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Quality of Government and Access to Safe Water

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Abstract

According to a conservative estimation by the World Health Organization, 1.2 billion people lack access to sufficient quantities of safe water, and 2.6 billion people are without adequate sanitation. Consequently, 80 percent of all illnesses in the developing world are estimated to be the result of waterborne diseases claiming the lives of 1, 8 million children every year. This paper investigates to what extent this problem is related to the quality of government (QoG) institutions. Water quality measured as human access to safe drinking water. The central question is if there is an independent effect of quality of government besides the effects of democratic rule and good economic resources. Taking into consideration the interaction effect between QoG and economic prosperity, we find that there is an independent effect of government effectiveness on the access to safe drinking water, especially in poor countries.

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Lacking Safe Water, Quality of Government and Cholera

On June 16, 2006, the world leading daily newspaper *The New York Times* had a front-page article about Angola. The article is introduced by a large picture showing two young boys and one young girl - a fair guess is that they are about ten years old - fetching water at a stream that runs through what looks like an incredibly large garbage dump. The article starts with the following words: “In a nation whose multibillion dollar oil boom should arguably make its people rich enough to drink Evian, the water that many in this capital depend on goes by a less fancy name: Bengo. The Bengo River passes north of here, its waters dark with grits, and its banks strewn with garbage”. The article goes on describing how poor Angolans living in the slums of the capital Luanda have no other option than to use the polluted water from the Bengo river and that this is the reason for why one of the worst cholera epidemics to strike Africa has occurred that has sickened over 43.000 people and killed more than 1.600 since its outbreak in February that year. Cholera typically spreads through contact with contaminated water and according to the article; this problem is everywhere in Luanda’s slums. As the picture shows, “children stripped to their underwear dance through sewage-clogged creeks and slide down garbage dumps on sleds made of sheet metal into excrement-fouled puddles”. The article continuous by stating that economists say that the oil-boom has resulted in a situation where the Angolan government have a huge budget-surplus and more money than they can spend and yet they seem unable to provide the population with such a basic thing as safe water and sanitation that would make the Cholera epidemic preventable. The article concludes by citing experts from various international organizations who argue that the situation is caused by two factors – the lack of infrastructure and huge influx of people to the capital due to the civil war that ended in 2002 and the high level of corruption.

Water and the Quality of Government: A Changing Agenda

When the leading international anti-corruption organization *Transparency International* published its annual Global Corruption report for 2008, the specific focus in the report as well as the title was “Corruption in the Water Sector”. The report contains no less than twenty-three chapters covering more than one hundred pages analyzing this specific connection between corruption and the provision of safe water. In addition, a semi-public international

organization about this specific problem was established in 2006 called the *Water Integrity Network* funded by grants from the international development authorities in Germany, the Netherlands, Sweden and Switzerland.[1] In addition to policy initiatives, this network brings together anti-corruption civil society movements and water professionals Thus, both in media and in leading policy and advocate organizations, there is an increasing apprehension that lack of safe water is a major obstacle to human well-being and population health in the world and that this problem is to a large extent caused by factors that can be defined as the *quality of government* (QoG) issues (Earle, Lungu and Malzbender 2008, cf. Rothstein and Teorell 2008). A number of studies have shown a correlation between environmental protection in general and factors related to the structure or quality of political institutions (Jahn 1998; Morse 2006; Welsch 2004). And asked to review the lessons of the World Bank policies for alleviating poverty in developing countries, Lawrence Summers – former Chief Economist of the World Bank, President of Harvard University and former Director of the White House's National Economic Council under President Barak Obama – have argued that "an overwhelming lesson that I think we have learned in the 1990s is… the transcendent importance of the quality of institutions and the closely-related questions of the efficacy of political administration" (cited in Besley and Ghatak 2007).

The magnitude of the quality of government (henceforth QoG) problem regarding the specific issue of people's access to safe water can be illustrated by the following example. According to a conservative estimation by the World Health Organization, 1.2 billion people lack access to sufficient quantities of safe water, and 2, 6 billion people are without adequate sanitation. Consequently, 80 percent of all illnesses in the developing world are estimated to be the result of waterborne diseases claiming the lives of 1,8 million children every year (UNDP 2006). A conservative estimate is that 12.000 people die every day from water and sanitation related illnesses (Cunningham and Cunningham 2008; Krause 2009; Postel and Mastny 2005; Stålgren 2006a). This enormous problem is by an increasing number of experts in the area no longer seen as an engineering problem, that is, it is not lack of technical solutions (pumps, reservoirs, dams, etc.) that is the main obstacle for why such large numbers of mainly poor people in developing countries lack access to safe water. Neither is it seen as a problem caused by lack of natural supply of clean water. Instead, the problem seems to be related to the existence of dysfunctions in the structure of the legal and administrative institutions. More

[1] See http://www.waterintegritynetwork.net/

precisely, the problem is seen as caused by lack of adequate institutions for maintenance, pricing and distribution of rights to land and water (Anbarci, Escaleras and Register 2009; Burns and Meinzen-Dick 2000; Burns and Meinzen-Dick 2000; Krause 2009; Meinzen-Dick 2007). A related problem, according to Sjöstedt, is that people in poor countries often refrain from investing in water infrastructure because they, due to unreliable legal and administrative systems, cannot be sure that their investments will not be confiscated by the authorities or claimed by other people. Thus, low quality of government that takes the form of a lack of secure legal and property rights hinders private investments in water infrastructure (Sjöstedt 2008 and 2010). A similar argument has been put forward regarding associational forms for water management, namely that in order to function they need to be supported by government institutions that have the capacity to enforce accountability between the governing boards of the associations and their members (Wegerich 2008).

According to the report by Transparency International mentioned above, there are an almost infinite number of reasons why corruption and other forms of low QoG can be detrimental to the provision of safe water. Among these are private companies that illegally pollute natural water resources and thereby destroying the ecological system which by paying bribes may avoid being prosecuted and punished by the justice system. Water resources management, not least in delicate ecosystems is often a complicated matter both technically and conceptually and therefore prone to be an area were different interests may collude (cf. Krause 2009; cf. Stålgren 2006b). In the struggle over the use of natural water resources, kick-backs as well as forms of patronage and clientelistic politics may play a large role. Similarly, ordinary people's lack of legally documented and guaranteed property rights to the land they use may prevent them from investing in necessary technical equipment (Sjöstedt 2008). Provision of safe water often requires huge investments in dams, water cleaning equipment and sewage systems that are carried out by private contractors. Public procurement for big contracts is a well-known source for large-scale corruption resulting in too high costs and too low quality of the constructions that, eventually, are put in place.

For example, in India, it is estimated that more than 25 percent of the costs for irrigation systems are lost in bribery. Many of these installations are technically very complicated which is likely to increase difficulties for transparency in the procurement process. Petty corruption at the point of service delivery may deter people from using safe water and may also lead them to be reluctant to pay for water at all since they may suspect that the money will be

stolen instead of being used for maintenance of the safe water equipment. This in turn may lead to water managers having far too little money for keeping the installations running. In some countries, this is a huge problem. For example, one study from India show that 40 percent of water customers had, during the previous six months, been making small payments to falsify meter readings so as to lower their water bills (Davis 2004). Similarly, a national survey in Guatemala showed that more than 15 percent of the population reported to have paid a bribe for getting a water connection. In Bangladesh and Ecuador, "private vendors, cartels and even water mafias have been known to collude with public water officials to prevent network extension" (Sohail and Cavill 2008, 44). In subsidies for irrigation systems, there are also many known cases when policy influence by large and strongly organized interest groups with large economic resources have resulted in policy outcomes that are heavily geared towards benefitting their own interests at the expense of "the common good" and of agents that are not so easily organized or economically strong. For example, a study of Mexico shows that the largest 20 percent of farmers get more than 70 percent of government subsidies for irrigation (Rijsberman 2008).

A Lack of Systematic Empirical Comparative Analyses

The above mentioned analyses are theoretically as well as empirically convincing in their claim that there is a causal link between Quality of Government (QoG) and Quality of Water (QoW). One problem is that, for the most part, the empirical analyses presented are based on case studies from specific countries or regions. While useful, there is a lack of large-n empirical studies in this area that would (or would not) substantiate the many findings from case and field studies (cf. Holmberg & Rothstein 2011).

In political science and environmental studies there is a debate going on about the effect democracy has on the environment. Some scholars claim that democracy reduces environmental degradation whereas others argue that this is not true and that democracy in fact can have a negative impact on the environment. Using different methods and data, the results are inconclusive since there is empirical evidence in support of both arguments (Karlsson et al. 2010; Midlarsky 1998; Neumayer 2002). One paper that is of direct interest for our argument is a study by Pellegrini and Gerlagh (2010). Their dependent variable is an

index called *Environmental Policy Stringency* and as independent variables they use two standard measures of democracy and corruption.[2] Their strategy is to compare democracy and corruption as determinants of the stringency of a country's environmental policy. The result of their analysis is that corruption is more important than democracy as an explanatory variable. Thus, in their analysis, democracy has a limited impact on environmental policies, and they argue that several other studies tend to overemphasize the importance of each variable. The authors conclude that it seems likely that previous empirical work have been overemphasizing the role of democracy for environmental policies and for environmental quality because of the omission of a corruption index as a control variable. Their conclusion is thus that reducing corruption would result in stricter environmental policies and that democracy on its own would not be sufficient. This is in line with many other studies that show that the impact of the degree of democracy on different measures of human well-being is surprisingly small and even in many cases non-existent, while the impact of measures of QoG is often quite substantial (for an overview of this research see Råby and Teorell 2010, Rothstein 2011).

One problem in the existing literature on the relation between QoG and people's access to safe water is that many studies are either country specific or even regional/local case studies. The few comparative studies that exists have either only compared a relatively small set of countries or not been using various measures of Quality of Water as their specific dependent variable.[3] In this study, we intend to remedy this lack of knowledge by analyzing data from a larger set of countries to see if, and if so how much, different QoG variables can explain human access to safe water.

Cross-Country Water Quality: Basic Patterns

We will begin the empirical analysis by looking at some basic cross-country bivariate relationships between measures of water quality on the one hand and measures of quality of government, levels of democracy, and GDP per capita on the other[4]. The data come from the

[2] *Democracy* is taken from from Polity IV, produced by ICSR of the University of Maryland and their measure of *corruption* is Transparency International Corruption Perception index from 1995

[3] Thanks to Veronica Norell for help with the literature search.

[4] This paper is a shortened revised version of Holmberg and Rothstein QoG Working Paper 2010:16. Thanks to Marcus Samanni for all data runs.

Quality of Government open source dataset (Teorell et al. 2009). Arguably, water quality is one of the most important factors relevant to ecosystem health as well as to human health. However in this context we will focus on water quality measures most relevant to human health.

The human oriented water quality measure that we use is based on two indicators provided by UNICEF-WHO combining the percentage of a country's population with "reasonable access" to an improved source of sanitation and an improved source of drinking water (see also Sjöstedt 2008, p. 11-12). The latter is defined as having as least 20 litres/person/day from a source within one kilometre from the dwelling (ibid. p 7). This is this, we think, a very modest standard of what should count as "access" to safe water, at least compared to what is taken for granted in most industrialized countries.

The quality of government measures that we employ as independent explanatory variables are two – the World Bank's government effectiveness scale and also its control of corruption index. In theory the two QoG-variables stand for different things. In practice, however, they are very closely related with a correlation of about +.94 between them. Levels of democracy as measured by Freedom House/Polity and GDP per capita (Gleditsch 2002; Marshall and Jaggers 2002) are two obvious control variables. We know from previous research that both of them have a relationship with water quality (Emerson 2010). Rich democracies tend to have better water quality than poor non-democracies. In testing the eventual effect of quality of government on access to safe water we want to control for the known and more general effects of democracy and economic development. Our question is: Can we find an independent effect of quality of government on top of or besides the effects of democratic rule and good financial resources.

At the end of the article in a special appendix four bivariate scatter plots are published with the access to safe water index run against the two QoG-variables (government effectiveness and control of corruption), the level of democracy variable and the variable measuring GDP per capita (log). The results are summarized in Table 1.

Table 1: The Relationship between Water Quality (Access to Safe Water) and Government Effectiveness, Control of Corruption, Level of Democracy, and GDP per Capita (Correlations (r))

	Correlation
Government Effectiveness	+.64
Control of Corruption	+.60
GDP per Capita (Log)	+.76
Level of Democracy	+.39
Number of Countries	About 190

Comments: The variable Water Quality (Access to Safe Water) is part of the 2010 Environmental Performance Index constructed by the Yale Center for Environmental Law & Policy. The variable is based on two indicators provided by UNICEF-WHO: The percentage of a country's population with access to 1) an improved source of sanitation and 2) an improved source of drinking water. The positive correlations indicate that good water quality is related to high government effectiveness, to low levels of corruption, to high GDP/capita and to high levels of democracy.

The outcome indicates a promising beginning. The relevant correlations are positive and rather strong. Access to safe water is clearly related to government effectiveness as well as to control of corruption. High government effectiveness and low corruption is connected to good water quality for humans. However, good human water is also strongly related to economic development and level of democracy. Rich and democratic countries tend to have better water for humans than poor and autocratic countries.

In Table 2 we control the linear effects of level of democracy and GDP/capita (log) on access to safe water by jointly regressing them on the water variable together with the government effectiveness variable[5]. The question is if the QoG variable survives such a control? To play it extra safe, we have run the regression among all countries as well as among non-OECD countries only. The later analysis is done to really make sure that eventual separate effects among poorer countries have a good chance to be detected.

[5] If we substitute the Government Effectiveness variable with the Control of Corruption variable in the analysis in Table 2 (and subsequently in Table 3) the outcome stays the same, except in two cases. In the analysis in Table 2 for All Countries the Control of Corruption variable has a significant effect on the .10-level. Looking at the analysis in Table 3, the Control of Corruption variable yields no significant effect among Non-OECD countries. In all other aspects substituting the two QoG variables gives the same results. Thus, the two QoG variables are basically interchangeable in this context.

Table 2: Regressing Water Quality (Access to Safe Water) on Government Effectiveness, Level of Democracy, and GDP/Capita Among All Countries and Among Non-OECD Countries Only (Regr. Coeff.)

	All Countries		Only Non-OECD Countries	
	regr. coeff.	std. err.	regr. coeff.	std. err
Government Effectiveness	-.8	2.9	2.3	3.4
GDP per Capita (Log)	14.4***	1.7	15.0***	1.8
Level of Democracy	.3	.6	.2	.6
Constant	-40.7***	13.6	-42.5***	14.7
Adj. R-squared	.57		.52	

Comments*:* p>/t/=.01***; =.05**; =.10* The number of cases is 188 for all countries and 158 for the Non-OECD countries. See also Table 3.

At a first glance, the results may seem a bit disappointing. There is no significant effect of government effectiveness on access to safe water. Not among all countries and not separately among poorer Non-OECD countries. The only significant effect is found for economic development. Not surprisingly, rich countries have the capacity of providing better water than poor countries. And this economic variable overshadows completely the eventual linear effect of the quality of government variable. However, since economic development is very strongly related to the quality of government variables we have a serious case of multicollinearity. It is difficult to distinguish between the effects of the two variables. One interesting example of that is that the effect of the QoG variable in Table 2 becomes highly significant if we substitute the GDP/capita (log) variable for an unlogged GDP/capita variable. One of the reasons for this is that the logged GDP/capita variable among all countries is stronger correlated with the government effectiveness variable (r=.83) than the unlogged version of the GDP/capita variable (=.73). The conclusion is that the QoG and GDP variables are so closely connected that it is very problematic to talk of separate effects.

Interplay Between Much Money and Quality Rule

One way of not solving the problem, but at least highlight the interconnectedness between economic development and quality of government in providing people with healthy drinking water, is to introduce the notion of an interplay between the two variables (QoG and GDP) and a possible interaction effect on access to safe water. In Table 3 we have done that by introducing an interaction term between GDP/capita (log) and the government effectiveness variable in our previous model from Table 2. The idea is that it takes an interplay between

money and quality of government (a.k.a state capacity) to achieve high levels of access to safe water[6].

Table 3: Regressing Water Quality (Access to Safe Water) on Government Effectiveness, GDP/Capita (Log), Level of Democracy, and an Interaction Term (Regr. Coeff.)

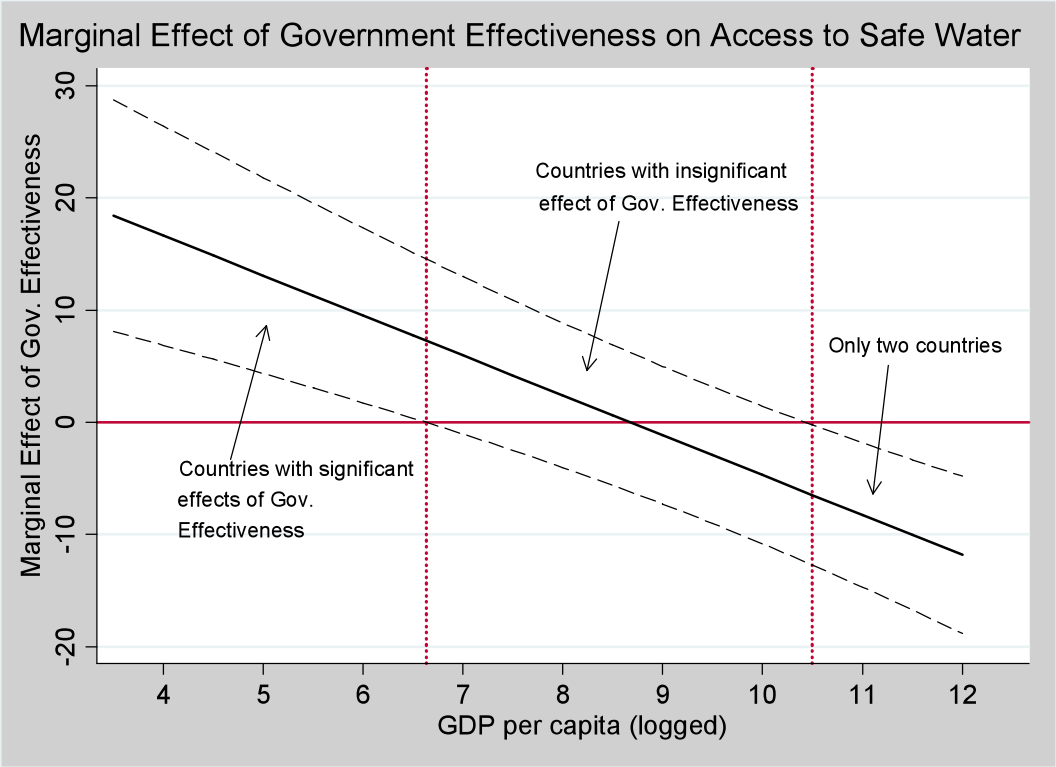
	All countries		Non-OECD Countries	
	regr. coeff.	std. err.	regr. coeff.	Std. err.
Government Effectiveness	30.8***	8.3	26.4**	11.5
GDP/Capita (Log)	13.5***	1.6	14.0***	1.9
Interaction Gov. Eff. * GDP/Capita (Log)	-3.6***	.9	-3.0**	1.4
Level of Democracy	-.0	.5	-.0	.6
Constant	-26.8*	13.6	-30.8**	15.5
Adj. R-squared	.61		.53	

Comments*:* p>/t/=.01***; =.05**; = .10* The number of cases is 188 and 158 countries, respectively. See Table 2.

Now things become clearer. To the extent that we can talk about significant effects in regression models with interaction terms, there is an effect of government effectiveness and there is a significant interaction effect. And as the coefficients indicate the effect of the QoG variable is especially strong among less developed and poor countries (see Figure 1).

[6] A special thanks to Nicholas Charron for helping us to specify the model and for interpreting the results.

Figure 1. Marginal Effect of Government Effectiveness on Access to Safe Wate



Comment: Analysis based on results from the interaction model in Table 3. The solid line represents the marginal effect of government effectiveness on access to safe water at various levels of GDP per capita. Dashed lines around the solid line represent 95% confidence interval. Based on the results, we find that the effect of government effectiveness on the dependent variable is significant and positive for approximately 25% of the countries in the sample. These countries are low-income and have on average GDP per capita (2002) of about $600 or less.

The effect is smaller among richer countries. This is an important result. It can functionally be interpreted as indicating that human access to safe water can not only be improved with the help of money. It can also be improved by better quality of government, especially in poorer countries. Thus, we arrive at the conclusion that - as with so many other things that are important for human well-being - quality of government matters and it matters for quality of water.

Table appendix

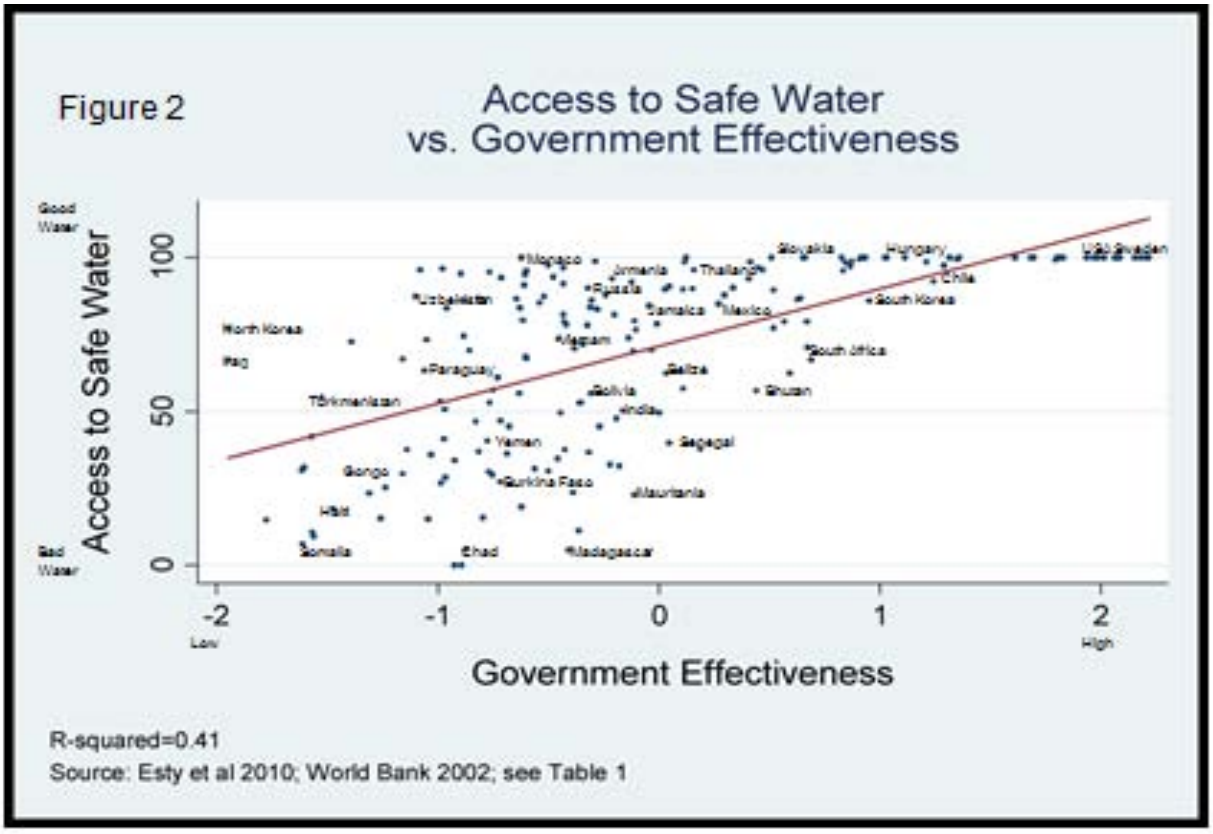
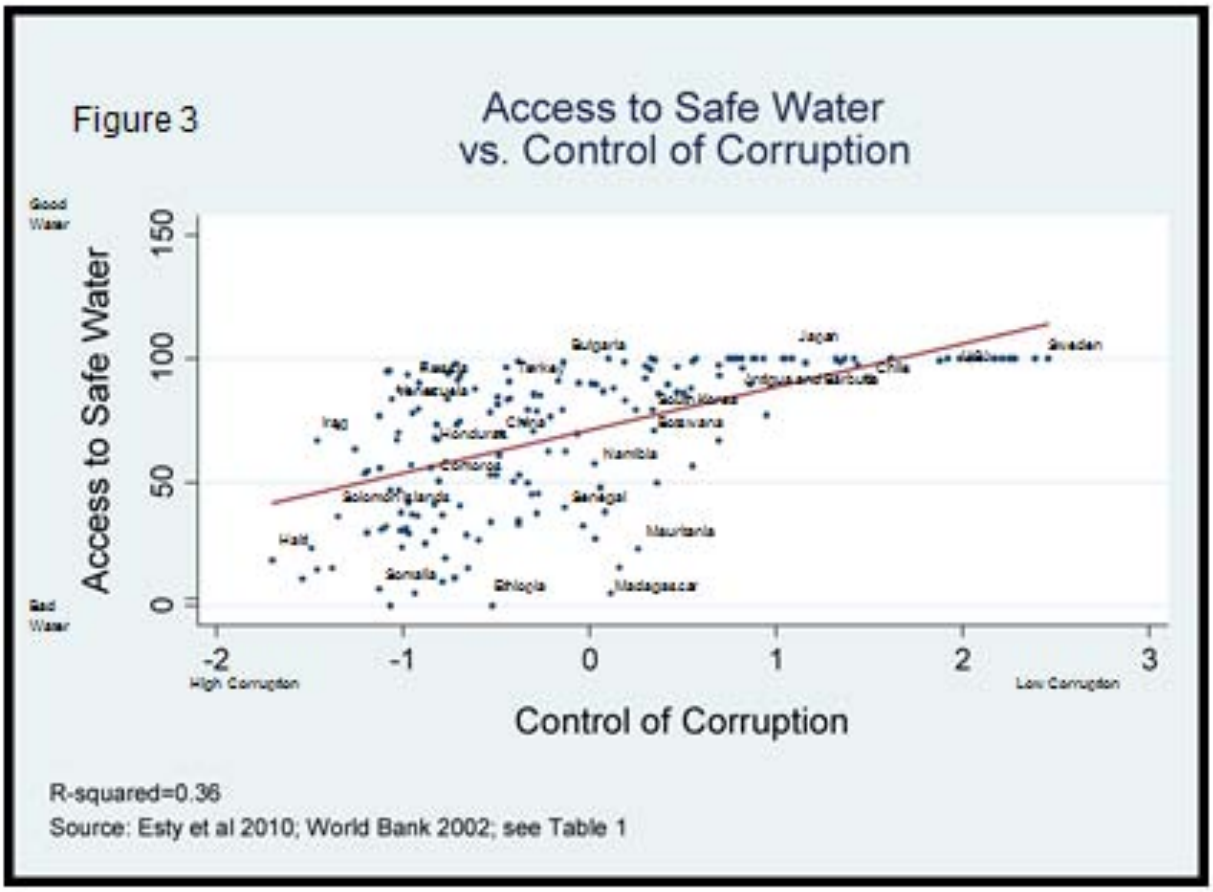


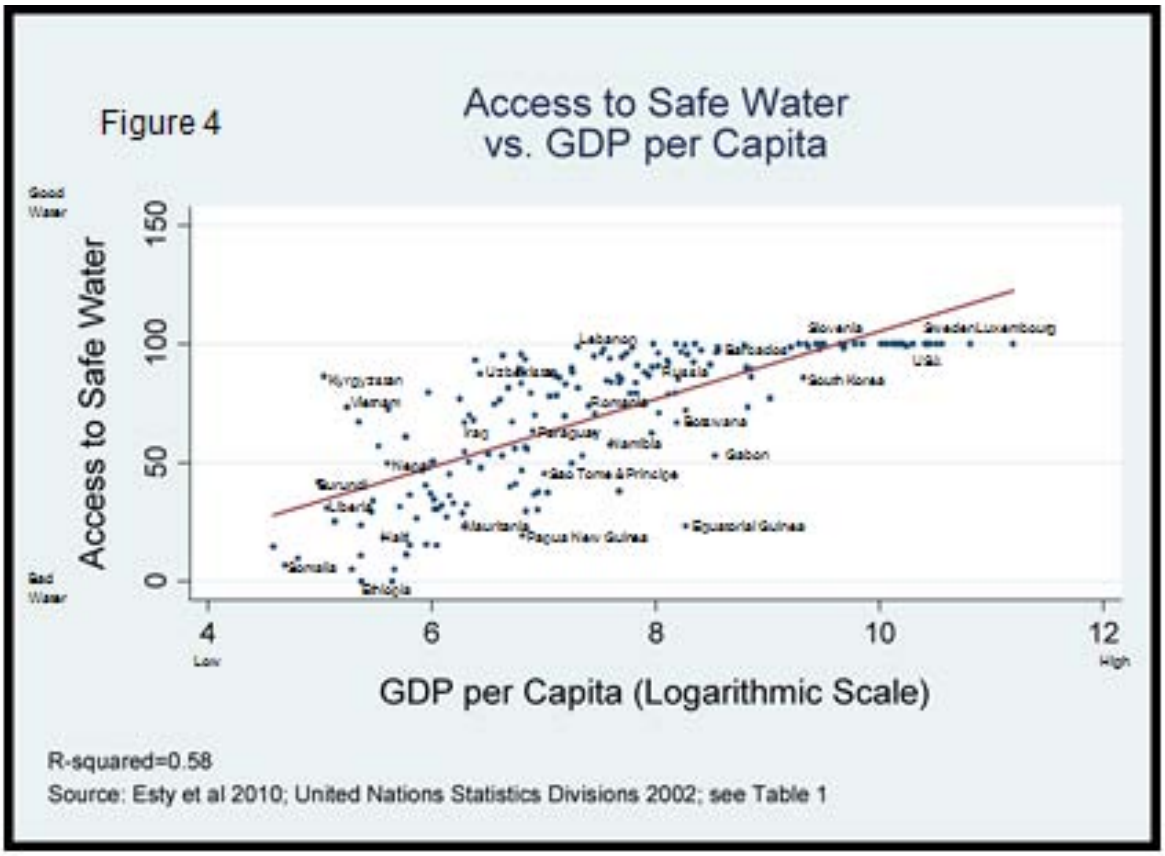
Figure 3



R-squared=0.36

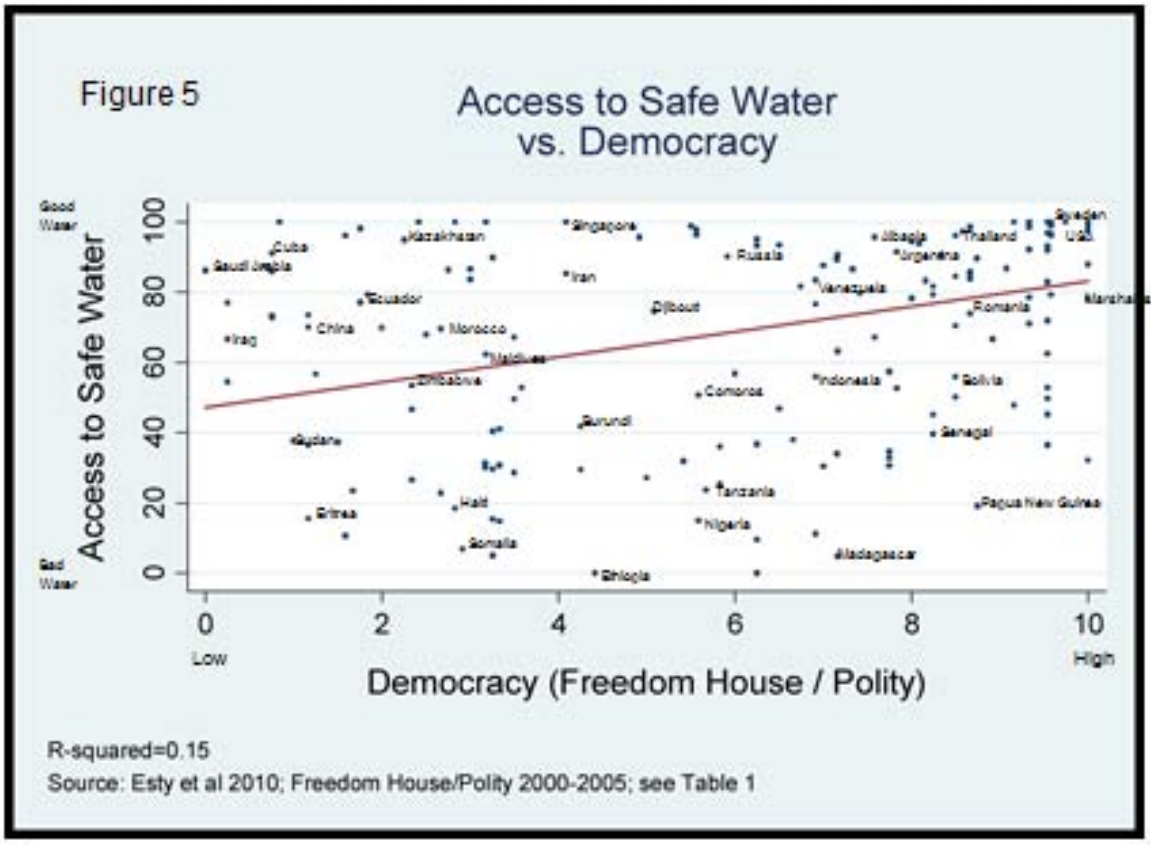
Source: Esty et al 2010; World Bank 2002; see Table 1

Figure 4



R-squared=0.58

Source: Esty et al 2010; United Nations Statistics Divisions 2002; see Table 1



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