Draft: October 2008

International Water Contracts and Household Outcomes: Evidence from Albania

Justin B. May[1]

Andrew Bacher-Hicks[2]

ABSTRACT

In 2002, the government of Albania entered into management contracts with Berlinwasser International AG for the provision of water supply in four of 36 political districts. Using 2002-2005 data from the World Bank's Living Standards Measurement Study for Albania, we assess the results of this contracting out of supply on various household outcomes including water price, continuity of water supply, hours per day of water availability, water source, water quality, and incidence of waterborne illness. Using a difference-in-difference approach and controlling for a variety of household characteristics, our results suggest that consumers in contracted districts experience, on average, 4.7 additional hours per day of service—though these come with average price increases of around 20 percent. Households in contracted districts are also 73.7 percent more likely to report continuous water service. In a multinomial logit framework, we find that consumers in contracted districts are significantly more likely to find an alternate source of water (e.g., a spring or well), most probably in response to the higher price of water. Interestingly, households in contracted districts are significantly more likely to report their subjective water quality as "unsuitable for drinking" but report significantly lower incidence of diarrhea.

Keywords: Albania, contract, household, poverty, water provision

JEL Codes: D60, H51, L33, O12, O13

[1]Department of Economics, College of William and Mary, P.O. Box 8795, Williamsburg, VA 23187, voice: 757.221.2398, fax: 757.221.1175, email: jbmay@wm.edu.

[2]voice: 717.725.2682, email: axbach@wm.edu.

1. INTRODUCTION

Privatization of public infrastructure has been a central goal of international financial institutions, bilateral donors, and development agencies since the late 1980s. While there seems to be a general consensus that sectors such as telecommunications or electricity should be privately-operated, the water sector is more controversial. Anecdotal and often polemic reports of costs and benefits of water privatization are considerable, but there have been relatively few empirical studies on the household impact of privatization. We hope to bring some clarity to this matter by examining the Albanian move to privatize some districts in 2003.

Proponents of privatization and its variations such as private sector partnerships (PSPs) emphasize the importance of the market, fiscal discipline, and increased investment as benefits of privatization. Through efficiency gains, improved management, and better access to capital, the private sector has been reported to improve performance, increase investment, and extend access to water by providing new connections and infrastructure. Moreover, the transition to the private sector can relieve the state of fiscal burdens in failing sectors. As such, both developed and developing nations have looked to the private sector when the government has failed to provide adequate supplies of water.

On the other hand, opponents often criticize privatization as a matter of principle: water is a common good that should not be in the hands of the private sector, and since it is essential to survival, it should be treated as a human right, not a commodity. Therefore, opponents of privatization argue that it is the government's obligation to provide universal low cost access to this vital resource. Moreover, critics point to the withdrawal of the private sector in cases where the risk-return ratio is prohibitively high, arguing that private companies have little incentive to supply water to poor regions, which, due to illegal connections and poor collection rates, remain unprofitable for suppliers (World Bank, 2004).

While member countries of the United Nations are unanimously committed to increasing access to safe drinking water in developing countries, there is little consensus on exactly how to achieve

this goal. An increasingly popular choice for developing countries is to create a private-sector partnership (PSP) in their failing water sectors, as was the case in Albania in 2003. As part of its economic transition, Albania committed to a massive effort to decentralize public works, and in June 2003, under the guidance of the World Bank, four of Albania's 36 political districts entered into management contracts with Berlinwasser International AG to oversee water provision.

This paper examines the impact of this privatization of Albanian water supply between 2002 and 2005. We examine the impact in terms of household outcomes including water price, continuity of water supply, hours per day of water availability, water source, water quality, and incidence of waterborne illness. The remainder of the paper is organized as follows: Section 2 examines the current literature on impacts of privatization. Section 3 reviews the history of Albania's water supply and the case for privatization. Section 4 introduces a discussion of the data and section 5 lays out our empirical model. Section 6 discusses and analyses the results, and we conclude in Section 7.

2. LITERATURE REVIEW

This section examines the literature documenting the impact of privatization, and presents evidence at the firm and sectoral level.

2.1. Firm-Level Studies

While privatization of public energy utilities has occurred on a large scale, the developing world has experienced relatively few cases of water supply privatization. Instead, most of the literature revolves around firm-level studies. Megginson et al. (1994) examine firm performance for 61 companies in 18 countries during the period 1961 and 1989. D'Souza and Megginson (1999) compare operating performance of 85 companies in 28 countries between 1990 and 1996. Both studies document increases in output (real sales), profitability, operating efficiency, capital investment, and dividend payments. Both studies document a decrease in leverage and Megginson et al. (1994)

report an increase in the median level of employment. However, both studies fail to differentiate the results between developing and developed countries, leaving the potential for unexplained heterogeneity in the data. Moreover, they are firm-level studies and therefore provide little explanation for specific industries, such as water supply.

In contrast, Boubakri and Cosset (1998) examine only developing countries. Between 1980 and 1992, they review 79 companies in 21 developing countries and find significant increases in post-privatization output (real sales), operating efficiency, profitability, and capital investment. They, too, describe a decrease in leverage and an increase in employment, although below the level of statistical significance. In a later study, Boubakri and Cosset (2002) examine 16 African companies between 1989 and 1996. As before, they find increased capital investment, but document statistically insignificant increases in profitability and insignificant decreases in operating efficiency, and output and leverage.

Other studies argue that the impact of privatization is more nuanced and can potentially hurt the poor due to job losses, increased prices and reduced access to services. Bayliss (2002) argues that the impact of privatization is, indeed, complex. Bayliss argues that while a private firm may increase efficiency and capital investment, there will be losers if prices increase and non-payers are disconnected. Instead of blanket privatization studies, she argues in favor of case-by-case studies.

Although multi-national, multi-industry studies have proven to be most influential, single industry studies employing similar methodology can highlight differences that are often hidden in aggregate data. Even firm-level studies limited to only developing countries may hide differences across sectors and across different countries or regions. The next section examines only the literature pertaining to water sector privatization.

2.2. Sectoral Studies

Few sectoral studies for developing countries have focused on the water industry; telecommunications and other industries that have been especially affected by privatization have garnered

more attention. Studies focusing on the water sector are divided among case studies and empirical work. Empirical work generally suggests that privatization improves economic performance, while the case studies report less universal benefits.

In a review of privatization in developing countries, Gray (2001) finds that privatization improved coverage and increased connections by 66 percent in Bolivia. In Buenos Aries, Argentina, Cartagena, Colombia, and Gdansk, Poland, Gray (2001) highlights significant improvements in labor productivity. Alcazar, et al. (2000) similarly find that following concession contracts in Buenos Aires, investment increased almost 2.5 times, operating efficiency improved, and product and service quality were markedly higher. Moreover, they conclude that there were social and external benefits as a result of increased coverage; almost one and a half million additional people have access to clean piped water and will no longer be forced to consume polluted well or ground water.

Galiani et al. (2005) examine the impact of water privatization in Argentina on infant mortality between 1991 and 2000. During that period, Argentina privatized 30 percent of the country's water companies. Using three different measures, Galiani et al. (2005) estimate that the infant mortality rate dropped by 5-7 percent in privatized regions, and up to 24 percent in the poorest of those regions. Moreover, they found that operating efficiency, capital investment and access all increased, while prices did not.

Other studies argue that efficiency gains or new connections may not translate into widespread quality of life improvements. Unregulated private companies with market power, many have argued, would pursue profit-maximization strategies that may cause quality of life reductions among consumers. Estache et al. (2001) argue that privatization may hurt the poor if prices rise (even to market-price) or investment is focused only on high-income areas; in other words, private providers may neglect to take into account the marginal social effects of their decisions. In these cases, efficiency increases come at the cost of quality of life, often for the poorest segments of society.

A 2004 Poverty and Social Impact Analysis (PSIA) of Albania produced by the United Nations Development Programme (UNDP) finds that service quality is better in privatized cities while access to water and sanitation is better in cities without private supply. Although there have been various

similar case studies of the Albanian water reform, there have yet to be any household level empirical studies of the impact of water privatization in this region.

3. THE ALBANIAN CASE FOR PRIVATIZATION

From the late 1970s until just a few years ago, waning domestic funding for Albania's water supply infrastructure left the antiquated system unable to meet the country's growing demand. From the end of World War II until reform in 1991, the water sector operated under the central government, and the Ministry of Construction was responsible for the water supply sector, including the regulation of all key powers such as tariff rates, investment, billing, and collection. Local utilities were responsible for very little, and were forced to accept controls and counterproductive incentives mandated by the capital. Within this state-run economy, the water-sector's cost effectiveness was low: politically-motivated, artificially low water tariffs did not generate enough revenue for the water utilities to cover the operating and maintenance costs; few incentives were offered to improve performance; and the low tariffs led consumers to waste water (World Bank 2003).

Despite being blessed with abundant natural water resources, without effective management or proper maintenance, eventually much of Albania's water supply infrastructure reached the end of its useful life, and in most regions it had deteriorated beyond the point of cost-effective repairs. By 1991, huge leakages and an increasing number of illegal taps accounted for water losses between 50 and 70 percent in most regions. This dilapidated supply network was ill-equipped to deal with the urbanization of the late 20th century, and in 1991 water was provided only 2-4 hours per day on average.

3.1. Background

The development and subsequent descent of the Albanian water supply sector can be divided into four stages. The first stage began in the 1930s when the first aqueducts were constructed by Italian companies, creating a network of limited extensions in some of the central Albanian cities.

Despite its age and deterioration, some of the 1930s infrastructure is still used to provide water.

The second stage (1950-1978) involved a rapid expansion of water supply and services in urban areas. Aid by socialist Eastern European countries and later by China, helped fund Albania's rapid development during this era. Along with international aid, the central government funded public infrastructure and the quality of services improved dramatically in urban areas during this phase.

The third phase (1978-1991) was characterized by the Chinese withdrawal of aid as a result of the political freeze between China and Albania, marking the beginning of Albania's decade-long period of isolation from foreign aid and investments. Lack of funding and equipment led to the progressive and massive deterioration of water supply facilities and infrastructure across the country. As the water sector deteriorated, leakages increased. Without proper maintenance, meters stopped functioning and revenue collection became impossible. During this phase water supply declined from continuous to intermittent and the few new facilities and systems that were built were poorly designed, increasing the chance for contamination and waterborne disease. Moreover, low water tariffs, insufficient allowances for operators, and deteriorating equipment led to widespread consumer and commercial waste.

The fourth phase (1992-2003) marked the end of the usable life for most of the water supply infrastructure, which had deteriorated beyond the point of cost-effective repairs in most regions. However, this period also marked the beginning of water reform in Albania. Following the collapse of the communist leadership in 1991, support from the Albanian government increased along with foreign aid (World Bank 2003).

3.2. World Bank Involvement and Management Contracts

In 1994, the World Bank initiated long-term support for Albania's water sector in an attempt to reform, repair, and rebuild the water supply sector, extend access to clean water to the poor in both urban and rural areas, and to begin wastewater and sewage treatment. Along with this support came the World Bank's endorsement of private-sector partnerships (PSPs) for the water

sector.

The first World Bank project in Albania was the Durres Water Supply Rehabilitation Project, which was approved in 1994 and closed in 2000. It was designed to provide crucial investment needed to rehabilitate existing facilities in Durres, a region of approximately 220,000 people. The primary goal of the Durres project was to fund local water institutions and ensure sustainability at the local level. The next project, the Water Supply Urgent Rehabilitation Project, followed in 2000 and funded similar rehabilitation endeavors in the regions of Fier, Lezhe, and Sarande, with the estimated benefits of the project to reach another 140,000 people. These first two projects focused on the most vulnerable parts of the water supply.

The next project, the Municipal Water and Wastewater Project in 2003, was also designed to assist the same four towns, but also had a central goal of introducing private-sector participation to Albania. The World Bank facilitated pilot projects and studies to in the transition to private sector participation, and a condition to receive aid from the Municipal Water and Wastewater Project was that a private operator had to be appointed in each of the four districts (World Bank, 2005).

Under further guidance from the World Bank, the Government of Albania began to decentralize public works, including the country's water utilities. Effective January 1, 2002, the law on "Organization and Functioning of Local Governments" (OFLG) stipulated that the authority of and responsibility for the water sector would be transferred to the local governments. Despite frequent setbacks, the Government of Albania continued this decentralization process among public works with complete functional and fiscal autonomy as the end goal, and in June 2003, the Government of Albania entered into 5-year management contracts with Berlinwasser International AG in the regions of Durres, Fier, Lezhe, and Saranda. The management contract provides a fixed fee and a performance incentive fee, which are co-financed by the Government of Albania and the World Bank. Berlinwasser was given the responsibility for the entire operation and maintenance of the water sector in the regions of Durres, Fier, Lezha, and Saranda. It has complete freedom for day-to-day management decisions, but the Government of Albania has retained the financial responsibility including price setting, although Berlinwasser makes tariff recommendations.

4. THE DATA

The data for our empirical analysis come from the 2002 and 2005 Albania Living Standards Measurement Study (LSMS), conducted by the Albanian Institute of Statistics (INSTAT), with technical assistance from the World Bank. The 2002 Albania LSMS was in the field between April and early July of 2002, and the 2005 LSMS was in the field between May and early July.

Both surveys were based on the updated sampling frame provided by the Population and Housing Census (PHC) in April 2001, which divided Albania into approximately 450 Enumerated Areas (EAs). Both the 2002 and 2005 surveys used four survey instruments to collect information: a household questionnaire, a diary for recording household food consumption, a community questionnaire, and a price questionnaire. Surveys are completed every three years in Albania with annual panel studies in the years in between. The panel surveys conducted in 2003 and 2004 were based on a sub-sample of approximately half the households from the 2002 survey, and the content of the panel questionnaires was also reduced to shorten the survey. Unfortunately, some of our key determinants were only included in the main 2002 and 2005 surveys. We, therefore, employ only these two years.

4.1. Albania LSMS Sampling Design

The sampling design for the 2002 and 2005 Albania LSMSs are strictly related to one another. In 2002, a stratified two stage cluster sampling design was employed; the Primary Sampling Units (PSUs) were represented by the EAs from the PHC, and the Second Stage Sampling United (SSUs) were represented by each household. EAs were stratified according to geographic area (mountainous, coastal, or central), development (urban or rural), and whether or not they were located in the capital, Tirana.

The 2002 LSMS divided the sample into 450 EAs with eight households per EA, for a total of 3,600 households. The selection of EAs was carried out by within each stratum through a Probability Proportional to Size (PPS) design, where the size was represented by population of

households within each EA. Instead of a PPS design, the second stage was conducted by systematic sampling whereby 12 households were initially selected, with eight households forming a base case and four alternative households.

The sampling design for 2005 is similar to the sampling design used in 2002. A selection of 455 new sample EAs was based on the PHC, just as in 2002. However, the EAs have been updated to reflect population changes and migration flows, which were particularly relevant in Tirana and Durres. Tirana was oversampled with an extra sample of 25 EAs, bringing the total number of EAs to 480 and the total sample to 3,850 households. Therefore, there are 480 PSUs that were selected using a PPS design. The second state selection was conducted again by systematic sampling, just as in 2002: an initial sample of 12 households was initially selected, with 8 households forming a base case and 4 alternative households.

To compensate for the non-random nature of the sample design, each household is assigned a weight that was used in calculations in order to obtain results relevant on the national, or stratified level. These weights reflect the likelihood of such a household randomly appearing within the entire population of households. Moreover, we employ a clustered logistic regression, which accounts for the clustering of EAs in LSMS sample design.

5. ESTIMATION STRATEGY AND RESULTS

We estimate the impact of management contracts on a variety of different outcomes: the source of a hourseolh's water, the quality of a household's water, the number of hours per day of water service, household average monthly expediture on water during the winter, household average monthly expediture on water during the summer, whether the household receives continuous water supply, and whether a household member has experienced diarrhea in the last month. In some cases, such as hours of continuous service per day, these outcomes are simple quantitative variables. In such cases, we use a standard difference-in-difference approach. In other cases, such as whether a household receives continuous water service, the regressand is dichotomous and qualitative. In

these cases we use logistic pseudo-maximum-likelihood estimation (pMLE). Finally, in a third group of cases, for example the source of water for a household, the dependent variable is polychotomous and qualitative. In these cases, we employ multinomial logistic pMLE.

Table 1 provides an overview of both the independent and dependent variables. Our variable of interest, the interaction of MC and YR2005, measures whether or not the household is located in a region where water supply is operated by Berlinwasser at a time when management contracts were in effect. Since Berlinwasser had promised to extend the infrastructure and increase investment, we would expect more households in contracted districts to report their main source as running water inside their dwelling, and we also expect a positive relationship between MC*YR2005 and water continuity and number of hours of supply. We would also expect that with this increased investment, reported water quality would increase and incidence of diarrhea would decrease. We also expect water expenditure to increase if Berlinwasser effectively lobbies the government for increased tariffs.

We expect that proxies for household location would be useful in explaining regional differences in water supply. For example, households in mountainous regions will probably report less piped water than houses in urban regions. We use the same reasoning in using distance to the nearest doctor as a proxy for how close the household is to a city center. We predict a positive relationship between urban households and a piped, continuous water supply for more hours per day. We expect that household income and educational attainment will be useful in providing a measure of ability and willingness to pay for clean water. We expect both of these variables to have a positive relationship with water continuity, number of hours, quality, and expenditure and a negative relationship with diarrhea incidence. All else equal, we would expect households with more members We also employ average water expenditure as an explanatory variable for number of hours of water supplied because households may receive more hours of continuous water because they pay for it. Therefore, we expect a positive relationship between average water expenditure and hours supplied.

5.1. Dependent Variables

We estimate three different types of dependent variables: quantitative, dichotomous qualitative (binary), and polychotomous qualitative. These three different types of dependent variable require three different types of estimation; we use OLS estimation for quantitative dependent variables, logistic maximum-likelihood estimation (MLE) for dichotomous dependent variables, and multinomial logistic MLE for polychotomous dependent variables. Table 1 summarizes our dependent variables and the type of estimation used.

5.2. Linear Regression

Linear regression is used for our estimation of the three quantitative dependent variables: hours of continuous water supply, winter water expenditure, and summer water expenditure. Our estimation for hours of continuous water supply is given by the equation

where X is a vector of household-specific covariates (i.e., the bullet list above). For our estimation for winter water expenditure and summer water expenditure, we take the natural log of the same equation in order to estimate the impact in terms of percent change. The estimation for winter water expenditure and summer water expenditure is given by

5.3. Binary Logistic Regression

Binary logistic regression is employed in our estimation of two dichotomous qualitative dependent variables: continuity of water supply and incidence of diarrhea. Continuity of water supply and incidence of diarrhea can be first estimated by the same linear model as above

where X is a vector of household-specific covariates and y is interpreted as the probability that the household has a continuous water supply or the probability that the household has reported an incidence of diarrhea. The logistic model then specifies that the probability of continuous water supply (y = 1) and incidence of diarrhea (y = 1) are given by

Conversely, this implies that the probability of non-continuous water (y = 0) and no incidence of diarrhea (y = 0) is

The likelihood function is the product of the logit functions for all observations where the event occurred multiplied by the product of one-minus the logit functions for all observations for which the event did not occur, and is given by

Where i refers to the households with continuous water supply or incidence of diarrhea and j refers to households without. Maximizing the likelihood with respect to vector X results in the MLE of X. Then, for the nth household, the probability of positive outcome is estimated as

Therefore, by the formulas above and the logit model,

and the log-odds ratio can be written the same way as the linear probability model defined in equation (3)

5.4. Multinomial Logistic Regression

Multinomial logistic regression is used in our estimation of two polychotomous dependent variables: water source and water quality. Water source (y6) has seven different alternatives k such that k = 1, 2, 3, 4, 5, 6, 7 and water quality (y7) has three different alternatives k such that k = 1,2,3, which are listed in Table 2 and Table 3, respectively.

The probability of a household having one of the seven (k) sources of water (prob(y=k)) or one of the three (k) water qualities (prob(y=k)) is represented by the standard multinomial logit model:

and

where X_k are separate parameter vectors for each condition k—k=1,2,. The likelihood function then becomes

6. RESULTS

The first estimates are ordinary least squares and are reflected in Table 3, which highlights the impact of water privatization on number of reported hours of continuous water supply to the household. Significant at the 1% level, the households in management contract regions in 2005 receive roughly 4.7 more hours per day of continuous water supply than non-management contract regions. As we would then expect, households in management contract regions also more likely to report that they receive a continuous supply of water. Table 6 shows that households are 73.7% more likely to receive continuous water if they are in a contracted region.

However, this increase in supply also comes at a cost. Tables 4 and 5 report that in regions operated under management contract, water winter expenditure is 19.7% higher and summer water expenditure is 21.6% higher, both of which are significant at the 1% level. Interestingly, there is another cost of the increase in continuity and hours of supplied water: water quality. Compared to the base case of water being reported as "good for drinking", the odds that households in management contract regions report that the water they get from their main source is "not good for drinking, but good for everything else" increase 39.0%, and are significant at the 1% level. Households in the four privatized regions also report that they are slightly more likely to have water that is "not good for anything" relative to the base case of having water that is "good for drinking", but these results do not hold up at any significance level.

Despite reporting reduced water quality, households in regions operated under management contract reported fewer incidences of diarrhea. Although these results are only statistically significant at the 10% level, Table 7 reports that households with privately supplied water have only about a 30% chance of experiencing an incidence of diarrhea compared to a household receiving water from a public supply, which is surprising when considering that these households receiving water under management contract generally report that the water is of lower quality. One explanation is the fact that households with privately supplied water tend to pay more, on average, for their water than other households, so it is possible that this higher water expenditure is due to the fact that more money is spent on bottled water for drinking. It is also possible that these households

are more critical of their running water due to the higher prices. They may also be more likely to boil the water or treat it in some way.

Relative to other estimates, we were able to conclude less about the changes in water source as a result of management contract. Table 9 shows that relative to the base source of running water inside the dwelling, the only statistically significant change explained by management contract variable is a highly significant decrease in the likelihood of water source being a river lake or pond. We also observed statistically insignificant decreases in the probability of the household's main water source being running water outside the dwelling, a public tap, or other, and we observed statistically insignificant increases in the likelihood that the main household water source is a water truck or a spring or well.

However, 81.4% (6055) of households reported a water source of running water inside the dwelling (source=1), running water outside the dwelling (source=2), or a public tap (source=3). If the regression is performed only on these three sources, we are left with a statistically significant at the 10% level decrease in likelihood that the household will have running water outside (relative to inside) and almost significant at the 10% level decrease in the likelihood that the household uses a public tap as its main water source in management contracted regions. Although it is a stretch, restricting the sample to include only households with running water inside, outside, or from a public tap as their main water source provides a crude indication that households in management contract regions are more likely to have running water inside the dwelling.

7. CONCLUSIONS

In this study, the contracting out of Albania's water supply between the years of 2002 and 2005 yielded statistically significant improvements in tests of continuity of supply, hours of availability, and incidence of diarrhea. While these results speak to the successes of privatization along some dimensions, the ambiguous results with respect to perceived quality of the water provided and the increased water expenditure also point to some of its potential failures. In short, our study has

reaffirmed what the contentious debate on water privatization suggests: privatization is no panacea.

Although this study has a employed data from well-before the management contract with Berlinwasser International AG took effect, the 2005 data may not account for the full effect of privatization as it certainly takes time for a private company to develop and implement a strategy for privatization. Using data from only one-and-one-half to two years after signing a management contract may not allow for enough time to capture the full effect of privatization. Because of this, another study using data from 2008, when Berlinwasser's initial 5-year contract expires, may provide a fuller account of the effect of this outward contracting of Albania's water supply.

Finally, our model also does not attempt to account for nor to explain any the choice of management contract regions. It is possible that some of the changes we observed were part of the reason why certain prefectures contracted out their water supply, while others retained public management. We do not regard this potential endogeneity as a particularly forceful critique, given the similarity of the contracted regions to the non-contracted regions along many of the dimensions we measure.

Table 1. Variable Definitions

Variable	Type	Definition
Dependent Variables		
Hours	Quantitative	Hours per day of service
Winter Exp.	Quantitative	Avg. winter expend./mo. for water service
Summer Exp.	Quantitative	Avg. summer expend./mo. for water service
Continuity	Dichotomous Qualitative	HH receives continuous service
Diarrhea	Dichotomous Qualitative	HH has experienced diarrhea in past XX mos.
Source	Polychotomous Qualitative	Water source
Quality	Polychotomous Qualitative	Subjective water quality
Independent Variables		
Doc	Quantitative	Distance to nearest doctor in km.
Income	Quantitative	Income in 1000s of new leks
Members	Quantitative	Number of household members
Education	Quantitative	Highest level of educational attainment in HH
Average Exp.	Quantitative	Avg. monthly water expenditure
Urban	Dummy	HH is in an urban area
Coastal	Dummy	HH is in a coastal area
Central	Dummy	HH is in a central area
Mountain	Dummy	HH is in a mountainous area
MC	Dummy	HH is in a management contract district
YR2005	Dummy	Year 2005

Table 2. Summary Statistics

Variable	Mean			Std. Dev.		
	Overall	M.C.	No M.C.	Overall	M.C.	No M.C.
Hours						
Winter Exp.						
Summer Exp.						
Continuity						
Diarrhea						
Source						
Quality						
MC	0.07	1.00	0.00			
Doc	18.67	17.39	18.76			
Income	27.73	31.89	27.43			
Members	2.65	2.48	2.66			
Education						
Average Exp.	0.11	0.21	0.10			
Urban	0.56	0.52	0.56			
Coastal	0.27	1.00	0.22			
Central	0.27	0.00	0.29			
Mountain	0.27	0.00	0.29			

Table 3. Difference-in-Difference Estimation of the Impact of Management Contracts on Hours of Continuous Supply

Variable	Coefficient	Linearized Std. Err.
C	12.7***	(1.48)
MC*YR2005	4.73***	(1.66)
Doc	0.0196	(0.0349)
Income	0.00245	(0.00335)
Education	0.238	(0.149)
Members	-0.105	(0.144)
Average Exp.	-1.55	(2.51)
Urban	1.14	(0.971)
Coastal	-3.35***	(1.11)
Central	-0.599	(1.01)
Mountain	1.17	(1.10)
YR2005	-0.0854	(0.819)
N = 3889		
F(11, 672) = 2.89		
Prob > F = 0.0010		
$\bar{R}^2 = 0.031$		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 4. Difference-in-Difference Estimation of the Impact of Management Contracts on Log Winter Expenditure

Variable	Coefficient	Linearized Std. Err.
C	-1.98***	(0.0752)
MC*YR2005	0.196***	(0.0697)
Doc	0.00219	(0.00160)
Income	0.000211	(0.000148)
Education	0.0291***	(0.00752)
Members	0.0925***	(0.00786)
Urban	0.438***	(0.0498)
Coastal	0.206***	(0.0387)
Central	0.0641**	(0.0344)
Mountain	-0.302***	(0.0531)
YR2005	0.129***	(0.0362)
N = 3895		
F(10, 674) = 37.35		
Prob > F = 0.0000		
$\bar{R}^2 = 0.270$		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 5. Difference-in-Difference Estimation of the Impact of Management Contracts on Log Summer Expenditure

Variable	Coefficient	Linearized Std. Err.
C	-1.98***	(0.0769)
MC*YR2005	0.215***	(0.0712)
Doc	0.00242	(0.00176)
Income	0.000225	(0.000159)
Education	0.0282***	(0.00793)
Members	0.0911***	(0.00820)
Urban	0.428***	(0.0543)
Coastal	0.187***	(0.0406)
Central	0.104***	(0.0370)
Mountain	-0.224***	(0.0564)
YR2005	0.158***	(0.0392)
N = 3889		
F(10, 673) = 33.14		
Prob > F = 0.0000		
$\bar{R}^2 = 0.2474$		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 6. Logistic Estimation of the Impact of Management Contracts on Continuity of Water Service

Variable	Coefficient	Linearized Std. Err.
C	-0.778***	(0.245)
MC*YR2005	0.552**	(0.279)
Doc	0.000730	(0.00290)
Income	0.00110	(0.00295)
Education	0.0644**	(0.0280)
Members	-0.0443**	(0.0221)
Urban	0.221	(0.157)
Coastal	-0.485**	(0.217)
Central	0.117	(0.191)
Mountain	0.580***	(0.212)
YR2005	0.208	(0.134)
N = 6656		
F(10, 909) = 5.32		
Prob > F = 0.0000		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 7. Logistic Estimation of the Impact of Management Contracts on Incidence of Diarrhea

Variable	Coefficient	Linearized Std. Err.
C	-6.38***	(0.778)
MC*YR2005	-1.23*	(0.655)
Doc	0.00349	(0.00458)
Income	-0.0183**	(0.00803)
Education	0.0929	(0.0999)
Members	0.318***	(0.0683)
Urban	0.189	(0.332)
Coastal	0.561	(0.472)
Central	-0.0990	(0.540)
Mountain	0.0693	(0.552)
YR2005	0.349	(0.315)
N = 6656		
F(10, 909) = 3.76		
Prob > F = 0.0001		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 8. Codes for Water Source Alternatives

Code	Source
1	Running water inside dwelling
2	Running water outside dwelling
3	Public tap
4	Water truck
5	Spring/well
6	River/lake/pond
7	Other

Table 9. Multinomial Logistic Estimation of the Impact of Management Contracts on Water Source

Variable	Coefficient	Linearized Std. Err.
Source = 2		
C	0.395	(0.367)
MC*YR2005	-0.321	(0.324)
Doc	0.0112*	(0.00634)
Income	-0.0261***	(0.00702)
Education	-0.272***	(0.0377)
Members	0.0942***	(0.0345)
Urban	-2.49***	(0.179)
Coastal	0.231	(0.276)
Central	-0.174	(0.268)
Mountain	-0.183	(0.294)
YR2005	0.130	(0.167)
Source = 3		
C	0.0198	(0.547)
MC*YR2005	-0.505	(0.516)
Doc	0.0158**	(0.00642)
Income	-0.0235***	(0.00912)
Education	-0.229***	(0.0513)
Members	0.150***	(0.0417)
Urban	-3.01***	(0.320)
Coastal	-0.696	(0.470)
Central	-0.898**	(0.445)
Mountain	-0.656	(0.469)
YR2005	-0.177	(0.267)
Source = 4		
C	-0.377	(1.856)
MC*YR2005	0.375	(1.55)
Doc	0.0253***	(0.00767)
Income	-0.0104	(0.0203)
Education	-0.419***	(0.143)
Members	0.0579	(0.128)

Table 9—Continued

Variable	Coefficient	Linearized Std. Err.
Urban	-3.75***	(1.09)
Coastal	-2.61*	(1.50)
Central	-2.24**	(1.14)
Mountain	-4.34***	(1.50)
YR2005	-1.01	(0.843)
Source = 5		
C	0.0976	(0.414)
MC*YR2005	0.266	(0.365)
Doc	0.0162***	(0.00585)
Income	-0.0168***	(0.00481)
Education	-0.236***	(0.0365)
Members	0.136***	(0.0322)
Urban	-2.72***	(0.241)
Coastal	0.278	(0.339)
Central	-0.152	(0.344)
Mountain	-0.725**	(0.370)
YR2005	0.242	(0.206)
Source = 6		
C	-2.01*	(1.21)
MC*YR2005	-30.6***	(1.43)
Doc	0.0281***	(0.0103)
Income	0.00256	(0.00788)
Education	-0.437*	(0.235)
Members	-0.152	(0.127)
Urban	-34.9***	(5.37)
Coastal	-1.74	..
Central	0.528	(1.16)
Mountain	-1.88	(1.25)
YR2005	-1.17	(1.23)
Source = 7		

Table 9—Continued

Variable	Coefficient	Linearized Std. Err.
C	-25.7	..
MC*YR2005	-0.229	(1.31)
Doc	0.00389	(0.0204)
Income	-0.0340	(0.0209)
Education	-0.434*	(0.250)
Members	0.506***	(0.0998)
Urban	0.795	(0.853)
Coastal	21.0***	(1.28)
Central	19.4***	(1.20)
Mountain	-13.4***	(1.14)
YR2005	-1.61	(1.04)
N = 6656		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall population. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 10. Codes for Water Quality Alternatives

Code	Source
1	Good for drinking
2	Not good for drinking, but good for everything else
3	Not good for anything

Table 11. Multinomial Logistic Estimation of the Impact of Management Contracts on Perceived 2005 Water Quality (All Respondents)

Variable	Coefficient	Linearized Std. Err.
Quality = 2		
C	-0.970***	(0.347)
MC*YR2005	0.871***	(0.312)
Doc	-0.00440	(0.00548)
Income	-0.000334	(0.000371)
Education	0.152***	(0.0383)
Members	-0.0169	(0.0321)
Urban	-0.0115	(0.259)
Coastal	-0.470	(0.320)
Central	-1.78***	(0.297)
Mountain	-1.91***	(0.404)
Quality = 3		
C	-3.30***	(1.12)
MC*YR2005	0.105	(0.801)
Doc	-0.00707	(0.0144)
Income	-0.0595***	(0.0224)
Education	0.420**	(0.189)
Members	-0.114	(0.116)
Urban	0.0516	(0.591)
Coastal	-0.562	(0.876)
Central	-1.10	(0.784)
Mountain	-1.57	(1.06)
N = 3709		
F(18, 459) = 7.51		
Prob > F = 0.0000		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall pop-

ulation. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

Table 12. Multinomial Logistic Estimation of the Impact of Management Contracts on Perceived 2005 Water Quality (Respondents with Source 1 or 2)

Variable	Coefficient	Linearized Std. Err.
Quality = 2		
C	-1.06**	(0.453)
MC*YR2005	0.428	(0.370)
Doc	-0.024***	(0.00935)
Income	-0.000531	(0.000410)
Education	0.164***	(0.0462)
Members	-0.000429	(0.0360)
Urban	0.152	(0.320)
Coastal	-0.334	(0.358)
Central	-1.91***	(0.341)
Mountain	-3.09***	(0.439)
Quality = 3		
C	-3.69*	(2.01)
MC*YR2005	-0.0763	(1.25)
Doc	-0.0738	(0.0498)
Income	-0.0573***	(0.0213)
Education	0.657*	(0.349)
Members	-0.163	(0.204)
Urban	-0.722	(0.798)
Coastal	-0.132	(1.34)
Central	-1.62	(1.05)
Mountain	-0.707	(1.37)
N = 2785		
F(18, 459) = 15.75		
Prob > F = 0.0000		

Note. — Data are clustered at the level of the "enumerated area" in Albania's LSMS data and weighted in proportion to their expected frequency in the overall pop-

ulation. ***, **, and * represent statistical significance at the 1 percent, 5 percent, and 10 percent level, respectively.

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