



**Successes and Failures
of Water and Sanitation Governance Choices
in Sub-Saharan Africa (1990-2017)**

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Abstract

Based on a survey of evidence on progress and of analytical diagnostics from various angles, the paper argues that, under current management and reform strategies, the SSA countries still lagging in coverage are unlikely to reach the universal water access and adequate sanitation targets promised by the Sustainable Development Goals set in 2016. This is not just about more, it is also about faster and better. And it is not only by the countries themselves, but it needs to imply all stakeholders in a coordinated way. There are three main explanations. The first is that, despite all the bells and whistles on achievements, financing constraints continue to be quite binding. Second, many of the local and international stakeholders continue to be slow at internalizing the lessons from the strategic mistakes in reform and technology choices and, in particular, in their implementation. And third, the current handling of the fast and accelerating urbanization process in the region, combined with an high population growth, is having unplanned and unmanaged perverse effects on the level and nature of the demand for service. Change has been coming and continues to come. But it is too slow and too unfocused to help fast enough the poorest who continue to be excluded from the benefits of improvements in the sector.

¹ The paper is a chapter in a forthcoming book on the state of water reforms to be edited by S. Saussier. I am grateful to S. Bertomeu-Sanchez, D. Camos, R. Schlirf and S. Saussier for comments and discussions. Any mistake is however only my responsibility.

1. Introduction

The main purposes of this paper are: (i) to provide a snapshot as of 2017 of the performance of the water and sanitation sector (WSS) across Sub-Saharan Africa (SSA), (ii) to review the wide range of institutional and governance reform experiences in the region since the early 1990s; and (iii) to show that, despite the significant progress achieved in the last 15 years or so as part of the efforts to deliver the Millennium Development Goals (MDGs), the reforms are still far from delivering as much as needed.

In SSA, as of 2017, the policy debate on WSS is still largely centred on the need to provide an affordable quality access to a significant share of the population unable to get it or to afford it in many of the countries.² It is thus mostly about investment and its financing, even if technological choices, unaccounted water, implementation mismanagement and other efficiency related issues are also quite present in the policy debates. The various waves of reforms implemented for almost 30 years now have not yet delivered WSS performances comparable to those achieved in other regions with similar or equivalent reforms. The sector is still underinvesting and still faces constraints in its efforts to fund investment requirements.³ The international community has been quite involved in supporting SSA efforts through multiple initiatives and efforts to mobilize resources with some success but also with many limitations in terms of their impact on the ground.⁴

To summarize the evidence on the success and failures of governance and other reforms, the paper is organized as follows. Section 2 reviews the major stylized facts. This is not a straightforward exercise. Although some of the basic data on access rates is common to all sources, most of the data on investment needs and financing sources are based on assumptions which vary across institutions and unfortunately. Moreover, there is often little transparency on the details of the assumptions. On other dimensions such as unaccounted for water (UFW), the evidence is mostly on country specific studies with very little strict comparability across countries available from public sources of information.⁵ This is why, for many of the indicators reported across performance dimensions, ranges rather than point estimates are provided. Section 3 summarizes the various experiences in governance, including regulatory reforms, conducted in the region. Section 4 is a brief survey of the relatively narrow technical literature assessing the impact of these reforms. This literature is quite modest in comparison to the many case studies provided by international organizations but is important as it provides statistically robust tests of the insights from the less technical studies. Section 5 concludes.

2. The stylized facts

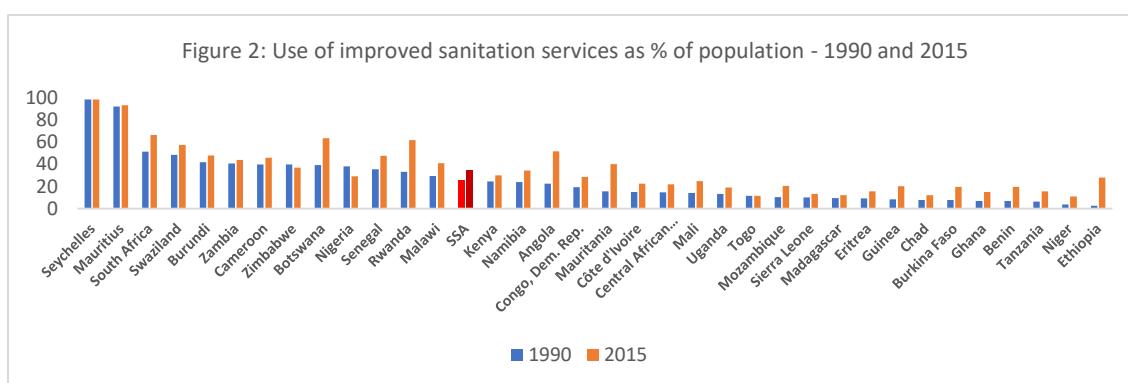
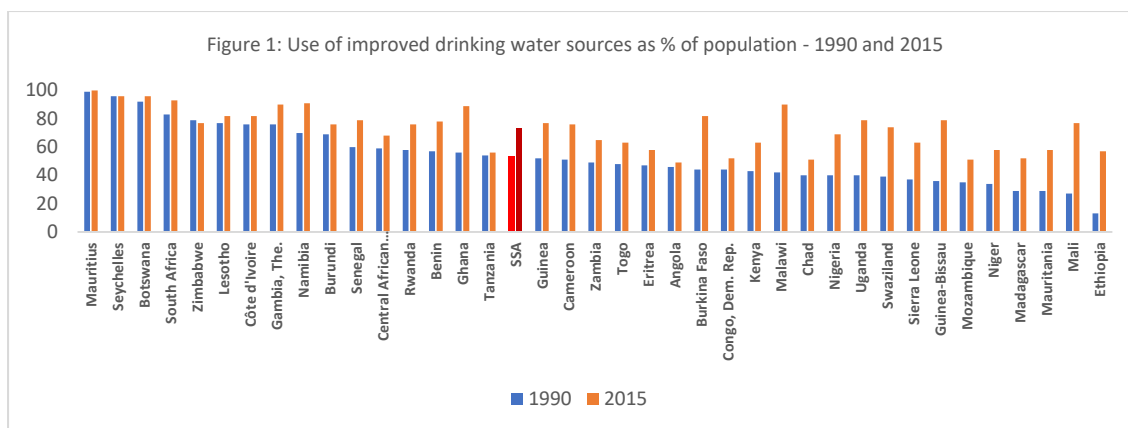
On an annual basis, SSA's investments needs in WSS for the foreseeable future are estimated between 1% to 2% of GDP on average (depending on the assumption made for technology and growth). Matching maintenance cost of the sectors increases these figures by 25% to 35%. This roughly adds up to total financing requirements of around 2.5% of GDP--this is the bulk part figure anchoring many of the policy discussions among experts. There is some dispersion across countries as national coverage rates vary significantly as illustrated in Figure 1 and 2 for water and sanitation access rates respectively. Overall, this adds up to estimations in 2017 prices as low as US\$ 25 billion and as high as US\$ 50 billion annually for the region.

² Although policy discussion also include a rebirth of old and recurring debates on the need to do better on irrigation to improve land productivity in the region, this chapter will not address the topic. See for instance, Woodhouse et al. (2017)

³ Hutton, G., and M. Varughese (2016)

⁴ Sambu (2016) and Ndikumana and Pickbourn (2017)

⁵ The latest comparable information dates from the Africa Infrastructure Country Diagnostic (AICD)-summarized in Foster and Briceno-Garmendia (2009). It is based on 2005-2007 data for most dimensions and this is by now largely out of date.



Source: Joint Monitoring Programme (JMP)

Current expenditure levels are well below the needs, even accounting for their current levels of inefficiency. IMF data reported by Gutman et al. (2015) on a sample of 25 SSA countries implies that on average, public expenditure in the sector is currently at around 0.9% of GDP (i.e. 20% of the total spent on infrastructure), even if 40% of the countries of the sample spend more, up to 2% of GDP. According to WHO (2014), over 80% of these public expenditures are spent in urban areas, yet about half of the WSS needs are still in rural areas.⁶ For a sample of 9 countries covered by WHO (2014), household contributions to the recovery of these costs ranged from 6% to 66% and for only four out of these countries did external financing reach 20% or more.⁷

Raising the public resources needed continues to be a problem for over 80% of the countries of the region since average income levels are still quite low and the tax basis quite narrow. For most countries, getting access to private funding in this sector has not been a serious alternative so far. According to the World Bank PPI database, between 1990 and 2016, private funding has generated investments adding up to US\$425 million and most of this has been captured by only 5 countries (South Africa, Nigeria, Kenya, Ghana and Uganda).⁸ That's about 16 million per year for a bit more than a project per year. It's also less than 0.1% of the US\$4 billion in funds committed to the sector in 2013 by the Infrastructure Consortium for Africa (ICA (2014)).

Growing sources of additional financing include institutional investors such as pension funds, hedge funds and wealth funds. And they also include Chinese investments. These have become one of the main players in the construction and financing of hydropower dams. It is also increasingly active in the construction of water treatment stations, city water supply systems and rural water well drilling.⁹ In 2010, it was present in 30 African countries.¹⁰ Investment funds interested specifically in water are a promising new financing options but are not yet a reasonably predictable source of funding for the region. The first public-private water fund was launched in Kenya in 2015 (the Upper Tana-Nairobi Water Fund) to finance upstream water conservation

⁶ World Health Organization (2015), INVESTING IN WATER AND SANITATION: INCREASING ACCESS, REDUCING INEQUALITIES GLAAS 2014 findings — Special report for Africa,

⁷ Burkina Faso, Ghana, Lesotho and Madagascar

⁸ <http://ppi.worldbank.org/snapshots/sector/water-and-sewerage>

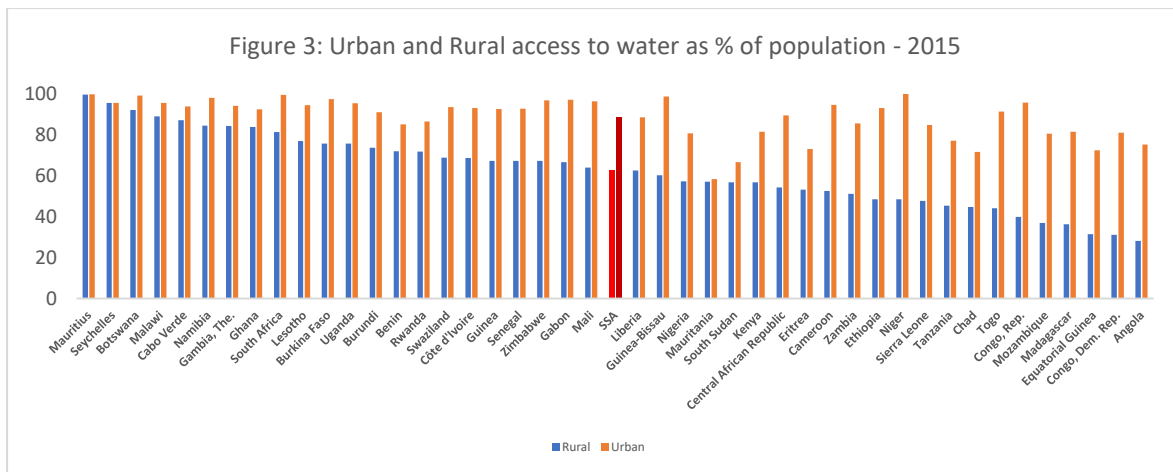
⁹ Tukic and Burgess (2016)

¹⁰ Godfrey and Ross (2016)

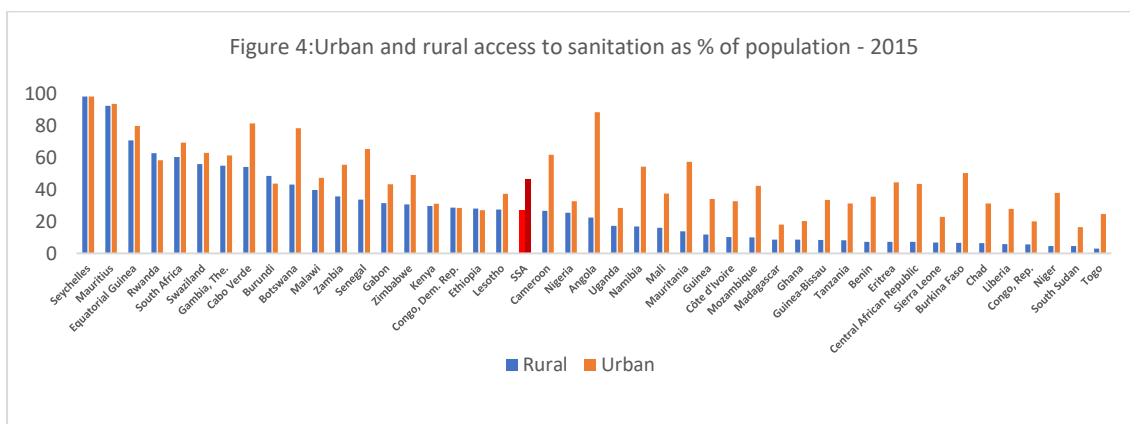
through activities such as watershed protection and reforestation.¹¹ The US\$15m the fund was aiming at illustrates the modest size of this expected source of financing.

The difficulties in finding enough financing to make the investments needed and matching O&M expenditures explain why as of 2015, according to the World Bank Development Indicators (WDI), about 319 million people in the region were without access to improved reliable drinking water sources. In other words, only 68% of SSA population had access to clean water sources. This is the coverage rate achieved by lower middle income countries in 1990 (that is a quarter of a century ago!). These lower middle income countries have now reached 89% of coverage. Figure 1 shows for water that the best performers have reached almost full coverage while the worse ones (Chad, Ethiopia, Niger or Mozambique for instance) lag significantly, despite significant progress since 1990. Figure 2 provides a very explicit sense of the extent to which sanitation continues to be a major problem across the region with only a few exceptions. Both figures also point to the dispersion of progress across countries.

The central fact emerging from these statistics is that, almost 20 years within the 21st century, 12 countries in SSA still suffer from water access rates below 60%. They also imply that only 1 person in 3 in the region has access to improved sanitation facilities as compared to 1 person in 2 in lower middle income countries, for instance. Figures 3 and 4 show how different progress has been between urban and rural areas, in favour of urban population. But the effort has not really been very effective enough to adjust to the fast pace of urbanization in the region. Partially, this is due to the endogeneity of the urbanization process, or in particular of its speed. The stronger the rural-urban access to public services gap, the stronger is the incentive to migrate. All the evidence points to a tripling of SSAs urban population by 2050. However, this will not guarantee them with access to improved water sources. The share of SSA's urban population with access to water piped to their home has actually declined, from 43 percent in 1990 to 33 percent in 2015, according to WHO (2015).



Source: Joint Monitoring Programme (JMP)



Source: Joint Monitoring Programme (JMP)

¹¹ <https://www.nature.org/ourinitiatives/regions/africa/explore/nairobi-water-fund.xml>

Much of the high-level policy discussions of these statistics have, so far, relied on the very broad definition of access to clean water adopted here as well. But it is important to highlight that, with this broad definition, many of those credited with access to improved water sources do not have home connections and need to rely on shared connections. Quality of service continues to be a major issue in the region and in most countries, regulators and other authorities lack the means to enforce quality requirements.¹² This aggregate data also hides that the poor are the main victims of the slow progress. In a sample of 35 SSA countries monitored by UNICEF, the poorest rural quintile has no access to piped water and open defecation is the only option for over 60% of households.¹³ In contrast, over 90% of the richest urban quintile can rely on improved sanitation and drinking water.

To complete the snapshot, it is important to point out that the slow progress of the region can also be partially blamed on technological choices made by the authorities and the suppliers. The financing requirements could be cut by improving the technical performance of many of the operators in the region as well as to differentiate the technological options to improve the matching between preference and ability to pay. Rural areas have been more effective on this front simply because they often no choice when they can no longer afford to wait for long undelivered promises by central authorities to deliver access through connections to networked facilities.¹⁴

To illustrate the scope for improvements, consider unaccounted for water due to both physical/technical (i.e. failures in trunk connections or aging pipes) and non-physical (i.e. underbilling or illegal connections) reasons. It continues to be a challenge in the region. Sharma (2008) suggests that, by the mid-2000s, it averaged at around 39% in SSA but could reach as much as 60% in many capital cities of the region. This compared to about 15% in the US for instance. A recent diagnostic of UFW in South Africa shows that the situation has not changed too much since the mid 2000s. Based on a sample covering about half of the country's municipalities non-revenue water was estimated for the country as a whole at 36.8%, of which 25.4% were linked to physical leakage.¹⁵ Similar assessments have been conducted for other countries and report similar results in the region, although they are often more addressed in technical consulting reports than in policy oriented academic publications.

To address these concerns, there are institutional and technological options. At the institutional level, there is enough informal evidence to be concerned with a bias build-in international financing sources. It is indeed still easier to get money for a new plants that will use a huge amount of the potential financial resources available, than working harder on UFW and water losses. The cost effectiveness of solutions is not always account for in the evaluation processes for a given level of benefit.

At the technological level, innovations are increasingly helping reduce the non-physical losses. For instance, Durban City's eThekweni is often cited as the most successful experiment so far to reduce the risks of failures to collect bills. The utility adopted flow meters that get switched into low pressure mode when customers fail to pay their bills. The meter can limit the quantity that flows through the valves to very small quantities that would add up to the volume the utility is obligated to, but no more.

Other technical issues are related to the cost of producing and delivering water in a region that is the world's second-driest continent (after Australia) with only 9% of global renewable water resources to support 15% of the global population.¹⁶ They also include the high cost of sanitation as a result of the lack of treatment tradition for many of the industries.¹⁷ For example, in Nigeria, Taiwo et al. (2012) report that less than 10% of industries treat their effluents before discharging them into surface water. Taiwo (2011), again, shows that in many SSA countries, rain washes municipal solid wastes and other pollutants into rudimentary drainage systems and subsequently, rivers. The upshot is, as suggested by Li et al. (2011), that pollutant concentrations observed in effluents can be as much as five times higher than observed in Europe.

But not all challenges are linked to technical issues. Some can also be blamed on policy decisions and in particular on the pricing strategy adopted in most countries. In 2007, under-pricing resulted in a loss of over

¹² Rimi Abubakar, I. (2016) provides a powerful case study in Nigeria.

¹³ UNICEF (2015)

¹⁴ Many of these issues are often linked to poor implementation and poor coordination of otherwise reasonable policy decisions. See World Bank (2017) for a series of detailed case studies, including some on SSA.

¹⁵ McKenzie et al., (2013)

¹⁶ UNEP (2010)

¹⁷ For a detailed discussion, see Wang et al (2013).

60% of utilities revenues.¹⁸ This is anchored, at least partially, in the choices made for tariff design. Based on the information available for 25 SSA countries on 2016 tariff structures, most countries of the region (22 countries for this sample) have adopted increasing block tariffs (without a fixed component).¹⁹ None seem to have adopted explicitly two part tariffs in the region as the 3 other countries of the sample are split between a linear, flat and decreasing block tariff. The intention is likely to have been to protect the affordability of a minimal use of water by all users. Moreover, few countries account for fixed costs in their billing in the region. Cost recovery is usually limited at recovering operation and maintenance expenditures, implying that the capital expenditures are often largely subsidized.²⁰ The intentions to care for equity are laudable but the implementation of the increasing block approach may not be sending the right signal to consumers with a capacity to consume and may be regressive rather than progressive as expected since connection subsidies go to those with connection and this excludes the poorest.²¹ According to van den Berg and Danilenko (2011), about 90 percent of the population with piped water access belongs to the richest 60 percent of the population. This leaves only 10% of those with access with a justified subsidy. Ideally, it seems that a more efficient and equitable solution would combine the two part tariff approach with the IBT (i.e. fixed charge + various consumption blocks with different tariffs and an exception for the poorest for whom the fixed part would be lifted).

Increasingly, the region has been trying to address both the risks of revenue losses from non-payment for consumption and the capacity to pay constraint of the poor by adopting pre-payment solutions. Pre-paid meters reduce the risks of arrears or debt, as customers pay in advance for a specified amount of water. This, in turn, improves revenue to fund wider coverage, and limits the need to inflate tariffs to compensate for revenue losses. But there is also the risk that the approach undoes some of the social purpose of the increasing block approach so common in the region.²² This is because the flat rate built in the pre-payment is often higher than the price of the service built in the first blocks of the increasing block approach. South Africa's decision to rely on pre-paid but with IBT pricing seems to be the most desirable combination of efficiency and equity. This can be done relatively easily on the basis of the consumer ID and reloading dates information).

Note that the increased use of pre-paid meters also implies high set up costs, including high capital expenditure on metering devices and high recurrent costs linked to sales, repairs and monitoring. In many instances, their sustainability depends on the margin for cross subsidies. This is not very different from the more traditional approach to cross-subsidies between urban and rural consumers or industrial and residential consumers. How much margin the service providers should be given to implement these cross subsidies is a recurrent regulatory concern. In all cases, the proper decision has to take into account the fiscal limits on direct subsidies and the distortions that cross-subsidies can lead to, for instance, in terms of investment decisions.²³

The human implications of these very dry statistics is that mortality and morbidity rates linked to underperformance in the water sector continue to be much higher than in any other region of the world. For instance, mortality rates attributed to unsafe water, sanitation and hygiene are estimated by the WHO (2014) at 39.52 per 100,000 people, 3.3 times more than in the Middle East or 12 times more than in Latin and Central America. And unless the awareness of the risks improves, these statistics are likely to get worse. The estimated number of people practicing open defecation has increased in the region from 181 million in 1990 to 229 million in 2015, adding to the complexity of the sanitation challenge in the region. The poor sector performance also has a dramatic impact on the productivity of the region. Research conducted by international organizations suggests that for every \$1 invested in water and sanitation,²⁴ an average of at least \$4 is returned in increased productivity.

¹⁸ Foster and Briceno-Garmendia (2009)

¹⁹ Based on data collected from the IBNET and GWI website, the two main sources of comparable information on tariffs for SSA.

²⁰ In rural and/or non-networked water supply, users are often required to pay around 5-10% of capital costs. Often this can be paid in labour or local materials. For sanitation, users are mostly required to pay 100% of capital costs and operation and maintenance and they usually cannot afford it.

²¹ See for multiple quantitative examples: Angel-Urdinola and Wodon (2012), Banerjee et al. (2008), Bardasi and Wodon (2008) and Estache and Wodon (2014) and for powerful documentation of 17 cases studies, see Heymans et al. (2016)

²² Heymans et al. (2014)

²³ Estache, Laffont and Zhang (2006) and Auriol and Blanc (2009)

²⁴ UNICEF (2015)

Despite the reasonable frustration with the size of the challenges ahead, it is also hard to ignore that solid progress has been achieved. Indeed, SSA had a coverage rate of 47% in 1990. This implies an increase of 1.8%/year on average since. Figure 1 shows that 11 countries have already reached access rates over 90%. During the MDG period, 427 million people are better off. Between 2000 and 2010 alone, 84 million urban Africans gained access to improved water supply and 42 million to improved sanitation, an impressive 3.9% average increase in access over the decade. It is impressive indeed. But once this good news has been acknowledged, the hard reality has to be used to motivate the additional efforts needed. The number of people without access to these basic services continues to be excessive.²⁵ Funding continues to be a challenge for too many countries. Finally, income levels in the region are such that it is still unrealistic to expect the lower income classes to be able to get to pay cost recovering tariff. And this implies that the economic regulation of the sector has to address jointly efficiency concerns (i.e. underinvestment, excess costs, mismatch between the supply and demand for quality, and excess physical and non-physical losses), equity concerns (i.e. the penalization of poor and rural areas) and fiscal concerns (i.e. the need to be able to minimize the largely unavoidable subsidies to the sector).

3. The sector organization and its regulation

The characterization of the organization and institutions of the WSS is not an easy exercise in any context.²⁶ It may be particularly complex in the African context as a result of the multiplicity of experiences across, and often within, countries spread over almost 30 years. This is partially linked to the diversity of the dimensions that drive the design of institutions and to the efforts, often too modest, to match these to local constraints and preferences. This diversity reflects differences in legal traditions (civil vs common law), accounting tradition, development levels (low income vs low middle income levels), country size, and ethnic homogeneity for instance.²⁷ It also reflects differences in market structures. For instance, East Africa, , Tanzanian counted, in the mid 2010s, 130 local utilities, Kenya 103, Zambia 18, Mozambique 15 but Rwanda, Burundi and Lesotho only one-each.²⁸ There are however a number of common characteristics to be highlighted to provide a good sense of the way the sector is organized in SSA, to define, implement and enforce policies and the supporting regulations.

As in many other developing regions, national water and/or environment ministries lead the formulation of water-related policies. They often need to coordinate with public works or finance ministries, in particular in the context of efforts to rely on large scale private options for the delivery of water services. They also need to coordinate with agriculture ministries in the management of irrigation or health ministries to coordinate the monitoring of water quality and define effluent standards for instance. Many of these ministries create separate agencies which are often specialized in a specific activity, such as monitoring, enforcement or implementation.

One of the main innovations launched in the late 1990s has been the decision to create separate regulatory agencies for WSS utilities, largely stimulated by international organizations but adding one of more player to the organizational charts. As of 2017, such separate utilities regulators had been adopted by 23 of the countries (48%) of the region, and a few more have it on the agenda as a signal of their willingness to minimize the risks of political interference in regulatory decisions²⁹. But, as discussed in the next section, this has never been a required, nor a sufficient condition to attract private financing into the sector.

Note that institutional changes have not only been designed to attract private investment. Since the mid 1990s, the region has internalized the importance of an integrated approach to water resource management. As a result, the relevance of the scarcity of water as a resource has been formalized in water laws which are quite comparable across the region.³⁰ The change is likely to have an impact on the regulation of water providers in the near future as competition for access to resources is likely to change as coverage improve and scarcity for other uses increases for natural reasons (including climate change). For now, the growing adoption of integrated water management approaches has not yet had a significant impact as residential water

²⁵ And it may be useful to remind the reader that water access and consumption are quite different matters. The average water consumption in Rwanda is 15 litres a day. In the USA, it is almost 40 times as much (575 litres per day) (see https://20liters.org/clean-water/?gclid=EAlalQobChMIImquFt7u-1QIVhj4bCh2gvgr1EAAYBCAAEg1fvD_BwE)

²⁶ Maziotis, A. et al. (2013)

²⁷ Guerriero, C. (2011)

²⁸ ESAWAS (2017)

²⁹ Bertomeu, Camos and Estache (2017)

³⁰ Global Water Partnership/GWP (2015)

consumptions continues to have priority over other users in the broad allocation of resources. Moreover, the implementation and enforcement of the law is still lagging in many countries. Budgetary constraints, poor planning and coordination, information gaps have all been blamed for the slow progress. But there is little doubt that water providers' regulation will have to adjust and prices as well as the opportunity cost of water starts being part of the decision-making process.

The third increasingly standard element of the institutional framework of many countries in SSA of relevance to the operation of WSS and to its regulation is the inclusion of the requirement of consultations processes with stakeholders and public participation in water planning, management and regulatory decisions.³¹ These processes can be broad or narrow. In 2017, for instance, South Africans launched a global consultative process to agree on the values of water and ensure a more equitable use of the available resources. But narrow consultations prior to tariff increases are indeed now quite common in the region and it is having an impact. In Maputo, Mozambique, focus group discussions with residents and interviews with key actors were used to identify the demand for flexible payment options to the urban poor in order to increase the affordability of connection charges.³² It allowed the provider to expand its customer basis as well. While these examples are success stories, the evidence on the effectiveness of participatory approaches is however still mixed.³³ For instance, it is not uncommon to observe that the connected households are usually the politically influential urban middle class, and it is not only more potentially keen to block tariff increases when consulted but also better the better organized to do so. It is, however, likely to become a standard regulatory tool in most of the region because it also serves as a communication tool and based on a recent meta-analysis, bottom-up approaches to consultation processes are likely to deliver desirable outcomes in terms of most performance indicators.³⁴

A fourth change in the sector is the increased role of local authorities in the design and implementation of policies.³⁵ Over 80% of the countries of the region have implemented at least some form of shift of responsibilities in the sector to subnational authorities, although often more in the form of devolution rather than full decentralization. But the degree of devolution has varied a lot across countries so that broad lessons are difficult to draw. The main one is that success has been mixed. The failures of a full transfer of decision-making authority can often be blamed on the reluctance of the central authorities to give up responsibilities they were traditionally controlling, or to provide sufficient technical assistance to allow the local authorities to learn enough about their new mandates (e.g. Malawi or Mozambique). This is partly linked to a reluctance to transfer the resources and assets needed to match a devolution of responsibilities to subnational authorities. But failures have also resulted from the undermining of the ability of subnational governments to deliver by competition from other actors with interests not necessarily aligned enough to lead to coherent decisions, such as user committees, local water forums or small private operators, making the design of regulation of water services in small towns more challenging than needed.³⁶

Besides these dimensions defining how policies are decided and monitored, a characteristic of the sector is the extent to which it can rely on private actors to finance, develop and/or manage its activities. As of 2017, the World Bank PPI dataset implies that 80% of the countries have at least some type of contract with private operators whether at the national or subnational level.³⁷ Although most casual observers could believe that these public-private partnerships (PPPs) started in the 1990s, the first large ones in the region took place in Ivory Coast, in 1959, with the implementation of an urban water "affermage", followed by a similar contract in 1960 in Senegal. Table 1 provides an historical perspective of the large scale deals reported in that database since 1993 when the most recent wave of public-private partnerships (PPPs) in SSA started.

³¹ Oxfam (2016)

³² Jimenez-Redal, Parker and Jeffrey (2014)

³³ Mansuri and Rao (2013)

³⁴ Narayanan, S., A. Thillai Rajan*, P. Jebaraj and M.S. Elayaraja (2017)

³⁵ Herrera and Post (2014)

³⁶ Jaglin, Repussard et Belbeoch (2011)

³⁷ Many of these contracts are actually quite small in terms of investment commitment but they do represent a private sector presence at least in management of activities.

Table 1: Large Scacle Public-Private Partnerships in SSA since 1993					
Year	Country	Contract Type	Contract Period	Government Level	Separate Regulatory Agency
1993	South Africa	Lease	10	Local	No
1996	Senegal	Lease	10	National	No
1998	Uganda	Management	3	National	No
1999	Kenya	Management	5	Local	Yes (2003)
	Mozambique	Lease	15	National	Yes (1998)
	Mozambique	Management	15	National	
	South Africa	BOT	20	Local	No
2000	South Africa	ROT	30	Local	
	Mali	Concession (ceased after 5 years)	20	National	Yes (2000)
2001	South Africa	BOT	30	Local	No
	Namibia	Lease	20	Local	Yes (2017)
	Niger	Lease	10	National	Yes (1999)
	South Africa	Management	5	Local	No
2002	Zambia	Management	4	National	Yes (1997)
	Congo Rep.	Management	2	National	No
2002	Uganda	Management	2	National	No
	Tanzania	Cancelled Lease	10	National	Yes (2001)
2005	Ghana	Management	5	National	Yes (1997)
2006	Senegal	Lease	6	National	No
	South Africa	Management	6	Local	No
2007	Cameroon	Lease	10	National	No
	Sudan	BOT	13	National	No
2008	Ivory Coast	Lease	15	National	Yes (1973)
	Mauritius	Management	7	National	No
2012	Ghana	BOT	25	National	Yes (1997)
2013	Congo Rep.	Management	4	National	No
2015	Senegal	Lease	10	National	No

Source: Author compilation from various sources, including the World Bank PPI database

Table 1 points to at least 8 insights.³⁸ First, the number of countries with deals large enough to be significant represents about a third of the countries of the region. In other words, two thirds of the countries have not been interested or have not had the opportunity to try the option. Second, one country (South Africa) signed almost a quarter of the deals over the 22 years period covered by the database. Third, over a quarter of the deals (including all the South African ones) were signed with local governments. Fourth, 39% of the contracts were management contracts, 39% lease/*affermage* contracts and 21% BOT/concessions, implying that massive private investment has not been the main result of the contracts signed in about 80% of the cases. Fifth, the average duration of contracts was 11 years, but it spreads from 2 to 30 years. Sixth, the craving for BOT has been decreasing during the period. Seventh, the existence of a separate regulatory agency was not needed for many of the contracts to attract private actors. And eighth, the same type of contract can be monitored by either separate regulatory agencies or ministries. In both cases, the contract serves as a key, if not the key, regulatory instrument.

What the table does not show is the complexity of the matching institutional designs needed to allow the contracts to function. The contracts in Senegal and Niger, which follow a similar model, provide a useful illustration. They follow an *affermage* model (based on the old French contract type) which also includes the creation of a state-owned asset holding company. This company takes over asset ownership, infrastructure development, service of debt, monitoring of the service quality, and development of public awareness about the sector reform on behalf of the government. Government (sometimes shared with regulator) retains policy, tariff setting, and water resource management responsibilities. The holding company enters the *affermage* for a specific duration with a professional operator, enjoying exclusivity over water services provision in its service area. A matching performance contract can also be introduced, covering technical and commercial performance obligations, financial incentives or penalties, and responsibilities regarding the rehabilitation of water systems.

The table is also somewhat misleading as it does not recognize the significant role of private actors other ways, notably in rural areas and smaller cities. A few African countries (including Cape Verde, Cote d'Ivoire, Gabon, Mozambique, Niger and Senegal, for instance), work with private actors through contractual arrangements other than service and management contracts (Mwanza, 2010). In most countries, also, small and often informal enterprises end up meeting the demand for water and sanitation services from households that the larger utilities are unable or unwilling to serve. Many of their clients are the poorer customers in smaller cities, peri-urban and remote areas. And their technological solutions are as diverse as wells, public stand posts, water kiosks, informal distribution networks, tankers and small scale vendor. As explained by Auriol and Blanc

³⁸ Note that the table does not report a number of deals which involved both water and electricity utilities. These include Cape Verde, Chad, Comoros, Gabon, Gambia, Guinea-Bissau, Madagascar, Rwanda, and São Tomé. Most were management contracts.

(2009), these facts imply that the poor end up paying more than they should and the rich much less, since the utilities serving the rich tend to be subsidized in the region, while alternative suppliers are not.

The final main institutional characteristic is the form of regulation adopted in the region.³⁹ Wherever alternative providers control the market (and these are particularly important providers for rural areas), self-regulation tends to be the norm. Self-regulation is also still quite common for larger utilities, as illustrated by the fact that about half of the countries have decided to maintain the regulatory decisions within a Ministry or similar government structures with enough margin for political control. It is most often used by municipalities, ministries or state-owned companies. Since the mid-1990s, however, formal regulatory mechanisms have increasingly been adopted to supervise both public and private operators.

In many of the deals, prices and their evolution are defined by contract, explicitly or implicitly, as often the competition for the market was decided based, partially, on the lowest bid. This implies that price caps are the most common form of price regulation—even if these are often turned into hybrid regimes through renegotiations that include an increasing number of cost components protected by automatic cost pass-through rules.⁴⁰ The time between reviews ranges from one to five years but unexpected adjustments have turned price regulation closer to a hybrid form, notably when some of the imported input prices (e.g. chemicals) were increasing, occasionally as a result of exchange rate depreciations (e.g. Nigeria). The most recent change in the sector is the fact that price increases are increasingly anchored in consultations processes as recently happened in Kenya (2014) or Niger (2017).

Contracts have, de facto, become one of the main regulatory tools to define all rights and obligations. But there is a diversity of models. Regulation based on performance review or contracts is quite common in the region—a lasting inference of the popular contract-plans of the 1970s. Successful examples include Uganda and Burkina Faso. Performance contracts are also built in the Niger and Senegal models of PPP and have been, until recently, monitored and enforced by a holding rather than an independent regulator. Explicit performance commitments are also part of most management contracts. More modern approaches have been adopted in most cases involving leases, BOT/BOO/ROT. Contracts are more detailed and are complemented by some discretionary power granted to regulatory authorities.

4. A survey of recent evidence on governance reforms and performance

One of the most remarkable changes in terms of performance assessment in the region since the mid to late 2000s, is the effort led by national authorities or groups of national authorities to conduct performance audits.⁴¹ Many of these are anchored in partial indicators and provide useful insights but they do not offer an analytically robust test of the impact of changes in institutions, regulations and contract as their main purpose is simply to audit the evolution of performance.

The region has also attracted the interest of academics, NGOs, policy advisors and other observers of SSA's WSS challenges more broadly. All of the actors have expressed a wide range (and a large volume) of opinions on how the sector has performed as a result of the institutional changes summarized in section 3.⁴² Many of the assessments have some ideological tone, in particular when discussing the relative role of the private and public sectors. As often when trying to explain failures, each side to the debates is quite effective at selecting cases and indicators providing at least partial evidence to argue their position. The bigger picture may be that neither side has the answer to speed up progress. Almost 30 years of trial and errors show that there is no simple recipe to improve performance fast. But this experience also shows that there are a few pragmatic general insights on which there is convergence.

A recurring cross-cutting message from the more recent diagnostics of the failures of the sector on which most seem to agree is the continued difficulty central governments face when trying to build up alone the sustainable institutions needed to spend the resources and operate the WSS assets properly. This inability has several drivers. First is a lack of adequate operational structures with dedicated budgets to finance such basic operational inputs as salaries, transportation, supplies or training. Second is the atomization of mandates in a sector which increases coordination costs in an environment in which the basic administrative skills continue

³⁹ Banerjee et al. (2008) provide the most systematic review of the regulatory context in the region. It is however a bit dated now and unfortunately there is no recent dataset reporting comparable information.

⁴⁰ Banerjee et al. (2008) argue that most of the contracts were indeed price caps.

⁴¹ Eg. Water Services Regulatory Board (2016)

⁴² See Woodhouse, P. and M. Muller (2017) for a recent overview

to be limited. Third is an underuse of the comparative advantages in the allocation of mandates. Fourth, there are intra-firm lack of incentives to perform as demonstrated for Uganda by Mugisha (2007). And last but not least, the failure to account for the relevance of the political economy of reforms which involve all levels of governments in a sector particularly politically sensitive.⁴³ For most of these detailed dimensions, data is limited and case studies are quite useful to identify concerns and possible solutions.

But there are also many other dimensions of the sector on which there is disagreement. This section surveys the most technical assessments of the main broad reform options on which there are disagreements (i.e. PPPs, regulatory choices, contract types and decentralization) anchored in econometrics, data-envelopment analysis (DEA), general equilibrium models and other quantitative techniques. This leaves out the large literature documenting case studies and other qualitative studies. These are useful in pointing out the relevance of control/contextual variables in their assessments of changes in specific indicators but make it hard to distinguish the relative importance of these factors from those specific to the WSS choices as drivers of outcomes. A recent meta-analysis by Thillairajan et al. (2016) of infrastructure reform experiences show that this confusion tends to lead to an optimism bias in the interpretation of the results. They demonstrate that in assessments of the impact of various forms of PPP, qualitative studies show a high proportion of positive evidence as compared to quantitative studies. In other words, quantitative studies are more likely to indicate no significant impact of a reform on access rates and service quality than qualitative studies.

Note that the technical assessments face their own share of limitations. Most have been quite constrained by data quantity and quality and many of the results are closer to establishing correlations rather than causality between institutional and regulatory changes and outcomes. But most provide reasonably robust correlations on the performance of WSS companies and their drivers for the samples they are tested on. This produces partial evidence on the relevance of ownership, regulation, contract type, separate regulatory agencies and decentralization. We also report the results of studies of the impact of foreign aid in WSS, since this is a strong source of financing.

The following focuses on quantitative and theoretical technical research covering explicitly SSA since the mid-2000. The impact indicators are the access rates, the efficiency, the equity/affordability and the financial viability of the sector. This evidence is summarized in Table 2. Overall, the table reveals that there are not many technical assessments. Most of the research on SSA is indeed conducted through case studies, and most of the many quantitative broad assessments of the reform options based on panel data do usually not test for an SSA specific effect.⁴⁴

⁴³ See Almer, C., et al. (2017) for recent evidence on water riots in SSA

⁴⁴ It is notable that there is no technical assessment of the impact of reforms on the accountability of the service providers in a region in which one of the major issues has been the political instrumentalization of public enterprises and the capture of politicians by private agents.

Table 2: Synthesis of the empirical literature on the impact of WSS policies and institutions in SSA (2005-2015)				
	Access	Efficiency	Equity/Affordability	Financial viability
Ownership	Mbuvi et al. (2011) : Public does better at delivering access (Uganda)	* Kirkpatrick et al. (2006): Private sector has lower water losses but other measures suggest smaller or no differences (Cross-Section) * Mbuvi et al. (2011): Public do better PPP deals (Uganda) * Mande Bafue (2015): the impact of ownership is sensitive to the type of regulation in place (Panel)	* Estache and Grifell-Tatie (2013): rural poor gained much less and taxpayers lost while foreign workers and investors benefited much more than locals (Mali)	* Mbuvi and Tarsim (2011): Public firms have done better than PPPs in Uganda in raising revenue (Uganda)
Regulation and contract type		*Mbuvi et al. (2012): no difference between performance contracts and other forms of regulation based on a 1 year snapshot *Mande Bafue (2015) : performance contracts actually help relatively more than other contracts when more details and more countries are picked up over a 5 year period	*Boccanfuso et al. (2009): Price reforms linked to restructuring were regressive (Senegal) * Estache and Wodon (2014): Poor targeting of pricing and subsidies continue to be an important driver of inequity in service affordability when access is in theory available * van den Berg and Danilenko (2017): smaller utilities typically charge higher water rates than larger one (panel)	*Marson and Sarvin (2015): access improvements increase for relatively low levels of capital cost recovery but drop beyond a certain threshold (panel).
Separate regulatory agency		* Mbuvi et. al. (2012): slight positive effect but only when service connectivity to pipe is considered and not robust to bootstrapping tests (cross section) * Mande Bafue (2015): no clear impact (panel) * van den Berg and Danilenko (2017): In low-income countries, a regulator results in better customer performance, but does not extend to operational performance (panel)		* Bertomeu-Sanchez et al. (2017): Separate agency is more able to attract private interest but not by much and much less than in other regions (cross-section) * van den Berg and Danilenko (2017): utilities with regulators do less well financially
Decentralizing	* van den Berg and Danilenko (2017): coverage lags with decentralization	* van den Berg and Danilenko (2017): district- or municipal-based service delivery shows better results on customer orientation but has a negative impact on labor productivity.		
Foreign aid	* Ndikumana et al (2017): Positive effect (panel) * Hopewell et al. (2014): no association for large systems (panel)	*Ndikumana et al.(2017): aid effectiveness is linked to the capacity of countries to absorb the financial support.		

On access. It is quite remarkable that, in the last 10 years, technical studies on SSA hardly cover the impact of institutional changes on access rates. This is in sharp contrast to the clear focus on access of many case studies looking at correlations between improvements in regulation, contracts or separate agencies and reductions in SSA's coverage gaps. The broad picture is that ownership matters, decentralization is not a sure bet and foreign aid is likely to work. However, context and measurement methods matter as sample choice and treatment techniques tend to have an impact on outcome identified.

More specifically, on access, Mbuvi and Tarsim (2011), with a DEA treatment of a Uganda specific dataset, find that public firms were better at meeting access needs between 2005 and 2007 than PPP. Considering a much large date set of 14 countries, and also relying on a DEA, van den Berg and Danilenko (2017) find that decentralization did not matter to coverage for the low-income group in the 2010-2013. The 2 papers focusing on the impact of foreign aid on access rates in the sector across the region disagree. Hopewell and Graham (2014) rely on a simple OLS regression on data from 31 cities in SSA between 2000 and 2010, and find no correlation between Official Development Aid allocated to WSS (large systems) and access. They do find a negative and significant association between aid and the prevalence of open defecation. Ndikumana and Pickbourn (2017) address the possible endogeneity issues raised by the Hopewell and Graham results. They rely on a panel of 29 sub-Saharan African countries over the 1990–2010. They find that increased aid targeted to the supply of water and sanitation is associated with increased access. This more robust result confirms findings for other regions and suggests that aid continues to be an essential part of the efforts to close the financing gap of the sector.

On efficiency. The papers on efficiency test the impact of ownership, of contract type, regulation type, of the creation of a separate regulator and of foreign aid. On most reform options the results are uncertain. To some extent, this can be blamed on the fact that many of the institutional details picked up by case studies are not easy to model because they can seldom be turned into data to be used in technical papers.

On ownership, regulation and contracts, the results are quite sensitive to samples and methods. Kirkpatrick, et al. (2006) conducted a cross-sectional analysis (for the year 2000) based on 110 water utilities in SSA, among which 14 utilities reported private sector involvement. They are the first to show how much the impact of private operators depend on the methods used to treat the data. While the DEA results favour private operators, the stochastic cost frontier analysis favours state-owned utilities, although statistically insignificantly. Mbuvi and Tarsim (2011) focus on two heterogeneous urban water utility-groups in Uganda ((10 public-public owned, 17 public-private owned) between 2006 and 2007 and treat the data with a DEA. They find public firms to be doing better. Mande Bafua (2015) fuels the doubt with an econometric analysis covering the 2000 and 2005 period for a sample of 27 utilities in 17 SSA countries. His results imply that during that period, combining private-sector participation in management and operations with regulation by either an independent regulatory agency or a performance contract, and combining public management with regulation by either means, are both associated with a positive but non-significant effect on technical efficiency. However, water utilities under public management regulated by either means seem more efficient than water utilities with private sector participation in operation and management when regulated by either means.

On the role regulators, Mbuvi et al. (2012) cover 51 water utilities in 2006 using the DEA techniques as well. The effect of separate regulatory agencies on efficiency had not been significant for that year when robustness checks are conducted, neither is regulation by a performance contract. Mande Bafua (2015) confirms with another sample, finding that performance had not been influenced by the existence or absence of a separate regulator during that period. Van den Berg and Danilenko (2017) find that getting into more details may help. They show that, for low-income SSA countries, having a regulator improves customer performance, but it has no impact on operational performance for their sample. Note that Ndikimana and Pickbourn (2017) contribute to the assessment of the relevance of regulatory institutions when they show that the effectiveness of aid for WSS is sensitive to the efficiency of aid utilisation. They highlight that there may be a case to try improve the absorptive capacity after a certain level of aid.

Specifically on contract types and regulation, Mbuvi et al. (2012) find no different impact between performance contracts and other forms of regulation for the single year they considered for their 1 year sample. In contrast, Mande Bafua (2015) finds a difference for the 5 year period he considers. Regulating water utility operations via performance contracts led to higher technical efficiency compared to control by an independent regulatory agency. He found no evidence that the form of regulation leads to a statistically significant difference between the technical efficiency of publicly and privately owned utilities.

Finally, on decentralization, van den Berg and Danilenko (2017), relying on an econometric treatment of a new dataset, find that district- or municipal-based service delivery shows better results on customer orientation. However, decentralization also tends to have a negative impact on labor productivity.

On equity and affordability. Despite the recurring policy and political concerns for the need to protect the poorest and to treat them fairly as part of policy reforms, only four technically robust papers have covered equity/affordability concerns in the region. They complement the very useful research focusing on case studies (World Bank (2017) and/or basic descriptive statistics and/or correlations (e.g. Banerjee and Morella (2011))). The first of these technical papers is van den Berg and Danilenko (2017). They show that the unbundling of the sector leads to smaller firms and these in turn rely on higher tariffs. This is related to the existence of economies of scale in the production of water in the region (also documented by some of the efficiency studies). This observation is consistent with Auriol and Blanc (2008), who show conceptually why it makes sense to expect that PPPs generally fill the gap of deficient public providers, at a high cost for end users in the SSA context. Indeed, they provide water to the poorest part of the population, while public firms serve the richest part. Moreover, they are often unregulated and apply large mark-ups, while public water is subsidized. This is why the average price per cubic meter of water from PPPs can be close to ten times higher than that of public utilities. Boccanfuso et al. (2009) find that the specific form of price regulation and price rebalancing as a result of reform has broader impacts. In the context of Senegal, relying on a general equilibrium model to track all the effects of any change, they find that most of the gains from their water reforms accrued to the highest income classes while the poor have seen little or only slow changes. Estache and Wodon (2014), working through a wide range of incidence analysis, show the extent to which pricing and subsidies

mistargeting, two common regulatory failures, explain why, even when access is in theory available, the service is too often unaffordable for the poorest. Estache and Grifell-Tatje (2013), focusing on a decomposition of the sources of efficiency gains achieved by reforms, looked at Mali's brief privatization experience and find a comparable result. While most users, intermediate suppliers, investors and workers did benefit, the poor rural users gained much less and taxpayers lost. They also show that skilled foreign workers and investors benefited much more than locals and that the firm's owners captured a large share of the rent they helped create (probably through transfer pricing as they controlled cost data for key intermediate inputs).

On financial viability. The financial viability criteria is seldom tackled explicitly in the research of the last 10 years, even if it has continued to be a highly publicized concern justifying in many ways the efforts to commercialize the large public utilities. The paper by Mbuvi and Tarsim (2011) finds that this commercialization paid off in Uganda. Public firms have done better than PPPs in raising revenue in their sample. Having a separate regulator has a less clear effect. While van den Berg and Danilenko (2017) find that utilities with regulators do less well financially, Bertomeu-Sanchez et al. (2017), focusing on a logit treatment of a cross section of countries cutting across regions in 2016, find that the odds of private participation in WSS in SSA are 0.04 and 0.08 times higher with a regulator. Since PPPs are unlikely to be signed on by private investors unless the bottom line is positive, this insight implies that having a regulator does indeed improve the chance of having of a positive bottom line, but not very significantly so.⁴⁵ With respect to decentralization, van den Berg and Danilenko (2017), once again, provide the only result. They find, for their sample, that it made no difference to the financial and operational performance of utilities. However, for customer performance, there are statistically significant differences: district- or municipal-based service delivery shows better results.

The result most supportive, and yet most conflictive, of the importance of regulation is however provided by Marson and Savin (2015). Indeed, they show that it can be good for financial viability but they also document of a very real trade-off between social and financial concerns. This trade-off has already been identified early in the reform processes by various authors (e.g. Bayliss and Fine (2007)). Marson and Savin (2015) increases the robustness of the conclusions reached by Bayliss and Fine (2007) but also Gerlach and Franceys (2010) and Bayliss (2014) who had already documented the interactions between water coverage and the financial performances of utilities and in particular the degree of cost recovery. Marson and Savin (2015) present a solid econometric treatment of data on 25 SSA countries from 1996 to 2012. They find important access increases for relatively low levels of capital cost recovery, but simultaneously a deterioration of access performances beyond a certain threshold. Van den Berg and Danilenko reach similar conclusions with their own dataset. For their sample, they find that where supply is delivered by utilities with good financial performance, on average, users spent 3.2% of GNI per capita on water supply services, compared to 2.3% for those served by utilities with weak financial performance. These results are not only important analytically as they inform of the existence of trade-offs, they are also incredibly important at the policy level, because they point to the need to take a decision on the trade-off between social and financial objectives. And this is, implicitly, a debate on the case for targeted subsidies in the sector already identified in Estache and Wodon (2014). Their results suggest that the privatisation wave and now the commercialization and private small scale providers give priority to financial performance.⁴⁶ The real agenda should now be to reconcile the two by refocusing the debate on the scope for subsidies and technology choices. And if fiscal constraints are binding, the debate should be about technology choice, tariff structures and the margin for cross-subsidies between the haves and the haves-not, if only for ethical reasons.

5. Concluding comments

This paper shows that SSA still has a water and sanitation problem, despite the significant improvement conducted under the Millennium Development Goals umbrella. Likewise, reaching the universal water access and adequate sanitation targets promised by the Sustainable Development Goals (SDGs), agreed upon in 2016 by the international community, seems to be unrealistic, based on the current record. More, faster and better is needed if SSA is to reach those targets.

⁴⁵ Note that they also show that this is quite different to what is observed in other regions. When everything else is held constant, the odds are about 17 times higher for a European or Central Asian country with a regulator and up to 43 times higher for a country in Latin America and the Caribbean.

⁴⁶ It is remarkable that the narrative has made it to the NGOs message as well. See, for instance, Rusca and Schwartz. (2012).

Financing constraints are central to the challenge as the financing gap continues to be significant. The slow internalization of strategic mistakes in reform choices, contract choices/designs and implementation are just as important an explanation for the slow progress. The uncertain handling of the fast and accelerating urbanization process in the region is an increasingly important factor as well. Currently, approximately 409 million Africans or 40% of the continent's population, lives in urban areas, more than twice the numbers in 1990. By 2030, that percentage of the urban population will rise to half the continent's population, or some 654 million people (Jacobsen et al., 2013). Over the next quarter century, demand for water in Africa is projected to nearly quadruple — the world's fastest rate (Jacobsen and al., 2013). Rising industrial and commercial demand linked to industrialization and rising incomes for some, have nourished expectations of higher quantities and better quality of water, increasing pressure for improved water management policies and implementation.

How does SSA get there and how are its poor protected in the process? For the 12 countries with access rates to rates below 60%, is it realistic to expect them to be able to achieve an improvement in access at an annual rate of 2.6% in a region in which the average annual growth rate of population is at about 2.5%—i.e. access has to increase by at least 5% annually? How much and how long will the international community be willing to contribute to the financing of a much faster increase in connections? Will the local governments be keen to rely more systematically on cross-subsidies from those already connected (and who benefited from subsidies in the past in view of the low cost recovery rates) to those without access? Will countries (and their advisors) work harder at matching regulatory designs and contractual forms to the local institutional capacity, commitment and fiscal constraints?

These are not simple questions. But the answer the national governments, the users and the donors (officials, NGOs and philanthropists) will give to these questions will determine the odds of meeting the SDGs target because they will determine the ability of countries to design implementation strategies that meet the implementation capacity of the countries at the national and at the subnational level. Or to put it more concretely, they drive the odds of making sure that the 319 million people in the region without access to improved reliable drinking water sources in 2015 and the 229 million people with no other choice but practicing open defecation, stand to experiment what has seemed to be so normal to the reader of this paper for so long: drink tap water and flush a toilet.

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