraging rate in the sector for some time now. This can be a source of trouble in a regulatory context. The only way to pick it up is to track trends. Similar damaging risks arise when prices are linked to inflation in risky environments rather than financial costs. It can impact the profitability of firms in quite dramatic ways and further expose the public sector when guarantees have been provided for private or public loans.

Similarly, monitoring cash management is also important. For both public and private providers, easy short-term cash options ignored by regulation have too often driven financial management decisions. For instance, many foreign firms operating in developing countries need to guarantee annual dividends or income flows to the private or public owners and the lenders. Increasingly, non-traditional lenders and investors are also voicing their preferences, and steady cash flows, unrelated to circumstances, are part of their wishes. This is often inconsistent with management focusing on the long-term investment and maintenance needs (as in the case of Mali during the early 2000s, see Estache and Grifell-Tatjé (2013)).

The final observation is the importance of monitoring the impact of the continuous efforts to increase the role of subnational governments in decision making in WSS. This is making WSS financing even more uncertain than when the financing is centralized. It raises complex coordination issues when mandates are shared. It also increases the difficulty of financing the sector since the financing and borrowing capacity of poorer regions and secondary cities is lower than for capital cities or richer regions.³⁵ It is a serious issue, but there is hardly any public information on its actual importance.

³⁵ See Herrera and Post (2014) for a much broader discussion of the associated trade-off between increasing users' voice through decentralization and decreasing political interference through private financing options.

So what? One of the benefits of failing to recognize the importance of the limited financial sustainability of the sector under a wide range of circumstances is that we now understand better these circumstances. This has led to a number of solutions mitigating some of the issues raised so far. Some of the options are not under the control of the sector, some target accountability and processes, while others are ideas for new financing instruments designed to tackle the limited fiscal or financial ability of the operators or governments.

The first solution is outside the control of regulators as it depends on countries' macroeconomic trends. Income growth is, indeed, part of the solution. As income increases, the scope to improve cost recovery increases. A survey by Nauges and Whittington (2010) of estimates of own-price elasticity for water from private connections in developing countries suggests that it is in the range from 0.3 to 0.6. Income elasticity is in the range 0.1 to 0.3. This implies that for middle income users, improving cost recovery can increase revenues and somewhat reduce consumption. It also suggests that, as countries move to middle income status, demand for investment should increase but that this will be easier to finance within the sector.

The second solution is also largely not under the control of the sector regulators and policy makers, although they can influence it. The specific design of decentralization may influence the financing of the sector at the subnational level. Decentralized financing decisions may make it easier for some of the cities to develop their own financing sources and the development of municipal bond markets provides evidence of the effectiveness of this solution.³⁶ Many cities have grown and are continuing to grow and their economies are increasingly diversified. This is improving their potential capacity to service debt on long-lived projects with debt servicing costs comparable to the cash flows that project finances are expected to generate. This raises equity issues again. Not all cities represent the same level of opportunities to rely on subnational bonds (i.e. the same level of risks). This is driven by different dimensions: diversification of the economy, average state of the economy, average age of the population, average wage of the population. Moreover, their borrowing capacity is often subject to some restrictions limiting their access to the main traditional sources of financing for the sector. For instance, most international donor agencies can hardly provide any or significant guarantees to cities. All these dimensions matter to the ability of any given city to raise revenue to repay debt or to pay the bills to the infrastructure providers. Unless creditworthiness concerns can be addressed, decentralization may penalize some cities more than others and a new financial gap is likely to emerge.

³⁶ See for instance ADB (2011) for a discussion of how Asian cities have been mobilizing sub-sovereign finance through effective approaches and mechanisms consistent with better local fiscal structures.

And if the risks of soft budget constraint problems are not anticipated, national governments will run the risks of having to pick up the tab for poor local management.

A third solution that could help would be to improve credit enhancement tools allowing private and public financing solutions to be less risky and thus cheaper. This is a particularly interesting option for the cases in which bond financing is an option. The idea is to help operators improve their chances of relying on international financing options, should they become part of the services offered by donors. There is a clear scope for international organizations to come up with ways of enhancing credit worthiness of actors in the water sector, whether on the public or private sector side, and to use it to increase the quality and the accountability of the regulatory system, as well as the number of financing sources. This is particularly important in countries in which secondary cities are emerging as one of the main sources of demand for WSS investment. And in this context, the market is hoping for “donor’s” collaboration in dealing with risks they are unfamiliar with (e.g. mitigation of vertical spill-over risks in government).

There is, in fact, a case to experiment more with new financing options to manage risks and hence help find ways to close the financing gaps of the sector. It may be reasonable to test the extent to which various designs (general obligation versus revenue bonds) would impact the pricing of the bonds and their duration (rating agencies should already have a sense, or at least a database that could be exploited to test this). Similar tests could be considered for other design options (pooled finance, revolving funds, how to rely on various types of credit enhancement, ...).³⁷ Pooling of cities has been done in the context of provincial water concessions in Argentina for instance.³⁸ The real issue is the optimal packaging of cities and for which type of projects. A lot of heterogeneity may reduce risk but also confuse investors. Furthermore, the design of the joint commitment by the various cities may prove to be a challenge in some of countries and for the secondary cities in many countries.³⁹

A final change that should be considered to reduce the lack of financial sustainability of the sector is an effort to improve the capacity of regulators and, in the process, to improve accountability in the

³⁷ See Platz (2009) or Ratha et al. (2011) for a discussion of the financing and credit rating issues at the subnational level and Alm (2013) specifically in the urban context.

³⁸ It also been done for toll roads throughout Latin America. This allowed a cross-subsidization of maintenance and repairs between new and old roads as part of the responsibilities mandated through the PPP contracts. Brazil, Colombia, Malaysia and Thailand were among the early users of this approach.

³⁹ In the context of secondary cities, one of the ways in which risks could be managed is by bundling cities and/or projects. This is because when size is an obstacle, pooled finance offers a useful additional option for municipalities or projects considered to be too small to justify the high transactions costs. Pooling cities or projects also reduces costs for the bond issuers. When needed, a credit enhancement could be offered by the national government (e.g. including a commitment to reallocate some of the inter-governmental transfers to the lenders). Transaction and coordination costs can be quite high though and this may one of the reasons why the approach has not yet been considered as a recurrent option.

sector. Doing so requires the adoption of financial modeling instruments as part of the regulatory tool kit. They add transparency of the issues early on in the regulatory process and hence help identify solutions. More specifically, the monitoring of the financial sustainability should be anchored in a transparent financial model which turns all obligations on quantity and quality, as well as all information on the current and future needs of users, into quantitative targets that can be monitored. This sort of financial model has been used quite widely and quite effectively. For example, it has helped in setting the right tariffs in Argentina, Mali, and Morocco, and has also helped in the context of conflicts or contract renegotiations. The basic intuition behind this modelling is summarized in Box 4. It shows how tariffs levels are linked to the required revenue in a context in which financing costs have to be taken into account.

Box 4: How regulators link required revenue and allowed average service price.

The regulation of a monopolist starts with an assessment of the net present revenue it will be allowed to collect over the period during which it is expected to run the business, in such a way that it does not lose money. At any point in time, Required Revenue (RR) is simply the sum of: (i) the net present value (NPV) of operational (or recurrent) expenditure, Investment (or capital) expenditure and the change in the value of assets associated with normal depreciation (negative) and other more market-based changes in value which can be positive or negative. The net asset value is simply the net present value of the investments throughout the period analyzed, accounting for depreciation, including sometimes controversial assessments of the value of the initial asset base.

Formally, this can be summarized with the following formula: $RR_T = \sum_{t=1}^T \frac{(G_t + I_t)}{(1 + \rho)^t} + A_0 - \frac{A_T}{(1 + \rho)^T}$

with G_t = Operational costs for year t (OPEX), I_t = Investments during year t (CAPEX), A_0 = Initial investment (asset value at the beginning of period), A_T = End of period asset value which accounts for a fair remuneration of capital), ρ = Discount rate (or cost of capital) and RR_T = Net present value of the minimum revenue required by the operator to ensure it does not lose money, to year T . Each of these variables is a source of tension between a regulator and the operator, whether public or private, simply because each is hard to measure precisely.

To estimate this revenue, the costs to be claimed by the firm have to be estimated and accounting data is central to this estimation. This accounting data has to cover both: (i) operational expenditures, i.e. G , (for instance to get a sense of the match between the actual efforts to maintain and the expected maintenance needs) and (ii) the capital expenditures, i.e. I , (to be able to track the efforts made to comply with commitments as well as the effective anticipation of any changes in demand or in technological requirements; for instance, in the context of changes in production technologies to address climate change concern). The accounting data also offers some (although hardly precise enough in a regulatory context) information on the changes in asset valuation and depreciation, both of which are relevant when setting the price.

To see how inflating cost leads to higher average tariffs, it is useful to consider the formula used to combine the required revenue estimated from costs (RR) and the sales volume forecast (V) to estimate the average price (P) that the monopolist should be allowed to charge. Formally: $RR_T = (\sum_{t=1}^T (P_t * V_t) / d)$

where V is the volume of water sold, d is the discount rate and P is the average tariff that the monopolist will be allowed to charge. P is thus the tariff that ensures this equality.

Overall, the approach, thus, ensures that the full, efficient costs of providing the regulated services are measured and monitored in a rigorous and transparent way.

3.3 Impact on equity

The problem? The equity or fairness concerns of a regulator largely focus on the extent to which the poor are treated differently from other users, and on the fairness of treatment across user types. Recent research has been trying to understand the factors explaining why such a well understood problem is being so poorly dealt with. Gerlach and Franceys (2014) highlight common institutional capacity constraints and a limited understanding of alternative providers.

Besides the usual lessons on the limited fiscal capacity to support the needs of the poor through well-targeted subsidies, a first key message is that regulation has not yet been able to rely on a solid enough baseline data, and matching sectoral targets, to be able to include low-income consumers and their current providers into the regulatory framework. In other words, regulators do not do what is needed because they cannot measure the problem they need to tackle. A second key message is that the current situation reflects a continuous weak level of commitment and accountability. The failure to specify service obligations, the poor management and regulation of alternative suppliers and the poorly prepared negotiations with potential investors for exclusions of high cost obligations, most notably those concerning the poor in rural areas and in slums, are possible because their consequences are not made very transparent to the stakeholders concerned and to the taxpayers who will eventually have to finance these high cost areas. Gerlach and Franceys (2010) made this point implicitly years ago but, since then, not much has changed.

When the data are available, the evidence on the poor targeting of support to the poor sends a depressing message. Gerlach and Franceys (2010) and Whittington et al (2015) remind us that research has a long record of identifying issues that reflect poor choices of tools, of processes and of policies. They also point to the long record of situations in which good intentions have penalized rather than helped the poor. For over 30 years now, independent and policy observers have been documenting the failure of subsidies to reach those who need them the most. The core issue continues to be the same; subsidies tend to subsidize consumption rather than access.⁴⁰ The choice of tariff structure and the imposition of service obligations does not do much better.

For instance, in 2013, according to GWI, 74% of the water tariffs in use in low- and middle-income countries were increasing block tariffs (IBT) and 22% uniform volumetric. The main advantage of IBTs is that they are expected to help the poor by ensuring that the first (“lifeline”) block is cheap (and sometimes free). The effectiveness of IBTs in supporting the poor depends on a few assumptions. First, the assumption is that the poor consume less than the rich. This ignores that, in many cities, poor families are also large families, so that total consumption can pull the users into unaffordable brackets

⁴⁰ See for instance Komives et al. (2005), Estache and Wodon (2014) and more recently Whittington et al. (2015).

relatively easily. Second, when poor families do not consume much, they may be victims of the common practice of utilities imposing a minimum charge on a household's monthly water bill.

But the issue is not only a tariff design issue. In many of the poorest countries, fiscal and financial constraints are too severe to be able to deal with poverty. Marson and Savin (2015) look at how water-coverage accounts and financial performances of utilities in 25 Sub-Saharan countries, from 1996 to 2012, interact. They find that access to water depended on financial results, but not linearly. Access increases for relatively low levels of capital-cost recovery but then drops beyond a certain threshold, documenting potential conflicts between financial and social objectives in WSS.

Note that equity concerns are however not only linked to poverty. The discussions on economic regulation of monopolies are essentially discussions about the fairness with which the rents linked to the existence of scale economies are shared between all the stakeholders. By design, thus, regulation is about a broad concept of equity. The desirable regulation captures the benefits of strong scale economies while reducing the risks of excessive profits (as compared to a competitive return). All forms of regulation of profits boil down to an upper limit on the price that the monopoly will charge. This, usually, leads to an average price above marginal cost if no subsidies to ensure a fair return are possible.

The challenge is to compare the scale efficiency gains with the allocative efficiency losses due to the fact that average costs exceed marginal costs when scale economies exist. Regulation increases output which is in the interest of consumers. Subsidies and average-cost pricing ensure a fair return to operators. But there is something subtler happening in the process. Rents are not eliminated totally and regulation becomes instrumental in sharing this rent between consumers, the operator, the workers, the taxpayers and any other relevant stakeholder. How this is done is part of the equity of regulation and understanding how price caps/fixed price and cost-plus/flexible price regulation, or any hybrid regime, deliver on this front is quite essential.

So what? Ultimately, all citizens, regardless of their personal circumstances, should be able to access the water and sanitation services. To be effective, the regulators and the operators need to understand the different dimensions of access gaps. This includes a fair diagnostic of what works and does not work but most importantly, at this stage, is understanding why it does not work. Regulators and academics working on regulation are now starting to increase the role of non-pecuniary dimensions as drivers of success and failure in the implementation of the social component of regulatory policy. We need to know more and do so fast.

What needs to be done has actually been quite well studied. The challenge is to get it done accounting for fiscal, capacity, accountability, commitment, and other institutional constraints. We know how to

design tariffs, about social tariffs, about universal service funds, about how to target subsidies, how to think about the need to be open to alternative technologies and modes of provision within the regulatory framework. We also know about the relevance of the frequency of billing and the damage that minimum consumption requirements and fixed charges can do to the poor. There has also been a lot of experimentation with prepayment, financing connection costs, and demand management devices. We know much more and yet it is not happening as well as it should.

The good news is that there are new ideas as to how to try to make things happen, thanks to some of the insights from behavioral economics. Governments, businesses, and other stakeholders have increasingly realized that behavior is influenced by more than just financial incentives and information. Efforts to nudge people to do the right thing have proven to be quite effective in hygiene campaigns to remind individuals to wash their hands at critical junctures, automating water purification processes. Nudging makes it easier to match the choices of price and quality of service mix with local social norms, educational or other local institutional characteristics.

With respect to water consumption, the emphasis has been on water resources management and demand management. In most regulated industries, including water, behavioral interventions have been linked to both individual choices and interactions between consumers and producers and society. For instance, Ferraro and Price (2013) showed the effectiveness of technical recommendation, pro-social messages and social comparisons sent to consumers. Non-pecuniary strategies do influence water conservation, with a higher effectiveness than social comparison in a group of high-use households. But they also find that the largest effects are in the short run and this has been a recurring observation in the use of behavioral and nudging tricks in regulated utilities.

With respect to poverty and equity concerns, there are many more new insights and most have very general implications. For instance, Martins and Moura e Sá (2011) validate for the water sector a result that is already quite well established in energy regulation: the poorest tend to be penalized by the excessive complexity of billing and payment options. Their result is in fact broader since it suggests that complexity also confuses efforts to improve demand management when trying to get users to consume less. Simpler bills deliver more. Olmstead et al. (2007) use experimental household data from a previous study and suggest that the difference between the price-elasticities under increasing block tariffs (IBT) and uniform rates could be explained by behavioral responses to price structures or city-level heterogeneity. Higgs and Worthington (2001) had already established a “flat-rate bias” in an experiment in Brisbane (Australia). In their experiment, consumers generally prefer a pricing system minimizing the impact on payments of uncertain future demand, even if there are no clear reasons to do so considering only current consumption.

But complexity not only blurs optimal consumption choices, it also often ends up being regressive. When users are too confused about pricing options, they do not select one and end up with the default option. Default options usually yield the highest return to the operator. People tend to go for the status quo.⁴¹ Protecting them from the regressive outcomes of this bias is a new regulatory role that is increasingly being recognized (although more so in telecoms and energy than in WSS). This includes, for instance, the mandate given to operators to automatically enroll residents in programs to improve water-use efficiency, while ensuring that this is not the highest cost solution to them if they do not change consumption and face budget constraints.

Allocating resources to protect the poor can also help demand management. Datta et al. (2015) conduct an experiment in Costa Rica to illustrate the importance of default options and of social norms. Informing consumers of neighborhood consumption rates in their bills reduced consumption by between 3.7 and 5.6 percent relative to a control group. Similar results were achieved from a plan-making intervention. They noted however that the plan-making intervention was more effective on low-consumption households while the neighborhood comparison intervention worked better in high-consumption households.

When the users are sufficiently educated, feedback to users on the details of their consumption types and levels is usually seen as useful in demand management. Feedback actually has strong potential social payoffs as well. Providing individuals with feedback on their usage ends up reducing bills when it allows them to cut their underestimation of their water consumption. Feedback may also lead people to set explicit or implicit goals for their consumption which makes progress easier to monitor and reduces the risks of procrastination. Under current technologies, it is relatively cheap to produce simple feedback targeted to the household over an extended period of time. To be effective and help set realistic goals, feedback has to be simple.

Clearly there is a lot of relevant information that has not been picked up in standard policy design and will reduce the negative effects of the limits on the technical capacity to manage an increasingly complex sector, as well as the lack of trust in a regulation often perceived as captured or unreliable. There is also a lot of additional knowledge to be acquired through additional experiments focused on the affordability of the public service. The water sector is lagging the power sector on this front. But research is progressively closing the gap.

And do not forget that data matters. Despite their attractiveness, most of the solutions discussed here depend on a regulatory commitment to build up the capacity to close information gaps and to use the

⁴¹ There are many reasons for this, including the fact that individuals weight the potential losses of moving away from the status quo.

new information to improve targeting. Unfortunately, one of the common observations of analysts of the incidence of pricing and subsidies in the sector is that there is very little data on water consumption. Most of the data on WSS focus on expenditures and derive consumption from some assumption of the pricing structure even when there are various pricing options. If regulators are serious about helping the poor get affordable access to piped water in cities, this needs to be corrected. It is not a coincidence that when a private operator takes over the business, one of the first tools to be implemented is a cadastre of users. The data is then usually processed through relatively standardized (and overpriced) software which can be used to simulate any tariff structure. Why not impose open access to the tool to regulators at least?

3.4 Impact on accountability

The problem? There are too many dimensions to accountability to be able to treat them fairly here, but they are all part of the characterization of water governance. Discussing governance is not any easier as it is a concept with many definitions.⁴² But in the context of regulation and its institutions, the definitions tend to address a few clear dimensions. These include incomplete or unclear legal and contractual obligations and rights, the distribution of mandates and financing options across national, subnational and supranational actors, the relative importance of public and private, or small and large operators, as well as multiple process-related issues.⁴³

We actually know very little about governance with sufficient detail for developing countries. Most of the information available comes from detailed case studies or cross-country studies in which governance is summarized into a number of limited indicators. They are, however, useful enough to realize the significant dispersion of institutional settings, even if key details cannot be quantified. Table 2 illustrates this diversity by focusing on the distribution of countries along two dimensions: the existence of a separate regulatory agency and some experience with PPP. But this fails to pick up the extent to which the regulatory bodies lack independence and/or capacity to manage economic and financial regulation—even when they are quite good at the technical level (Gerlach and Franceys, 2010). In Africa, for example, only half of the Sub-Saharan countries which introduced separate regulators in the water sector achieved significant improvements in their targets. Very few Sub-Saharan countries managed to protect those agencies from political interferences (Mande Bafua,

⁴² The Global Water Partnership (GWP) defines it as “the range of political, social, economic and administrative systems that are in place to develop and manage water resources, and the delivery of water services, at different levels of society”. It emphasizes transparency, inclusiveness, responsiveness, sustainability, fairness, coherence, integration and accountability.

⁴³ OECD (2016) is a remarkable effort to provide a snapshot of the governance structure of city water regulation. The data are relatively new and hence have not yet been treated statistically, at least for external audiences.

2015; Mbuvi et al., 2012). Many observers would argue that the same holds for Latin American water regulatory agencies for instance.

Table 2: Summary of data set						
	Countries with an autonomous water regulatory agency	Countries with PPP	Countries with both an autonomous regulator and PPP	Countries with PPP but no autonomous regulatory agency	Countries with an autonomous regulatory agency but no PPP	Countries with no autonomous regulatory agency and no PPP
Full Sample (177 countries)						
Number	80	157	69	89	11	8
Share (in %)	45.2	88.7	39.0	50.3	6.2	4.5
Developing country sample (123 countries)						
Number	55	108	48	60	7	8
Share (in %)	44.7	87.8	39.0	48.8	5.7	6.5
Developed country sample (54 countries)						
Number	25	49	21	29	4	0
Share (in %)	46.3	90.7	38.9	53.7	7.4	0.0

Source: Bertomeu and Estache (2017)

What we do know, from solid theoretical and empirical research, is that the creation of a separate regulatory agency does not guarantee accountability since the water sector continues to be seen as rent extracting, as documented by Transparency International for instance, despite the institutional changes adopted in many countries.⁴⁴ We also know that accountability can be influenced by the degree of commitment, the skills of regulatory staff or civil servants, the protection from political interference and from capture by operators (e.g. Laffont (2005)). The relevance of legal context (Guerreiro (2011), culture (Athias and Wicht (2014)) or the regulatory board composition (World Bank (2017))) has also been demonstrated. And anthropologists and sociologists have added that the relevance of local norms of acceptance or resistance are key drivers influencing accountability, particularly in the context of changes in power structure that can be associated with imported governance structures (e.g. Ostrom (1990) or more recently Pal (2009)). All of these dimensions interact to define the level and nature of accountability observed for any given WSS sector. Not all of these accountability drivers can be acted upon by regulators, but some can and this is where there is

⁴⁴ <http://www.transparency.org/topic/detail/water>

a margin to improve the extent to which the actors of the sector can be held accountable even when institutions are weaker than desirable. This is something policy makers are only starting to internalize in their regulatory evaluations and decisions (Estache (2016)).

An older key insight is that some of the rules of the regulatory game may have to be differentiated for public and private operators. When public enterprises are in charge, even when they are corporatized (i.e. run as private enterprises with strong, accountable corporate boards), the main risk is probably an increased political interference with regulatory decisions, or simply the temptation not to separate the policy and the regulatory functions. This often reduces revenue and when interference results in overstaffing, it increased costs. The upshot, however, is that, just as in the case of information asymmetries managed by private operators, the outcome tends to be a cost that is not minimized and a demand that may not be met, whether the operators' motive is profit or any combination of social or political objectives. Additional differences relevant to the design of regulation when accountability is limited include the following. Public operators make fewer efforts to collect bills or to recover costs since the incentive to maximize revenue is lower. Private operators are more likely to have to pay their fines and penalties for unexplained cost increases. Public operators are more likely to be able to rely on subsidies to recover their costs. Private operators are likely to rely on higher discount rates (i.e. expected rates of returns) to assess the desirability of investments. And fifth, the scope to access private financing is, of course, quite different, even if, increasingly, corporate bonds are becoming an option in regulated industries.

Besides these institutional drivers of accountability, it is essential to recognize the role of poor data quality, poor accounting practice and a poor appreciation of this information in any effort to reduce corruption and underperformance in the sector. Cost mark-ups tend to either finance political parties or allies or simply lead to profit sharing between private operators and politicians, legally when cost increases are linked to higher taxes, or illegally when cost increases lead to bribes. In both cases, it starts at the procurement stage for many activities (from construction to maintenance and outsourcing). More transparency about this would probably reduce the scope for political interference but this has not yet been validated empirically in any coherent way. It is based more on anecdotal and casual evidence. Moreover, when political interference cuts across the board, there is little that a single sector can do on its own to change the incentives. This is not just about including a risk premium in the cost of public or private capital, it is about the choice of incentives to be factored into the details of regulatory design.

In practice, all the evidence available from international watchdogs concerned with corruption suggests that accountability gaps continue to be an issue which regulators have not been able or willing to address properly in developing and emerging economies. (And some would argue that many

developed economies are not doing any better.) Clearly there is a lack of willingness to enter into conflicts with operators, whether they are public or private, to be able to produce reasonable financial and accounting data. Technical and operational data is somewhat more available. But basic service cost and quality data (e.g. hours of service per day, basic reports on water quality, number and types of repair required) are much more difficult to obtain. And yet, they are necessary to be able to assess the extent to which there is cost manipulation which may result from a lack of accountability for corruption or from incompetence. This is where processes kick in.

Information collection and dissemination starts with a process. The failure to kick-start this process can be used to explain why information asymmetries, rents and the battles for a share of the rent continue to be so vivid and tend to lead to the disappointing performance of many utilities. But this is only a reflection of the tolerance for poor information reporting at the operator's level.

Few governments consider it useful to impose information disclosure obligations on the operators or to allow their regulators to do so. And for the few who do, enforcement is often lacking for predictable reasons including operators' desire for greater latitude. This is equivalent to the rejection by equity funds of disclosures needed to reduce the systemic risks in the financial system.

One of the reasons why the sector is not making the most of the options available to improve accountability is that regulators have their own biases as suggested by Trillas (2016). Indeed, one of the recent lessons of behavioral economics is that there is a need to question the assumption that the staff of regulatory agencies (or the experts they rely on), have the will and the knowledge to implement whatever policy is best for society. Regulators, just as operators, have biases and there are no reasons to expect the local biases to be compatible with the matching investors' biases and expectations. The acceptance or rejection of a regulatory design is endogenous to the context and this is why one of the policy options underused so far is the framing of regulation to the local context rather than the adoption of standardized institutions and tools.

So what? There are many partial solutions capable of improving accountability which are technically feasible. Most of them are not easy and touch upon political and cultural issues usually ignored by reformers. This makes them challenging but not unfeasible.

A first direction for solutions to the accountability challenges is to better account for local legal and cultural preferences in the design of regulation. The public good nature of water makes it relatively

easy to rely on ethnical, religious or other traditional accountability systems. The evidence suggests that they work quite well to ensure the accountability of local authorities and local providers.⁴⁵

A second direction is the improvement in the technicality and of the transparency of regulatory processes and of conflict resolution processes. For now, these processes are often much more legalistic than analytical, and make it easy to credit the lack of accountability to regulatory weaknesses. Quantifying the disagreements makes it easier to reach an accord and increasing the transparency of this agreement makes it easier to ensure the fairness of processes. Failing to do so can result in corruption and capture.

A third direction is to improvement the role of stakeholders, including independent academics, in performance evaluation and conflict resolution. This improves accountability by increasing the public awareness of the role played by operators, regulators and political authorities.

A fourth direction is increasing in the margin available to rely on consultation processes and information campaigns. These can be used for a wide range of situations, including, for instance, when deciding on the trade-off between quality and prices in the sector, since budget constraints may lead consumers to favor a somewhat lower quality of service to avoid being cut-off entirely.

A solution more targeted to countries with a large share of informal providers is to consider the formalization of many of the de-facto solutions offered by legal or illegal small independent providers. Many are actually already part of the system as large-scale service providers outsource the management of some of the service obligations to them. Reducing the informality may improve accountability for the poor treatment of small operators and of users.

Accountability is also linked to the quality of the board of regulatory agencies or other supervisory institutions. Boards need to be able to operate to high standards, and report transparently. But if they are not accountable for repeated poor decisions, the outcomes are unlikely to be the desired ones. Conflicting objectives and unclear roles and responsibilities of governments, water utilities and regulators have led to inefficient allocation of water resources, misdirected investment, undue reliance on water restrictions and costly water conservation programs.

With respect to data, as already mentioned when discussing efficiency, the obvious solution is to require companies to report on their performance directly to their customers and other stakeholders, as well as to the state. The performance report would have to meet the informational requirements of a transparent set of regulatory evaluations designed to ensure the sustainability of operational and capital costs, and technical and service quality. In many instances, the tensions between operators and users are linked to a lack of trust anchored in an absence of transparent information.

⁴⁵ See Ostrom (2009) or Pal (2009), for instance.

Communicating and interacting with public audiences are part of good modern governance practice. Common instruments allowing these informed interactions include regulatory accounting; annual performance reports; compliance statements, that the company has complied with all its relevant statutory, license and regulatory obligations and is taking appropriate steps to manage and/or mitigate any risks it faces; and data assurance reports to provide evidence that the information provided is accurate.⁴⁶ Managing to get all the city operators to provide this information on a regular basis is not an unrealistic goal. Furthermore, it would be a great start to increase the accountability of all stakeholders in the sector, not just the operators. Moreover, improving the role of external auditors in the sector would further enhance the scope for better accountability. Regulatory accounting systems would indeed allow independent professional audits of costs and other performance dimensions to function as a complement or validation of regulatory audits. For simple contracts, auditors can actually become substitute to regulators, reducing the cost of regulation to society.

4. Concluding comments

The stylized facts leave few doubts. Since the early days of the reforms, issues linked to capacity, credibility, accountability, or fiscal constraints have been recurrent themes in regulatory diagnostics. This recurring presence can be interpreted as the recognition of unmet challenges which should have been considered more seriously in the main lessons of theory and past experiences. They should not come as an after-thought in sector audits, but should be internalized early-on in the design or redesign of regulatory frameworks. With the benefits of these insights, there is no longer reason to ignore the costs in terms of efficiency, equity, fiscal and accountability of omitting core institutional characteristics such as legal tradition, culture, and local social norms, since they all impact the effectiveness of any regulatory (or sector) policy. These can and do influence the optimal design of regulatory tools.

The failure to match institutional weaknesses with regulatory tools is not the only failure of the last 30 years which could easily be corrected. In too many instances, WSS performance has been penalized by the underestimation of the importance of decision or evaluation processes and of the importance of cost and financial information. Both processes and information are necessary to any effort to improve the performance of the sector. More transparency on all performance dimensions is necessary to improve accountability. And improved accountability tends to deliver improved

⁴⁶ These provide the legal basis for a regulator or any stakeholder to challenge the operators and their managers for non-compliance with all its relevant statutory, licensing and regulatory obligations and for the lack of effort to take appropriate steps to manage and/or mitigate any risks it faces.

performance. But this starts with a diagnostic of what limits accountability in the details of regulatory frameworks, as these limits often hide in processes and information gaps.

Ultimately, this paper boils down to a call for a more systematic approach to WSS diagnostics which would minimize the current bias favoring standardized approaches to regulation. What has been missing until now is the ability to produce an encompassing vision of sector performance, more aware of the relevance of all institutional, process-related and informational impediments, bottlenecks or preferences. This is not very different from the widely used unified framework suggested by Hausman et al. (2005) for growth diagnostics. WSS diagnostics should be just as effective at helping to formulate sector strategies that are both operational and analytically robust and, of course, strategies that account explicitly for the institutional constraints and preferences which have not been given enough attention until recently.

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