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Governance Matters: Universal Access to Water

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Abstract: Universal access to water is acknowledged as a fundamental human right which governments have to secure. To improve access to water, it has been argued that an important factor, if not the most important, is to strengthen water sector governance and reduce corruption. Looking at the relationship between governance indicators and access to water sources and controlling for various factors, our contribution fills a gap in proving empirically, for a cross-country analysis including 147 countries, that governance indeed matters. In particular, we add a nuance to the debate, showing that rural population is more vulnerable to weak governance.

Keywords: Universal Service; Water; Governance

“The main reason behind [the lack of access to clean water] is not the lack of a natural supply of water, nor is it primarily an engineering problem, i.e. stemming from the lack of technical solutions. Instead, this global water crisis is primarily a crisis of governance.”

Stålgren (2006: 3)

1. The Water Crisis – A Governance Crisis?

On 28 July 2010 the United Nations explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights.¹ But unlike the unfortunately widespread perception, water is a scarce resource, and a resource that usually has to be processed before being apt for consumption. Water used in most of our daily activities must be clean, free of germs, chemicals, or any type of contamination. As defined by the WHO/UNICEF (2012), *“an improved drinking-water source is one that by the nature of its construction adequately protects the source from outside contamination, in particular from faecal matter”*. Due to the importance of water, it is commonly agreed upon that governments should assure its correct provision and guarantee full access to its population. Therefore, many countries have introduced Universal Service Obligations (USO) that can be defined as *“the obligation of an operator to provide all users with a range of basic services of good quality and affordable rates”* (Cremer, H., Grasmı, F., Grimaud, A., and J.J Laffont, 2001, 7); amongst others, water.

Unfortunately, in many countries, people do not have access to potable water, and therefore live in inappropriate and unfavourable conditions. Therefore, the United Nations included access to drinking water and sanitation as one of its Millennium Development Goals (MDG). Specifically, target 10 of MDG 7 states the objective of doubling the population who has sustainable access to safe drinking water and basic sanitation by 2015. Since, 193 countries and 23 international organizations committed themselves to the achievement of this goal. There are visible results. From 1990 to 2010, two billion people gained access to improved drinking water sources (WHO/UNICEF, 2012).

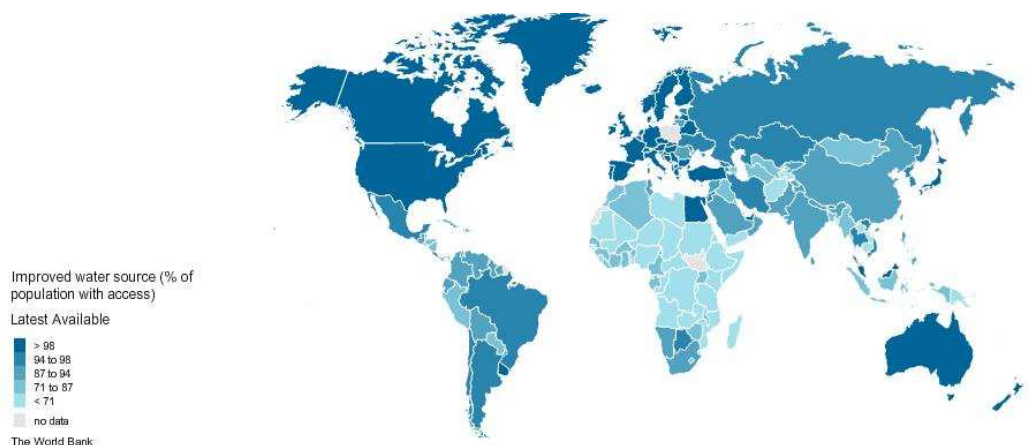
Nevertheless, according to the WHO, in 2010 more than 783 million people, an 11% of the world’s total population, weren’t that lucky. A regional analysis points out that Sub-Saharan Africa is the region which accounts for more than 40% of the population without access to improved water, while on the other side, China and India account for almost half of the population who gained access to improved sanitation facilities (WHO/UNICEF, 2012).

¹ See UN Resolution 64/292 and UN website http://www.un.org/waterforlifedecade/human_right_to_water.shtml.

But how can we explain these gaps in access? Is it a lack of availability of natural fresh water resources or a lack of funds for financing network expansion and water treatment? While referring to the water crisis, Transparency International (2008: XIX) states, just as Stålgren (2006: 3) in our initial quote above, that “[...] *it is a crisis of governance: man-made, with ignorance, greed and corruption at its core. But the worst of them all is corruption.*” The logic linking governance² to access to water is pretty straightforward. Good governance, characterized by transparency, participation, accountability, and low levels of corruption, leads to a better government management and performance in its task of guaranteeing access to water, and therefore to higher access to improved water sources.

However, despite a general agreement that access to improved water sources depends on governance beyond usual suspects such as fresh water sources, infrastructure, population density and gross domestic product per capita, we are not aware of studies that show the relevance of this institutional factor beyond anecdotic evidence and case studies. We therefore empirically explore this relationship between access to improved water sources access and governance for 147 countries. We further differentiate between rural and urban areas, as it might be suspected that the situation in rural areas could be worse than in the cities, as rural population could be left aside and ‘forgotten’ by politicians and public officials. Our results support the claim that governance indeed matters; and more so in rural areas.

Map. Percentage of population without access to improved water source (2013)



Source: World Bank eAtlas (<http://data.worldbank.org/products/data-visualization-tools/eatlas>)

² We follow Kaufmann, Kraay and Zoido-Lobaton (1999: 1) who defined governance “[...] broadly as the traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, (2) the capacity of the government to effectively formulate and implement sound policies, and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them.” See, however, an excellent critical discussion in Baland, Moene and Robinson (2010) of the concept of governance, where the authors argue that its use does not add much to the literature on institutions.

In the following we first present a brief review of case study evidence and a theoretical framework describing the relationship between governance, corruption and access to water. Section three describes the data and our empirical strategy. The results that show that access to improved water sources indeed does depend on governance as measured in three indicators are presented and discussed in section four. Section five concludes.

2. Relationship between Access to Public Services and Governance

2.1 Evidence from Case Studies

It is increasingly argued that a limited access to water does not only depend on availability of natural fresh water resources alone. Rather, it is seen as an institutional failure: the institutional (“governance”) context does not provide the adequate incentives and framework for the government and providers to comply with their task to guarantee access to water for all. The reasons behind that can be manifold. For instance, Akhmouch (2012: 8) highlights factors that may impede an effective governmental policy with respect to access to water, such as “[...] *the absence of integrated planning of water use; dispersed and uncoordinated multilateral, bilateral and international donor agencies; the lack of transparent and effective institutions for arbitrating conflicts over water use; and a lack of vision of what is actually necessary to effectively govern water.*” In the following we briefly review the literature that looks at particular cases, at regional or country level. However, to the best of our knowledge, no study has tested the influence of governance on the access to improved water sources in a cross-country setting.

Akhmouch (2012: 6), in her thorough study for the OECD, affirms that in Latin American and Caribbean (LAC) countries “[...] *the primary obstacle pointed out ... is the policy gap, followed by the accountability gap and the funding gap. Information and capacity gaps are also crucial in two-thirds of LAC countries surveyed.*” These gaps make allusion to the insufficient availability or access to inputs needed to ensure an adequate service provision: i.e. weak political framework, lack of transparency and institutional quality, insufficient financial resources, insufficient access to information, and lack of scientific and technical expertise and infrastructure. Additionally, Akhmouch (2012) states that it is not possible to think of a “one-size-fits-all” solution to solve these different governance problems among LAC countries, but rather emphasizes that it is necessary to study and examine each specific context in order to design appropriate strategies that will serve to achieve universal access to water.³

³ The idea that “context matters” is becoming almost a new lemma, especially in the development arena. We support this view, without having to fall into the relativistic trap. Rather, we may follow the basic idea expressed by Rodrik (2007): there is one economics (i.e. basic principles), but many recipes (i.e. institutional materialization of these principles).

Mehta, Fugelsnes and Virjee (2005) are looking at Sub-Saharan Africa's situation in achieving the Millennium Development Goal (MDG) of access to safe drinking water. In particular the authors underscore that the countries "[...] *will need to implement cost recovery policies and use public resources better so as to increase sector performance, help the poor gain access to water and sanitation, and leverage more resources into the sector*" (p. 240). Again governance matters, as the policies mentioned do not arise in a policy vacuum, but are the result of a political process which depends on the quality of institutions in place. Mehta et al. (2005) also highlight the importance of the availability and access to information in order to design correct plans to achieve the MDG.

In a case study on Nigeria, Olomola et al. (2012) explicitly focus on the relationship between governance and public service delivery. The authors recognize the importance of accountability and participation in the achievement of good governance and consequently in the growth and development of the country. An important point that they address is the influence of particular characteristics of the population in the governance of water services. Olomola et al. (2012: 2) found that "[...] *participation depends on household and community characteristics such as educational attainment, income, geographical domain as well as channel of service delivery and geo-political zones.*" Along these lines, Olomola et al (2012) emphasize that those who can actually ask for accountability, are the ones with higher incomes, who have enough empowerment to do so. These points made by the authors suggest that there might be a distinction between urban and rural areas with respect to the link between governance and access to water, which we thought interesting to follow up on in our study.

Finally, GDN (2012) studies the situation in Uganda, and highlights the numerous challenges which appeared with the transition from public service provision to privatization, stating that it is more difficult for the government to control private agents' actions than to control public officials.⁴ The study also states that even when increasing the funds, the situation in the water sector didn't change much from 2005 to 2009, which supports the idea that there are more important aspects to consider, e.g. governance. Especially, the author emphasize the disastrous effects of corruption on access to water as resources devoted to water services are channelled into private pockets instead: "*The water sector follows a similar pattern with access to safe water in rural and urban areas remained at 65 percent and 66 percent respectively despite increases in funding from UGX 110.02 billion to UGX 172.24 billion over the same period. There are reports of wide spread corruption and embezzlement of funds meant for service delivery in Uganda*" (GDN, 2012, p. V).

⁴ See also Rose-Ackermann (1999: 86), for a similar point especially with respect to corruption. She warns that structural reforms such as liberalisation and privatisation without strengthening the institutions through adequate reforms of the government capacity to control and regulate, may only lead to establishing corrupt relations, private monopolies, and undermining the credibility of the state.

2.2 Governance, Corruption, and Access to Water

In policy papers today, governance is widely acknowledged as a key issue in the water sector.⁵ On the one hand, this can be explained by the importance that governance and corruption issues have gained since the mid-1990s. On the other hand, many social, political, infrastructural and technological reforms haven't been enough to guarantee sufficient improved water access, which triggered the necessity to search for deeper malfunctions within the water sector. Tropp (2007: 20) underscores that “[...] *the effective application of technology and the proper functioning of infrastructure require an enabling governance system.*” For this reason, how decisions are taken, who participates, and on which information processes are based, has become a worldwide issue in the water sector (Tropp, 2007).

In particular, as suggested by GDN (2012) and many other authors (e.g. Davis, 2004, or Transparency International, 2008) the water sector is vulnerable to corruption. Corruption can be understood as both a symptom and cause of weak governance. Factors facilitating corruption of all kinds and levels in this sector are, for instance, the absence of competition in the market, and thus either the need for regulatory oversight implying a close interaction between public and private sphere, or direct public service delivery, with the danger of clientelistic practices or embezzlement of public funds, inelastic demand, or the important infrastructure and construction component, known for offering extensive opportunities to corruption.

Plummer and Cross (2007) clusters the many different corrupt practices that may arise in the water sector along the main processes typical for the water sector, the value-chain. Each process is prone to different types of corruption, and the consequences for the effectiveness and efficiency of the water sector are tremendous. González de Asís (2009: 36) provide an overview of impacts of corruption in the water sector and stresses, for instance, that corruption may in particular increase construction, operation and maintenance costs. Davis (2004) estimated that water providers in South Asia might spend 20 to 35 % more on construction contracts than the value of the services provided. Estache and Kouassi (2002) estimated that as much as two-thirds of the operating costs for 21 water companies in Africa were attributable to corruption. Corruption also influences project selection and slows down implementation, further reducing the direct economic benefits and the financial viability of water utilities. All these effects may arguably have a direct negative impact on coverage. But corruption in the water sector also has more indirect negative consequences, affecting disproportionately the poor. Drinking water of poor quality may lead to diarrhoea due to contaminated water, especially amongst children. Population without access to piped water is particularly prone to bad quality and overpriced water as they have to rely on informal water service providers. If

⁵ See, for instance, the UNDP Water Governance Facility website (www.watergovernance.org/), the Water Integrity Network (WIN, www.waterintegritynetwork.net/), or the OECD Programme on Water Governance (www.oecd.org/gov/water/).

access to improved water sources is limited because of corruption and weak governance, we are again confronted with a vicious cycle.

Corruption therefore is likely to undermine government's effectiveness in guaranteeing access to water. In turn, accountability of public officials, active citizens' participation, and available information all allegedly play important roles in limiting corruption, strengthening governance, and therefore in guaranteeing an adequate exercise of the government's functions. The relationship between transparency and participation on accountability is pretty straightforward: if information is not available to citizens, it is more difficult for them to know how the government is being managed. Therefore citizens are unlikely to be able to effectively participate in processes, express concerns and sanction bad decisions by the government. Consequently government's performance is likely to not reflect their needs, and may further open opportunities to corruption, nurturing a vicious cycle of weak institutions, corruption, and bad performance. Keefer (2004: 24) states it as it follows, "[...] *the emphasis on voice and accountability rests on a natural and persuasive logic: governments that pay little attention to citizen concerns – because citizens are unable to voice them or are unable to sanction governments that ignore them – are less likely to pursue policies that further social welfare.*"

2.2.1 Transparency and Participation

Corruption and bad performance breed in opacity. As highlighted in Boehm (2011: 302), *[w]hen looking at the underlying factors facilitating corruption, much can be explained by the principal-agent-client relationships and the resulting informational advantages at various levels. Indeed, asymmetric information creates scope for informational rents, but also for strategic manipulation of information and collusion of actors.*" Partly, legislation, and its effective implementation of course, can be an answer. Al Afghani (2009) compares England's and Indonesia's legislation and emphasizes the importance for the water sector of a law that guarantees access to information. In a nutshell, informational issues are serious problems that many countries still need to solve. However, what at first sight appears to be mainly a technical issue is actually highly political and sensitive. As information is power, those benefitting from the opaque status quo are likely to invest considerable efforts in impeding the provision of information in an effective way.

Participation, i.e. voice, is the ability of individuals or a group to be heard and taken into account in certain decisions or policies. Ideally, in order to be able to take informed decisions based on the needs and preferences of the citizens, government should allow citizens to participate through an adequate institutional framework. Eliminating or hampering the relationship between the government and the citizens, in turn, impedes accountability, opens doors to corruption, and in consequence hampers the achievement of good governance and the quality and relevance of public policies.

Referring to the water sector, Transparency International (2008: XXVIII), states that "[t]ransparency and participation build the very trust and confidence that

accountable water governance demands and civil society plays a critical role in turning information and opportunities for participation into effective public oversight.” The fundamental idea goes back, at least, to Becker (1983: 327), who recognizes the importance of conforming groups that “[...] *are assumed to use political influence to enhance the well-being of their members. Competition among these pressure groups for political influence determines the equilibrium structure of taxes, subsidies, and other political favors.*”

However, individuals are confronted with the problem of collective action, and many interests may be unable to conform as a pressure group that could effectively participate in the policy arena. In particular, the problem in public service sectors is that the ones affected are generally the poor, and especially the poor in rural areas. For them, the costs of any collective action are likely to be higher than the expected benefits. Therefore they may not be able to effectively participate in the government’s decision making processes. A possible consequence could be that public agencies just don’t consider their will or try to improve their situation.

Rather, decision-making processes may be captured by small elites, viz. the rich, urban, minority. Auriol and Blanc (2008), for instance, show that prices for piped water in countries in Sub-Sahara Africa are subsidized, but only reach the rich population who has access to the system, while poor and middle class often have to rely on informal water providers. According to the authors, this suggests a problem of capture by the ruling elite, who are the ones that design energy and water policies without much concern about their optimality.

Now, what about votes? At least in democracies, this could be a way the poor could express their discontent with a given government’s performance. However, topics that drive elections are usually related to unemployment, security or the like rather than to water, so elections may only be a very indirect, and ineffective, way of accountability for such specific issues. Nevertheless, granting access to water in certain areas actually may be driven by the possibility to obtain votes. As Boehm (2011: 318) reports from a case study in Zambia, expansions of the network may follow this logic. One interview partner answered as follows: *“Needs-based projects? Yes, but based on the needs of the local politicians.”* But, even if access to improved water sources could be generated this way, it happens in a very selective and arguably unfair manner.

Finally, Paul (2001: 13) points out an interesting determinant of the use of participation: “[...] *the relative costs of exit and voice and their levels may vary depending on the degree of market failure affecting the services.*” While “exit” is an option if there are different alternatives, as it enables to hire other service providers when the community is not satisfied with the actual one, “voice” alludes to the pressure citizens can exert on public agents to act appropriately, according to what they want. Paul (2001) states that in markets with less market failures, the cost of voice is higher than the cost of exit, since in competitive environments the consumer can freely move from one provider to another. The opposite occurs when market failures are abundant, such as in the water sector, because the cost of exit is higher, if

not prohibitive, than the cost of voice, since consumers have no options to change their provider. Note that Paul (2001: 17) also points out that “[...] *the public is likely to use voice only when there is a high probability that the public sector will be responsive and make this investment worthwhile.*” That is, citizens need to get some feed-back: If nothing happens despite having voiced concerns or needs, apathy and cynicism may be the consequence, undermining even further the legitimacy of the government.

2.2.2 Accountability

The World Bank Institute (2005) defines accountability as “*a proactive process by which public officials inform about and justify their plans of action, their behaviour, and results and are sanctioned accordingly.*” Accountability is often seen as the key determinant to assure good governance; effective accountability implies transparency and participation, but adds the requirement of negative feedbacks (sanctions) in case of non-compliance with established rules or policy commitments. Without sanctions commitments to rules and policies are non-credible. Therefore, good accountability includes sticking to the rules, behaving according to the law, being effective at the assigned tasks, and making the right decisions (World Bank Institute, 2005).

Furthermore, two types of accountability can be differentiated: horizontal and vertical. Horizontal accountability refers to those cases in which public agencies examine other government’s institutions and sanction them if they find that inappropriate actions were taken. These can be Supreme Audit Institutions, or in case of the water sector, the regulatory agency or the Ministry supervising water providers, for instance. Vertical accountability occurs when the control of the government’s actions is exerted by the citizens. The importance of both types of accountability is recognized by Paul (2001). The author argues that accountability is effective only when, besides the government control over public services providers (horizontal accountability), the citizens have exit and voice (vertical accountability). In other words, if the community doesn’t have the ability to exit nor has voice, they can’t control that the providers behave as they should or that the network is expanded to reach their households.

Therefore, it can be conjectured that more accountable governments should lead to better results, including with respect to access to water. We expect corruption, lack of accountability (sanctions), lack of transparency, and lack of participation (exit and voice), to have measurable negative impacts on access to improved water, through their effects on reducing government’s effectiveness and compromise in complying with its task to guarantee access to water for all.

3. Data and Empirical Strategy

3.1 Data

The data we used to test this expected relationship between governance and access to improved water sources was obtained from the online World Bank database⁶. The variables are countries' statistics from all regions of the world. The endogenous variables used in this study are from 2010, and are: (i) percentage of total population with access to improved water source, (ii) percentage of rural population with access to improved water source, and (iii) percentage of urban population with access to improved water source. As control variables, we used the rural population as a proportion of the total population, roads paved as a percentage of total roads in each country (as a proxy for infrastructure), renewable internal freshwater resources per capita measured in cubic meters, GDP per capita PPP in constant 2005 international USD, and population density as people per sq. km of land area. This set of control variables was taken from the World Bank database and their values correspond to the year 2009; except for renewable internal freshwater resources per capita, which reports data from year 2007.

Our three explanatory variables, the governance indicators, were taken from the World Bank Worldwide Governance Indicators (WGI) online database⁷, produced by Daniel Kaufmann, Aart Kraay, and Massimo Mastruzzi. Three out of the six WG indicators enable us to directly test the three aspects found to be relevant in section two above: corruption, lack of accountability, and weak government effectiveness.

Therefore, our first explanatory variable is the Control of Corruption indicator.⁸ According to the WGI website, this variable specifically “*reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.*” The second governance indicator is Voice and Accountability in order to test the importance of an accountable government. Again according to the WGI website, the variable “*reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.*” At first sight, this one is perhaps the most representative indicator, since it includes participation, voice, and accountability, and therefore should also lead to lower levels of corruption and better performance. Finally, we included a direct measure of Government Effectiveness, which the WGI website describes as reflecting “*perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.*” It is important to point

⁶ <http://data.worldbank.org/indicator>

⁷ <http://info.worldbank.org/governance/wgi/index.asp>

⁸ We use the Control of Corruption Indicator from the WGI instead of the Corruption Perception Index (CPI) from Transparency International for convenience only; both are highly correlated. Other indicators such as the Global Corruption Barometer, by Transparency International, tend to reflect petty corruption only. Here, we are interested in the overall perceived level of corruption in a country.

out that these indicators widely reflect perceptions, since it is quite difficult, if not impossible, to measure them as objectively as might be wished.

The data of the explanatory variables employed corresponds to the year 2005. We considered it necessary to leave a period of time between the governance indicators and the variables of analysis, which belong to data from 2010. Five years might be an appropriate lapse of time for governance indicators to impact on the countries' situation regarding access to improved water sources.

The initial database contained a sample of 214 countries, while the one of the Worldwide Governance Indicators included 215 countries. Unfortunately, we had to drop certain countries from the sample because of their missing values in the variables needed for the regressions: 35 countries were deleted because they had missing values on the dependent variable Improved Water Source, 3 countries because they didn't report data on Improved Water Source (urban), 13 countries because they had no data on Renewable Internal Freshwater Resources per capita, 10 countries because they had missing values on GDP pc PPP, and 1 because it didn't have data on roads paved. Another 5 countries were deleted because of missing data in one of the databases used. The final sample for our econometric approximation therefore includes a cross section of 147 countries.

The summary statistics of the dependent, control, and explanatory variables, are presented in Table 1. In particular, for the endogenous variable Improved Water Source, we can observe for the whole sample of 147 observations by 2010 an average of 86.37 % of access to improved water source. For that same year, the results for rural and urban population access differ; the former one was below the total average, while the second one was above, with an 80.07 % and 94.17 % respectively. This confirms the need to analyse the two populations separately.

Table 1. *Summary Statistics*

<i>Variable</i>	<i>Observations</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Min</i>	<i>Max</i>
<i>Dependant Variables</i>					
<i>Improved water source</i>	147	86,370	16,370	40,000	100,000
<i>Improved water source, rural</i>	147	80,070	21,490	27,000	100,000
<i>Improved water source, urban</i>	147	94,170	8,620	52,000	100,000
<i>Control Variables</i>					
<i>Rural population</i>	147	0,450	0,220	0,020	0,900
<i>Roads, paved</i>	147	48,790	33,680	0,800	100,000
<i>Renewable internal freshwater resources per capita</i>	147	19.267,570	56.846,390	23,390	545.630,800
<i>Population density</i>	147	132,450	193,750	1,750	1.293,720
<i>Square of Population density</i>	147	54.286,990	199.935,000	3,060	1.673.711,000
<i>GDP pc PPP</i>	147	11.525,360	13.259,970	303,390	67.962,640
<i>ln of GDP pc PPP</i>	147	8,650	1,280	5,720	11,130
<i>Explanatory Variables</i>					
<i>Control of Corruption</i>	147	-0,080	1,020	-0,146	2,350
<i>Voice and Accountability</i>	147	-0,060	1,010	-1,660	2,160
<i>Government Effectiveness</i>	147	-0,060	0,970	-1,950	1,770

Note: Dependant Variables, as well as Control Variables, were obtained from the World Bank database. Explanatory Variables were extracted from World Governance Indicators. All calculations were done with Stata.

Taking into account the plausible relationship between our explanatory variables, we considered it necessary to do a correlation test (see table 2). As expected, a high correlation was found between the governance indicators, i.e. a country with high levels of accountability would be expected to have low levels of corruption and vice versa. Nevertheless, each of these variables explains different aspects of the governance quality, but due to these strong correlations, we run different regressions with each one, in order to get appropriate estimators, and avoid problems of multicollinearity between the explanatory variables. Since there are 3 endogenous variables, and 3 governance indicators employed separately, we estimated in total 9 regressions. The control variables were used in all the regressions.

Table 2. *Summary of correlations coefficients for Control of Corruption, Voice and Accountability, and Government Effectiveness*

Variable	Correlations		
	1	2	3
1. Control of Corruption	1,000		
2. Voice and Accountability	0,856	1,000	
3. Government Effectiveness	0,955	0,870	1,000

3.2 Empirical Methodology

As the variables which we aimed to explain could only take values between 0 and 100 %, with most observations being close to 100 %, it was necessary to use a model that limited the results to this range. We opted for the Tobit Model, which can be seen as a combination of a Probit model and an Ordinary Least Squares (OLS) model. The similarity with the Probit is that having access to improved water sources is a binary variable, that is, either you have access or not. On the other hand, it is comparable to the OLS because the percentage of the population who has access to an improved water source is a continuous variable between 0% and 100%. An OLS estimator would have been inconsistent in this case, because from the total sample the estimator only takes those observations with access to improved water sources, leaving aside the ones who don't; the Tobit model, in turn, includes the whole set of observations considered for this study.

Our objective is to explain the percentage of population, total, urban, and rural, with access to an Improved Water Source as a function of exogenous variables as control variables, and the relevant governance measures as explanatory variables. As mentioned, three models were estimated for each of our three endogenous variables. Model 1 included Control of Corruption, Model 2 Voice and Accountability, and Model 3 Government Effectiveness. In the next section we present the results.

4. Results

4.1 Governance Indicators

In Table 3, we show the results of our regressions for Improved Water Source, namely the percentage of the total population who had access to an improved water source by 2010. In Model 1, the estimation showed that the effect of Control of Corruption is significant; an increase in one unit in the perception that corruption is controlled in a country increases the access to improved water sources in the total population by 4.17 %. When considering Voice and Accountability in Model 2, the results obtained showed that an increase in one unit of the perception of this variable in each country increases improved access of the total population by 3.55 %. Model 3, which uses Government Effectiveness as the governance indicator, shows that an increase of one unit increases the access by 4.51 %.

The results therefore show that the governance indicators have a significant effect in explaining the access to improved water sources as expected. This confirms that these institutional variables play an important role when analysing the water sector.

Table 3. *Effects of governance on the Improved Water Source: total population*

<i>Variable</i>	<i>Coefficient</i>		
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>Rural population</i>	-	-	-
	23,769***	23,128***	24,972***
	(6,329)	(6,577)	(6,472)
<i>Roads, paved</i>	0,169***	0,181***	0,168***
	(0,030)	(0,031)	(0,030)
<i>Renewable internal freshwater resources per capita</i>	0,000**	0,000**	0,000***
	(0,000)	(0,000)	(0,000)
<i>Population density</i>	0,050***	0,046***	0,049***
	(0,017)	(0,017)	(0,017)
<i>Square of Population density</i>	0,000**	0,000**	0,000**
	(0,000)	(0,000)	(0,000)
<i>ln of GDP pc PPP</i>	5,552***	6,003***	5,007***
	(1,487)	(1,159)	(1,582)
<i>Control of Corruption</i>	4,176**	-	-
	(1,796)		
<i>Voice and Accountability</i>	-	3,553***	-
		(1,319)	
<i>Government Effectiveness</i>	-	-	4,511**
			(1,833)

Note: ***Significant at the 1% level, **Significant at the 5% level

In table 4 we show the results when estimating the percentage of access of the rural population to improved water sources. Just as before, the estimates of governance indicators have all significant effects on the endogenous variable. In Model 1, an increase in one unit in the perception of the extent to which corruption in a country is controlled increases the access to improved water sources of the rural population by as much as 7.91 %. With Voice and Accountability, the direction of the effect is the same, but the magnitude is lower compared to the results shown in Table 3, Model 2. A one unit increase in the perception of Voice and Accountability in a country increases access to improved water sources by the rural population by 6.97 %. Again, the strongest effect was in Model 3, where an increase in one unit in the perception of Government Effectiveness, increases the rural population with access to improved water sources by 8.61 %.

Table 4. *Effects of governance on the Improved Water Source: rural population*

<i>Variable</i>	<i>Coefficient</i>		
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>Rural population</i>	-1,071 (8,645)	-0,328 (9,088)	-3,501 (8,605)
<i>Roads, paved</i>	0,258*** (0,043)	0,283*** (0,044)	0,256*** (0,042)
<i>Renewable internal freshwater resources per capita</i>	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
<i>Population density</i>	0,064*** (0,021)	0,056** (0,022)	0,060*** (0,022)
<i>Square of Population density</i>	0,000** (0,000)	0,000** (0,000)	0,000** (0,000)
<i>ln of GDP pc PPP</i>	7,524*** (2,002)	8,333*** (1,655)	6,424*** (2,190)
<i>Control of Corruption</i>	7,912*** (2,322)	-	-
<i>Voice and Accountability</i>	-	6,977*** (1,877)	-
<i>Government Effectiveness</i>	-	-	8,619*** (2,652)

Note: ***Significant at the 1% level, **Significant at the 5% level

Finally, table 5 shows the results for the regressions on Improved Water Source (Urban), i.e. the percentage of the urban population who has access to improved water sources. The estimations showed that increases in the scores of any of the three governance indicators have significant effects on the access to improved water

sources. Model 1 estimated that an increase in one unit in the perception of Control of Corruption increases the percentage of the urban population accessing improved water sources by 5.09 %. Model 2 and Model 3 also showed positive effects of the governance measurements on the regressed variable. An increase in one unit in Voice and Accountability increases it by 4.40 %, while an increase in one unit in Government Effectiveness reflects an increase of 5.74 % in the endogenous variable. Again, the variable with the greatest impact on access to water sources is Government Effectiveness.

Table 5. *Effects of governance on the Improved Water Source: urban population*

<i>Improved Water Source, Urban</i>			
<i>Variable</i>	<i>Coefficient</i>		
	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>
<i>Rural population</i>	-7,034* (4,151)	-6,480 (4,349)	-8,794** (4,213)
<i>Roads, paved</i>	0,119*** (0,028)	0,133*** (0,030)	0,118*** (0,028)
<i>Renewable internal freshwater resources per capita</i>	0,000*** (0,000)	0,000*** (0,000)	0,000*** (0,000)
<i>Population density</i>	0,013 (0,012)	0,009 (0,011)	0,012 (0,012)
<i>Square of Population density</i>	0,000 (0,000)	0,000 (0,000)	0,000 (0,000)
<i>ln of GDP pc PPP</i>	1,753 (1,202)	2,291** (0,992)	0,948 (1,371)
<i>Control of Corruption</i>	5,093*** (1,710)	-	-
<i>Voice and Accountability</i>	-	4,409*** (1,349)	-
<i>Government Effectiveness</i>	-	-	5,744*** (1,804)

Note: ***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level

When comparing the results, it can be observed that all three governance indicators have a greater impact when explaining access to improved water sources of the rural population. This suggests that the rural area is the most vulnerable to the poor control of government's activities, and therefore to the proliferation of different practices of corruption, to the absence of voice and accountability, and to low government effectiveness. Since rural population, by definition, is located away from urban agglomerations, policy makers may see them as a group with less relevance for them. Consequently fewer resources are assigned to supply their necessities; and with corruption, even less of these resources will actually reach them.

Furthermore, especially in developing countries, rural citizens often don't have the opportunity to exert their voice or participate, and thus are excluded de facto from decision making processes. Their needs and requests may be left aside. Due to the mentioned difficulties they may face in organizing themselves as a pressure group, it is more difficult, if not impossible, for them to hold the government accountable for this lack of interest in their needs. According to our results, any improvement in voice and accountability would lead to increase rural population's access to improved water sources. The case for improving Government Effectiveness is similar, and even stronger; any increase in government effectiveness will have a higher impact in the rural sector. But note that government effectiveness is a result of a political process: if there is no pressure for the government to improve its effectiveness, e.g. through accountability processes, participation and transparency, the government is likely to waste no efforts in doing so.

4.2 Control Variables

The relationship we found between our control variables and access to improved water sources was as expected in almost all cases. Rural population, as a proportion of the total population, affects negatively the access to improved water sources for the total and urban population. This means that any increase in the rural population will decrease the percentage of the population who have access to improved water sources. This is quite straightforward. The amount of roads paved, as a percentage of the total roads in each country, has a positive relationship with the endogenous variables. We included this control variable because we considered it important to have an approximate measurement of the country's infrastructure level, which is important in water provision. What the results show is that a 1 % increase in the roads paved, indeed increases the access to improved water sources of the total, urban, and rural population by 0.17 %, 0.12 %, and 0.26 % respectively. All the estimated coefficients of this variable were found to be significant.

For the case of renewable fresh water resources per capita in each country, the effect found in the access to improved water sources is positive, but only significant in the case of the total and the urban population. The amount of freshwater resources per capita in a country does not affect significantly the access to improved water sources of the rural population. However, note that all coefficients are approximately 0.00, meaning that the access to improved water sources is really not determined by the amount of freshwater resources in a country, confirming the literature quoted above.

The effect of density, defined as the total population per sq. km in each country, is positive and significant for access to improved water sources of the total and the rural population, not for the urban population. This indicates that increases in the amount of people concentrated in a sq. km tend to increase the percentage of the population with access to improved water sources. This might be explained by service providers being more interested in areas where more people can be served due to the costs of provision; the more concentrated the area to be served, the lower the marginal cost of provision. To evaluate if this effect was infinite, we calculated a new variable, namely square density. As expected, the effect is not infinite. Indeed, the positive

impact of density only works until a certain point, after which it turns out to be negative. It appears therefore that the lower costs of attending an additional consumer in the water sector have a limit, from which they begin to increase again.

Instead of using the GDP pc PPP variable, the log of it was calculated and included in the model, seeking an appropriate approximation of the percentage of growth of this variable. Its effect is positive and significant in 7 of the 9 regressions. The coefficients of log of GDP pc PPP that are not significant were the ones estimated in the regressions of Model 1 and Model 3 of the endogenous variable Improved Water Source (Urban). This means that when Control of Corruption and Government Effectiveness are implemented as the explanatory variables, the log of the gross domestic product per capita PPP doesn't have a significant effect on the percentage of the urban population with access to improved water sources; while in the other cases it does have a positive and significant effect, as mentioned.

5. Conclusions and Policy Implications

Water is, if not the most, one of the most important natural resources people have. Therefore universal access to improved water sources should be a priority for all countries. Worldwide, 193 countries have committed themselves to the Millennium Development Goals. While the goal of achieving 88 % coverage have been reached, there is still an 11 % of the population who don't have the privilege of obtaining potable water.

While it is the government that is responsible to achieve access to water for all through public policies, it is also true that the government is subject to failures. In our study we aimed at exploring empirically the relationship between governance and access to improved water sources. We further differentiated between urban and rural population, as theory and case studies suggested there might be a difference between them with respect to governance aspects. Implementing a Tobit methodology for the econometric approximation, our results show clearly that governance indeed matters; and especially for the rural areas. According to the estimators, governance is more important than the amount of renewable internal freshwater resources per capita, the paved roads, the countries' density, and the growth of GDP pc PPP—which of course doesn't mean these latter variables are irrelevant.

Our findings therefore confirm and give an empirical grounding to the claim that water sector governance matters; a fact that hardly surprises people who worked in the field aiming at implementing water sector reforms successfully. Despite access to fresh water resources and financing from general budget and bilateral or multilateral donors, these reforms have often not succeeded to improve access to water as desired. The policy recommendations are therefore straightforward and join the claim of the publications of the OECD, UNDP, the Water Integrity Network, Transparency International and others we cited above. Firstly, there is a need to empower water users, especially in rural and poor peri-urban areas, so that they can voice their needs and trigger a response by the government. Second, efforts must be made to minimize

corrupt opportunities in the sector. A large literature, which we partly cited above, have emerged recently, which emphasises the need to combine anti-corruption prevention with prosecution. Third, capacity development and strengthening administrative processes within water service providers and government authorities entrusted with the regulation of the sector are important in order to increase the government's efficiency and effectiveness.

However, technocratic solutions, either against corruption or to improve government effectiveness, have proven to be difficult to implement when political will to support such reforms is lacking. But this political support does not fall from heaven: it is the result of a political process. We therefore underscore in particular the aspect of voice and participation, leading to vertical accountability, as we believe this might be the only true origin for sustainable change of the sector. The path for such an incremental change might be facilitated by providing support to civil society (including academia and media), user groups, and users that have to rely on informal water providers in organising and participating effectively in their demand for better water services.

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