Inter-American Development Bank

Water and Sanitation Sector:

A Colombian Overview

Fabiana Machado
Giselle Vesga

Department of Research and Chief Economist

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Abstract

This report presents descriptive statistics from Colombian water and sanitation data, and corresponding public opinion data. The water and sanitation data are at the firm and municipality level and produced by several Colombian government agencies. The public opinion data are provided by the Latin American Public Opinion Project (LAPOP).

JEL classifications: H410, H760
Keywords: Water and Sanitation, Service provision

1. Introduction

High levels of coverage and high-quality provision of water and sewerage services are key issues in improving quality of life and reducing poverty. Several studies have been conducted on the topic in Colombia, mainly looking at the effects of decentralization and privatization on the sector's performance.

Despite these efforts to understand the sector's performance, research on the factors underlying differences in coverage and quality of water and sanitation provision remains scant. An initial step in this line of investigation is to provide a global picture of the sector's state of affairs, which represents the main motivation for this data collection effort and report.

The paper presents a rich set of data at three levels of observation: municipality, firm, and citizen. Municipal data are from the National Planning Department (Departamento Nacional de Planeación, DNP), Colombian Electoral Office (Registraduría Nacional del Estado Civil), National Statistics Administration Department (Departamento Administrativo Nacional de Estadística, DANE), and academic researchers.[1] Municipal-level data allow us to identify key contextual traits pertaining to the quality of life, service accessibility and performance, investment and expenditures, and political landscape. A summary table presenting all variables in the analysis, the unit of observation, the source, and the coverage is provided in the Microsoft Excel worksheet "variables and years.xls" included with the data.

Firm-level data are from the Colombian System of Public Service Information (Sistema Unico de Información de Servicios Públicos, SUI).[2] The SUI makes available data on provider finances, with emphasis on investment patterns and performance indicators. While in many cases there is a one-to-one correspondence between firms and municipalities, there are some firms serving multiple municipalities and some municipalities with multiple providers.

Finally, we selected relevant questions from the Latin America Public Opinion Project (LAPOP) on citizen perception of the government, public service provision, and other related topics.

This wealth of data allows us to provide a general—if incomplete—review of the water and sanitation sector in Colombia including firm and local government behavior as well as

[1] Thanks to Fabio Sánchez from the Universidad de los Andes.
[2] These data are monitored by the Superintendencia de Servicios Públicos Domiciliarios (SSPD), a government body that controls and monitors the provision of public services.

citizens' perceptions. Our hope is that this data bank will be a valuable tool for both researchers and policy professionals seeking to understand the political economy of public service provision.

Our aim with this report is to fulfill two main objectives: first, to provide a descriptive overview of the data at the municipal, firm, and individual level; and second, to provide some basic sectoral analysis based on our descriptive statistics with the hope of motivating future research.

The remainder of the paper is presented in three sections. The next (second) section presents the municipal-level data, and it is organized around three themes: general characteristics of municipalities, water and sanitation performance indicators, and electoral information. The third section presents firm-level statistics, including investment and performance indicators. The fourth section presents individual-level survey data, with particular emphasis on service satisfaction, political participation and attitudes towards the government. Within each section we first describe the available data and sources, then provide a brief set of findings.

2. Municipalities

At the municipal level we provide three general types of information: i) general municipal characteristics, including population, distance to departmental capital, and tax revenue; ii) performance characteristics, including general measures of quality of life as well as performance indicators specific to the water and sanitation sector; iii) electoral statistics, including the level of competition and number of parties in municipal-level races.

The data include information on a total of 1,123 units of observation (municipalities). There are two reasons why this figure does not correspond exactly to the current number of municipalities (1,119): changes in the administrative boundaries (where new municipalities are created from old ones) and the inclusion of departmental districts.[3] The data include all metropolitan areas and the capital city, Bogota D.C.

2.1 General Characteristics

2.1.1 Population

Population characteristics of municipalities are provided by DANE. The total number of inhabitants (*total*) in each municipality refers to the national census conducted in Colombia in

[3] Small groups of population that are not part of the municipalities established by Decree 2274 of October 4, 1991.

the year 2005. The variables (*hombres*) and (*mujeres*) show the number of men and women, respectively. Table 1 displays a breakdown of total population decomposed into urban (*total_cab*) and rural (*total_res*) areas.

Table 1. Population by Urban and Rural Area

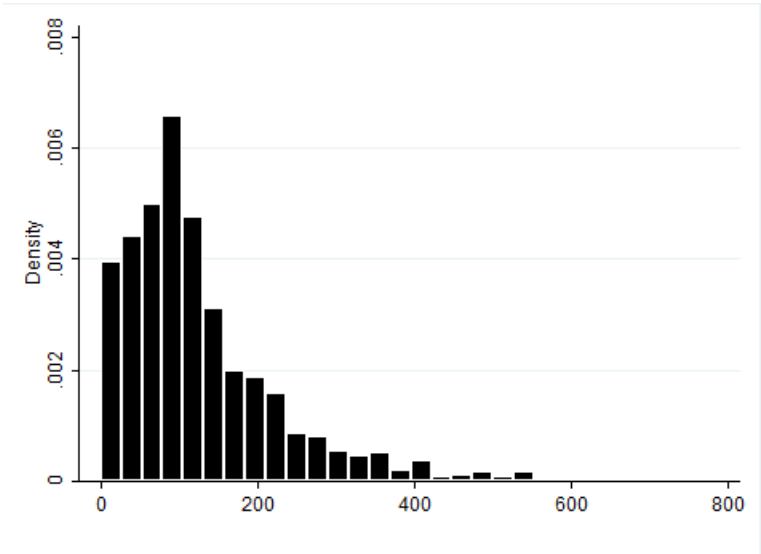
Variable	Obs	Mean	Median	Std. dev.	Min	Max
Urban	1,098	28,697.98	4,159.50	231,580.95	17	676,3325
Rural	1,112	8,955.04	6,210.00	9,735.12	4	111,180
Total	1,114	37,224.76	11,421.00	231,629.30	4	6,778,691

Source: Census 2005.
Note: Urban areas include large metropolitan cities.

2.1.2 Distance to Main City

The linear distances (*discapital*) between each municipality and its department capital provide a measure of centrality. These distances are based on latitude and longitude coordinates from the Agustín Codazzi Geographic Institute (IGAC). This variable is calculated in kilometers, and has a minimum value of 0, which correspond to capital cities, and a maximum of 790 km. The average municipality is approximately 128 km away from the department's main city. The distribution of distances is plotted in Figure 1.

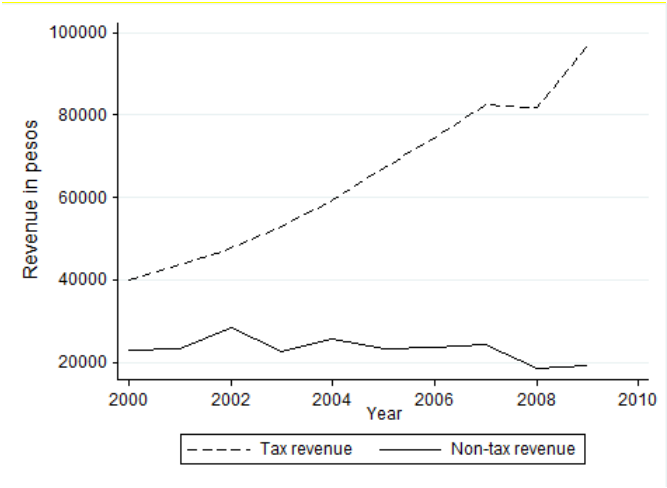
Figure 1. Distance to the Capital (KM)



2.1.3 Tax and Non-Tax Revenue

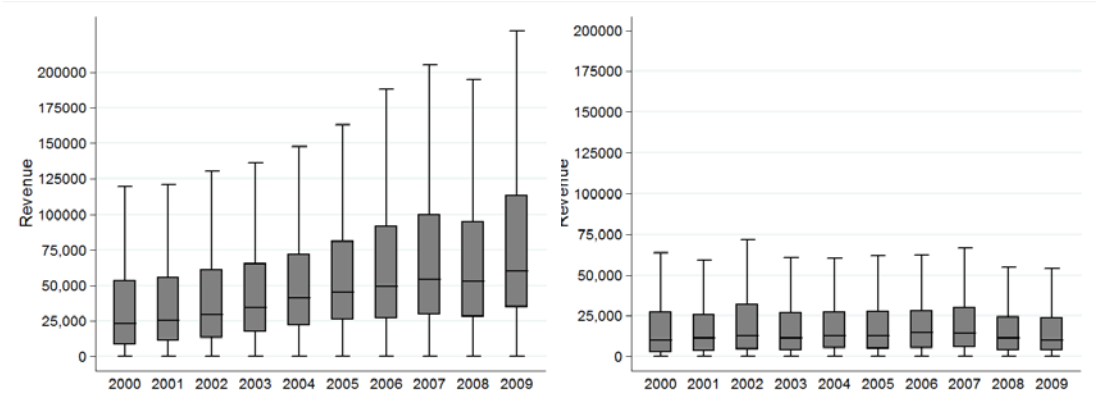
Per capita tax (*tax_08pc*) and non-tax (*notax_08pc*) revenue (in 2008 pesos) are available from 2000 to 2009 and provided by the National Planning Department (DNP). Figure 2 displays the average revenue of municipalities during the period for which data are available. While tax revenue increased over time, average non-tax revenue has been stable at around 20,000 pesos per capita, declining somewhat since 2007 (possibly due to the financial crisis experienced during those years). As shown in Figure 3, the dispersion of revenues within those years is skewed towards the left.

Figure 2. Average Tax and Non-Tax Revenue



Note: Values in per capita and constant prices of 2008.

Figure 3. Tax and Non-Tax Revenue by Year



(a) Tax Revenue (b) Non-tax revenue

Note: Values in per capita and constant prices of 2008. Figure excludes outlier values.

2.2. General Performance

2.2.1 Quality of Life

Two quality of life indices are included in the data. Both, however, are available only for 2005. The first index measures unmet basic needs (*necessidades básicas insatisfechas*—NBI) and is based on data provided by DANE. The NBI (*prop_tot*) shows the percentage of households in the municipality that have at least one basic need unfulfilled. The following needs are considered: housing adequacy, crowding levels, access to basic sanitation services, school attendance and subsistence levels.

Housing adequacy is evaluated based on the quality of the construction and materials used. Examples of inadequate housing are mobile homes, natural shelters or bridges, and houses with no walls or dirt floors. A household is considered to be overcrowded if there are more than three persons per room. The baseline for evaluating school attendance is that every child in the household between the ages of 6 and 12 years old should be attending school. Finally, subsistence requires a minimum of one working person per three dependents and that the head of the household have a minimum of 2 years of primary education completed.[4] This index was calculated based on census data in 2005 by the DANE. The information is available aggregated at the municipal level or broken down into rural (*prop_res*) and urban (prop_cab) areas.

The second index is an overall quality of life indicator (*icv*), also from DANE. ICV is an index calculated by taking the first principal component of the following variables: educational attainment of the head of the household and members 12 years old or older, number of members between 12 and 18 years of age attending secondary school, members between 5 and 11 years old attending school, household floors and wall materials, access to water, cooking method, garbage collection, sewage system, number of children 6 years old or younger, and number of persons per room. The resulting variable ranges from 0 (lowest quality of life) to 100 (highest quality of life).

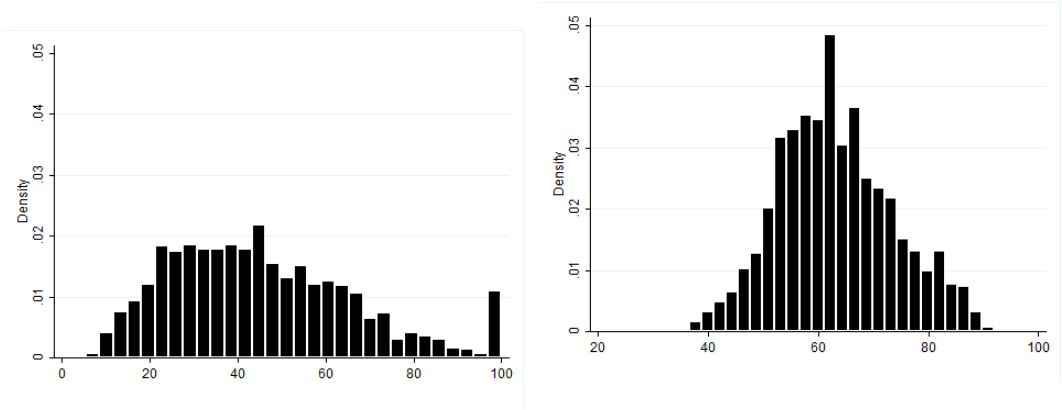
The distribution of municipalities over the range of the unsatisfied basic needs index is shown in Figure 4(a). Most Colombian municipalities have an index below 50 percent, and a few are clustered at 100 percent. This indicates many families in Colombia still lack some very basic needs. When it comes to the quality of life index, shown in Figure 4(b), the average municipality scores somewhat above 60, but still below the minimum acceptable value set by the government.

[4] See: http://www.dane.gov.co/files/investigaciones/boletines/censo/Bol_nbi_censo_2005.pdf

Both indicators illustrate the discrepancies across Colombian municipalities, covering almost the entire range from excellent quality of life to basic needs being unmet.

Municipalities scoring low on the ICV index and high on the NBI tend to be smaller in number of inhabitants, poorer in terms of tax revenue and located further away from the capital of their department. Whether a municipality is predominantly urban or rural and whether paramilitaries or the military are present is not significantly correlated with either indicator; see Figures 6(b) and 6(a).

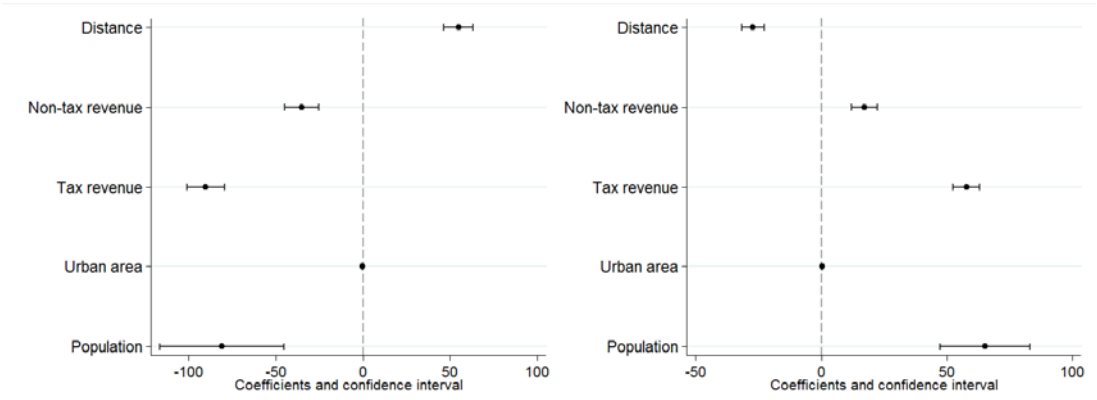
Figure 4. Indicators



(a) Unsatisfied basic needs (b) Quality life index

Source: Census 2005.

Figure 5. Association ICV, NBI and Municipality Characteristics



(a) Unsatisfied basic needs (b) Quality of life index

Source: Authors' calculations.
Note: Results correspond to estimated coefficient of OLS bivariate regressions of the indicators on each municipal indicator (population, urban area, distance to the capital and revenues. Variables were scaled 1-100 for comparison.

2.2.2 Management Performance

DNP provides an overall management performance indicator (*idi*) for municipalities from 2005 to 2011. IDI is an overall index of municipal government performance calculated by the DNP and available for 2005 to 2011.[5] The indicator is based on five subcomponents: effectiveness, efficiency, compliance with the law, management capacity, and exogenous factors. The first component is intended to capture the extent to which municipal governments accomplish the development plan they set forth for particular sectors (education, health, water and sanitation, and "others"—housing, roads, agriculture, environment, culture, recreation and sports, etc.). The goals are mostly set in terms of investment levels. The first four sectors receive a weight of 60 percent in the calculations and "others" receive the remaining 40 percent. The weights attributed to the items within the "others" category are determined by the local governments themselves. The variable is measured in percentages.

The efficiency component is constructed for the same sectors used in the effectiveness indicator, but focusing on how far the local government effort and investment goes in reaching intended outcomes (enrollment rates, test scores, access to public health services, rate of immunization among children, etc.). In that sense it is possible that some municipalities invest more and better fulfill their investment plans, but achieve lower levels of the outcomes relative to municipalities that invest less. This indicator is based on the Data Envelopment Analysis technique, where inputs are assessed relative to a production frontier. The closer the municipality is to the best achievable outcome given its level of inputs the more efficient it is. The final indicator is an average of efficiency scores for each sector and varies from 0 (least efficient) to 100 (most efficient).

The third indicator refers to compliance with the law regulating the distribution of power and resources among government units, which was passed during the process of decentralization. In particular, the indicator seeks to captures the extent to which local governments are complying with the guidelines for using the resources transferred to them by the national government under the General Participation System (Sistema General de Participaciones, SGP). The information used to calculate this indicator is based on reports submitted by local governments under the Budget Execution Reporting System (Sistema de Captura de Ejecuciones Presupuestales, SI-CEP). This indicator is also a simple average of scores for each of the sectors and components

[5] For a detailed methodology see DNP, CAF and UNDP (2005).

within them. The general metric is a ratio between what was spent in each component over what the law stipulates as the minimum expenditure. It is worth noting that inconsistencies in the report providing the data, or failure to submit it, entail a score of 0 to the municipality at fault. The maximum score is 100.

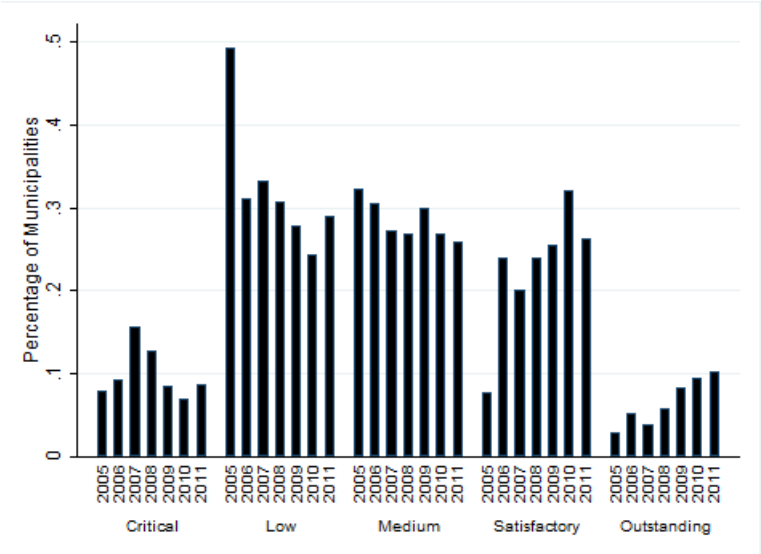
The management component tries to capture the administrative, fiscal and sectoral capacity of municipalities to fulfill their development plan. The first two aspects are aggregated into one index of management and are equally weighted. The administrative capacity score is calculated based on indicators for management personnel stability, and levels of professionalization, systematization and automation of processes, among others. The fiscal management capacity score is based on self-financing capability, debt levels, dependency on transfers, proportion of own resources in budget, investment levels and savings capacity. The third aspect, sectoral management capacity, focuses on the same sectors used in previous measures: education, health, and water.[6]

The final component includes variables exogenous to the municipal administration but that affect their performance. These exogenous factors are chosen by each municipality depending on their own assessment of what affects their performance the most.

The aggregation of all these measures yields the final performance indicator, taking values from 0 (lowest performance) to 100 (highest performance). This scale is broken down into four categories: outstanding (above 80), satisfactory (between 70 and 80), medium (between 60 and 70), low (between 40 and 60) and critical (below 40). Performance at the municipal level has been increasing according to this measure. As shown in Figure 6 the percentage of municipalities classified as having “critical” and “low levels” of performance has declined as the percentage of “outstanding” municipalities has grown.

[6] For further information on the methodology see DNP, CAF and UNDP (2005).

Figure 6. Municipalities by Score on Government Performance Indicator



Source: DNP.
Note: Scores are calculated by the government based on self-reported information from municipalities. The indicator follows the methodology of DNP, CAF and UNDP (2005).

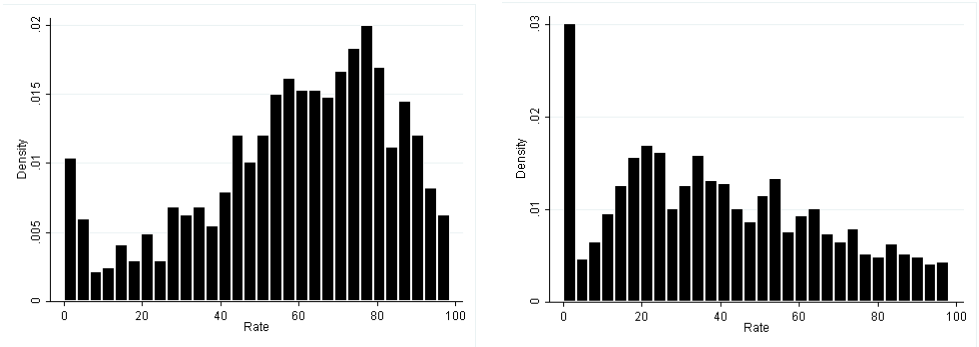
2.3. Water and Sanitation Performance

2.3.1 Coverage

Performance in the water and sanitation sector can be measured from several perspectives. A common indicator is coverage, or the percentage of the population with access to both water (*p_acueducto*) and sewerage (*p_alcantarillado*) services. The measure presented here is based on the 2005 census.[7] The distribution of municipalities across coverage rates is shown in Figure 7 for water and sanitation, respectively. It is skewed towards lower levels of coverage when it comes to sanitation, but towards higher coverage in the case of access to water. There remains, however, a good number of municipalities where more than half of households do not enjoy access to water, and even more municipalities fail to provide sanitation services to a majority of their households.

[7] Available at http://190.25.231.246:8080/Dane/tree.jsf

Figure 7. Coverage Rates in the Sector



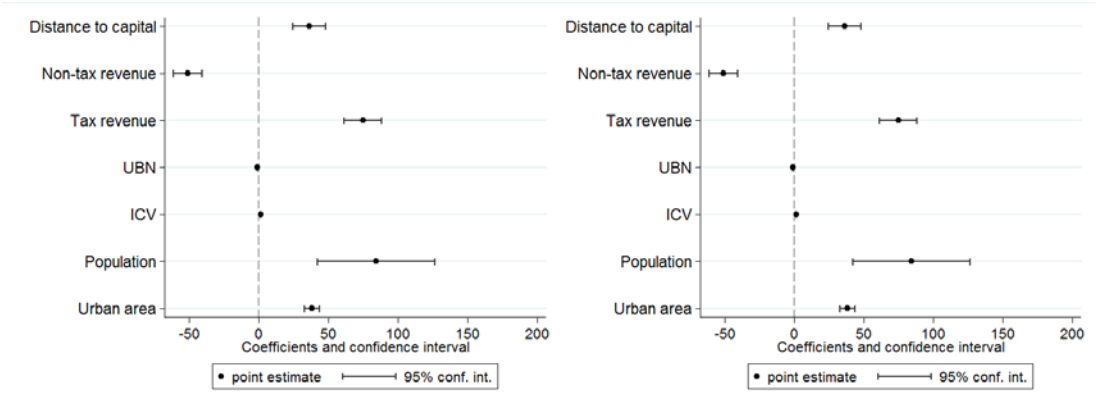
(a) Water coverage (b) Sewerage coverage

Source: Census 2005.

2.3.2 Municipal Characteristics and Coverage in the Water and Sanitation Sector

In order to check for associations between municipal coverage in the water and sanitation sector and general municipal characteristics, we run simple bivariate OLS regressions. Results are displayed in Figure 8. First, cities that are located further away from the capital and those with higher tax revenues tend to perform better on average than cities located closer to the capitals and collecting less taxes. Bigger cities, in terms of population size, are also the ones receiving better scores on coverage and efficiency, although not on effectiveness. Finally, municipalities that are predominantly urban tend to have better service coverage and efficiency, but lower effectiveness on average.

Figure 8. Correlations among Sector Coverage and Municipalities' Characteristics



(a) Water coverage (b) Sewerage coverage

Source: Authors' calculations.
Note: OLS bivariate regressions of coverage on municipal characteristics with year fixed effects.

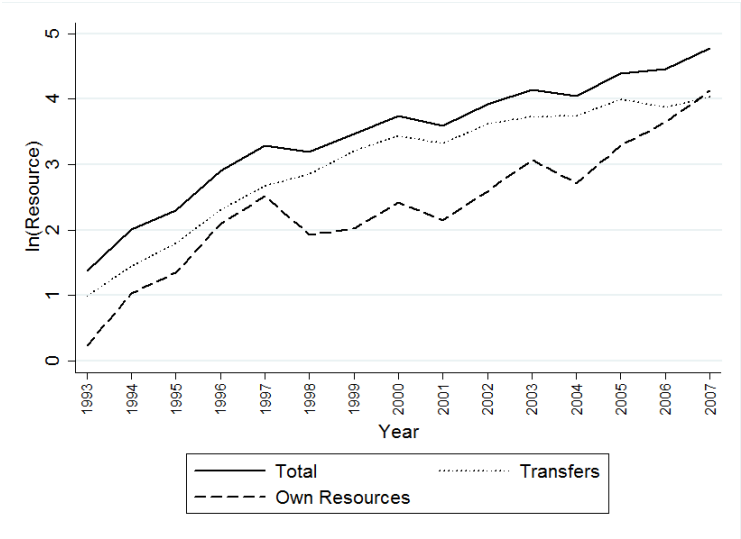
2.3.3 Expenditures in the Sector

In addition to composite indices, that data set also includes information on raw expenditures in water and sanitation. The data, available from 1991 to 2007, specify the amounts financed through own resources and through transfers from the central government. Those data are provided by the DNP and the variables are measured in per capita values at constant 2008 pesos (*Tot_agua_pcapita* refers to total expenditures, *transferencias_agua_pcapita* measures expenditures through transfers, and *recursos_agua_pcapita* captures expenditures from own resources).

Trends over time of expenditure in the water sector are shown in Figure 9. Expenditures have been on the rise since 2001, in particular those financed through municipalities' own resources.

Sánchez and Pachón (2013) argue that after the sector's reform in 2001,[8] local governments had higher incentives to increase expenditures in the sector. The reason, the authors argue, is to gain more political support through an increase in local political autonomy and as a result higher capacity to deliver services valued by the population.

Figure 9. Per Capita Expenditures in Water and Sanitation

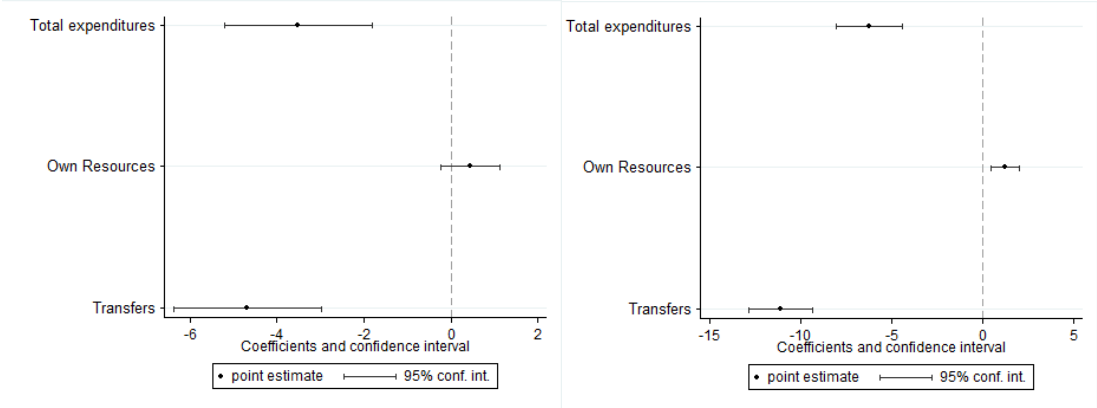


Source: Authors' calculations.
Note: The values are the logarithm of the average per capita expenditure in the sector per year. On average data are available for 96.14 percent of the total number of municipalities.

[8] Law 715 of 2001, which established the way in which the transfers received by the General System of Revenue Sharing should be distributed to Municipalities and Departments.

The association between expenditures and coverage is shown in Table 10, which shows the results for a simple bivariate OLS regression with fixed effects by year. The results support the findings of Sánchez and Pachón (2013) related to expenditures in the sector with own resources and the sector's performance.

Figure 10. Correlations among Expenditures and Coverage



(a) Water coverage (b) Sewerage coverage

Source: Authors' calculations.
Note: OLS bivariate regressions of coverage on the logarithm of per capita expenditures in the sector with year fixed effects.

2.3.4 Effectiveness and Efficiency in the Water Sector

Two additional indicators available are the ones used to calculate the government capacity measure described above. As previously mentioned, the DNP has devised two indicators of municipal effectiveness (*eficacia_Agua*) and efficiency (*eficiencia_agua*) in the water and sanitation sectors. They are available from 2005 to 2011, excluding 2006. They are measured on a 100-point scale, where 100 means that the municipality has the best performance.

As explained earlier, the effectiveness indicator seeks to capture the extent to which municipal governments accomplish the goals established in their development plans. For this particular measure only goals related to the water and sanitation sector are considered. The efficiency indicator, in turn, attempts to capture, through data envelopment analysis, how far a municipality is from the best achievable outcome (based on what other municipalities achieve) given the amount of inputs it dedicates to the sector.

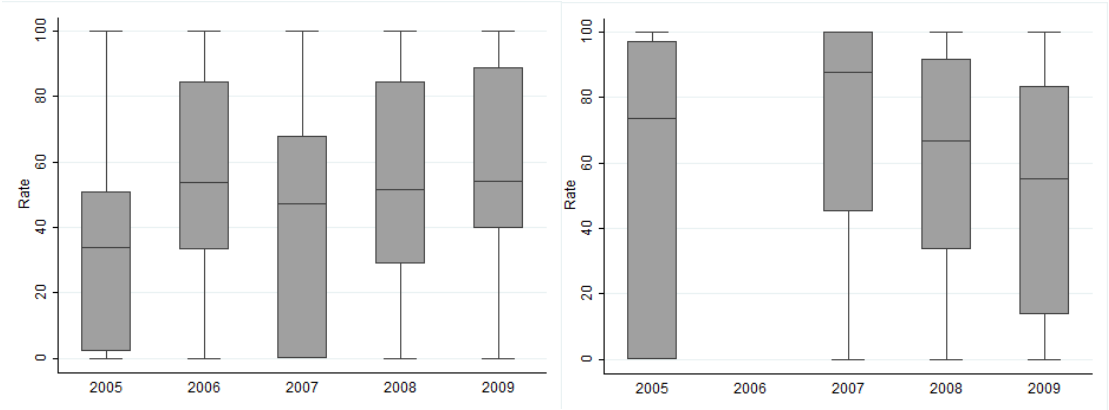
The final indicator is a simple average of two efficiency indicators, one with respect to coverage and the other with respect to quality. Efficiency in coverage is input oriented, that is, the scores takes into account how much input municipalities are using to produce a certain level of outputs. The smaller amount of inputs they use to reach a given level of output the better. The two outputs used are the amount of water made available and the number of users with access to it. The inputs considered are total monetary investment in the sector and monthly average supply of water. The efficiency indicator on quality is output oriented, that is, scores are calculated based on their distances from an output frontier given their levels of input. The better the output they produce given a particular level of inputs the higher the efficiency. The output in this case is the water quality index, and the inputs are the average scores on water quality tests and total investment in services.[9]

As was the case with the comprehensive indicator discussed in the previous section, the indicators specific to provision of water can be classified into five levels: critical, low, middle, satisfactory and outstanding. It is important to note that if two or more municipalities share a common provider and are contiguous, input and output values are aggregated at the provider level. This means some municipalities will share the same ratings.

Figure 11 displays the efficiency rate (quality and coverage) of water services for the period 2005-2009, and the effectiveness scores for the years 2005, 2007, 2008, and 2009. On average, efficiency in the provision of water services has been stable throughout the period, while effectiveness has shown somewhat of a decline (about 20 percent). This is expected, given the efficiency methodology, which depends solely on the municipalities in the sample and is a relative measure of performance.

[9] See: https://www.dnp.gov.co/Portals/0/archivos/documentos/DDTS/Gestion_Publica_Territorial/1aMetod_desem_mpal.pdf

Figure 11. Efficiency and Effectiveness Rates



(a) Efficiency (b) Effectiveness

Source: DNP.

2.4 Local Elections

Local elections can convey important information about the degree of political participation and competition across municipalities. The dataset contains information about turnout and measures of the extent of competition in mayoral and municipal council elections. They are available for election years including 1997, 2000, 2003, 2007 and 2011.[10] It is important to highlight some key issues about local elections in Colombia. First of all, mayors cannot be reelected for consecutive terms. Second, local councils have anywhere between seven and 21 seats depending on the municipality's population size. Moreover, for council elections, parties can decide whether or not to use preferential voting.[11]

The first indicator discussed is voter turnout, available for mayoral and local council elections since 2000 (*turnout6* and *turnout7*, for the mayor and council elections, respectively). The second group of variables includes those commonly used to capture the degree of political competition in a given election. They are the effective number of parties[12] (*en_parties6* and *en_parties7*, for the mayor and council elections, respectively) and the margin of victory

[10] Elections took place every three years until 2003, when terms were increased by one year.

[11] In local council and congressional elections in Colombia parties can choose whether to compete with open or closed lists. Under closed lists, the party determines before the election the order in which seats will be awarded to candidates. Voters in such cases cast their votes to particular party as opposed to an individual candidate. Under open lists, the ranking of candidates for seat allocation is determined by the number of votes they receive. In such cases, voters cast their votes to individual candidates.

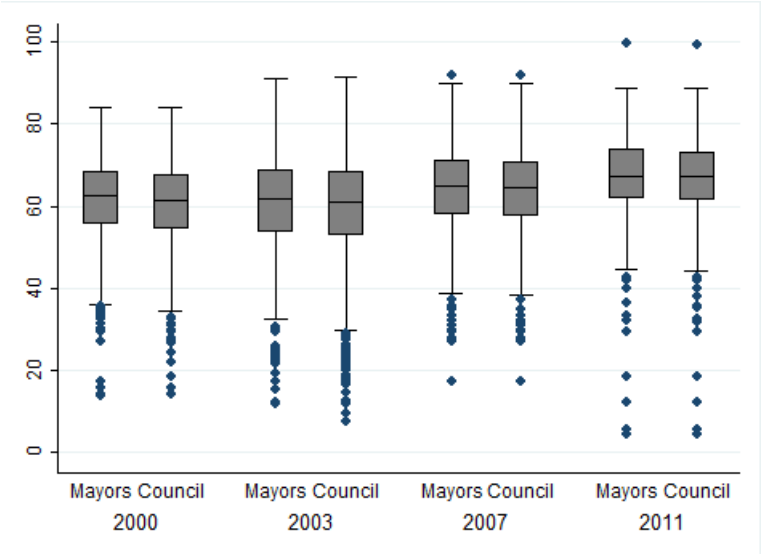
[12] Calculated, following Laakso and Taagepera (1979), as the inverse of the sum of the square of a party's proportion of all votes.

(*margin6*), calculated as the difference in vote percentages between the top two mayoral candidates.

2.4.1 Turnout

One of the most important forms of political participation and an instrument for citizens to affect the political decision process is voting. Voter turnout has been used in numerous studies to proxy for a municipality's level of political engagement and interest, in particular where voting is not compulsory. It is commonly measured as the percentage of the voting age population who actually turns out at the polls. In Colombia, voting is not compulsory and, as shown in Figure 12, average turnout levels at local elections have slightly increased during the 10-year period covered by the data (from about 60 percent in 2000 to around 70 percent in 2011). Variation across municipalities, however, remains high.

Figure 12. Turnout Rate



Source: Colombian Electoral Office.

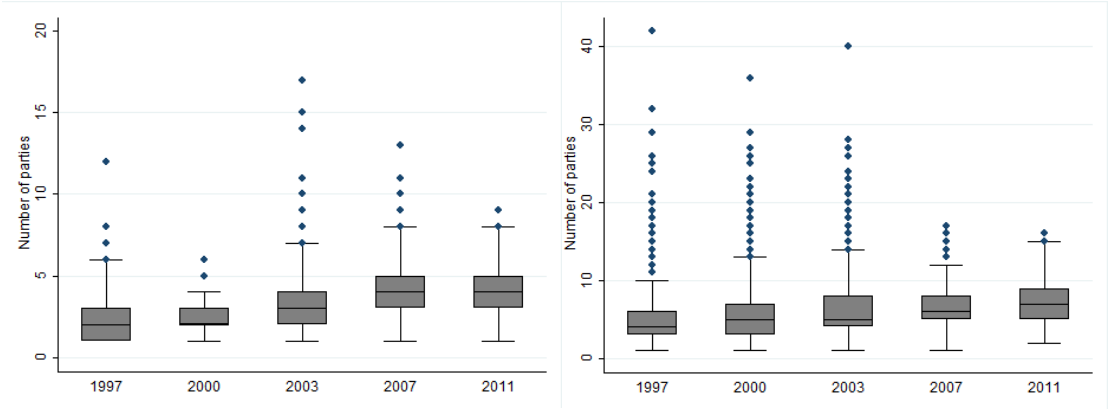
2.4.2 Competition

Political competition has been recognized as a relevant factor for understanding local performance in service delivery. It is usually proxied by two indicators. The first is the effective number of parties running for or holding office, and the second is the margin of victory. Close

elections, meaning small margins of victory, are usually interpreted as a sign of a highly "competitive" political landscape.

The total number of parties (*nparty*) that participated in each election, mayoral and legislative, is shown in Figure 13, and the effective number of parties with seats in the local council can be seen in Figure 14. The average number of parties competing in and winning elections in municipalities in Colombia has been increasing. The average has shifted from a two-party competition to a race involving up to four parties in mayoral contests, and up to 10 parties in local legislative elections. Local legislative seats are still concentrated in the hands of four or fewer parties.

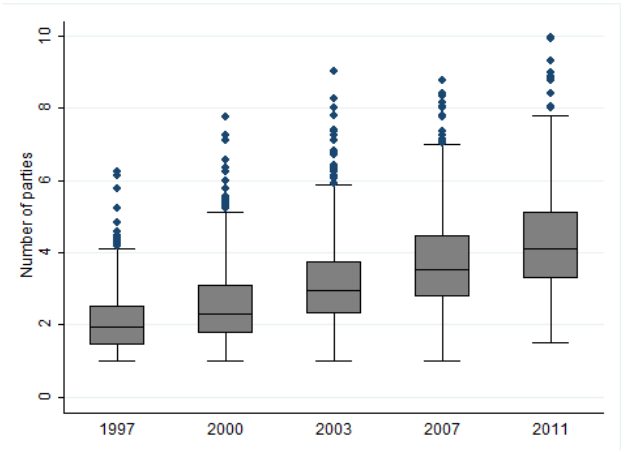
Figure 13. Number of Parties by Type of Election



(a) Mayor elections (b) Council elections

Source: Authors' calculations based on Colombian Electoral Office data.

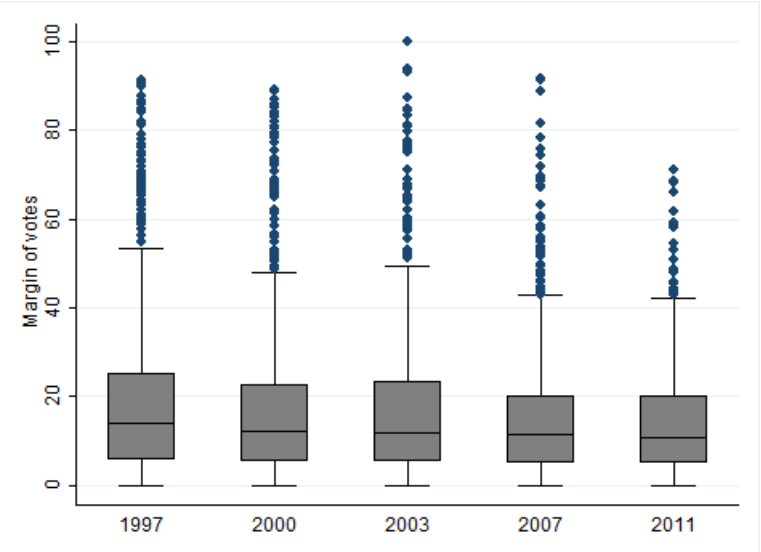
Figure 14. Effective Number of Parties Holding Seats in Local Councils



Source: Authors' calculations based on Colombian Electoral Office data.

Finally, Figure 15 shows the distribution by year of the margins of victory in mayoral elections. It is measured as the difference in percentage of votes received by the first two contenders.

Figure 15. Margin of Votes in Mayor Elections



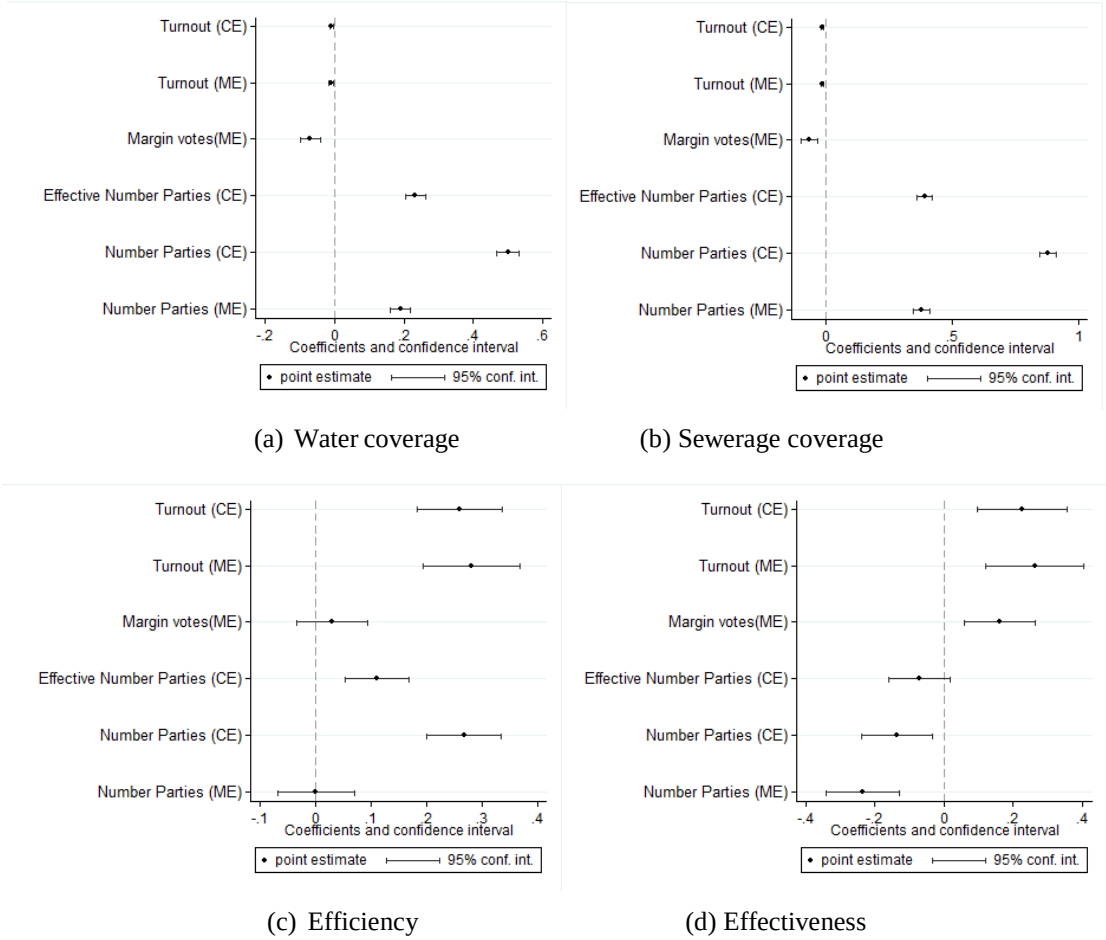
Source: Authors' calculations.
Note: Margins are calculated as the difference in percentage of votes received by the first two contenders in mayoral races

While in some municipalities mayoral elections seem to be highly contested, in others mayors are winning with very wide margins. The average margin of victory lies below 20 percent and shows a slight decrease over time to around 15 percent in 2007.

2.4.3 Elections and Performance

Figure 16 displays simple bivariate associations between the political variables and outcomes in the Water and Sanitation sector. The figure shows the coefficients of OLS regressions of the outcome indicators on each of the political measures described separately above. Municipalities with better performance in terms of service coverage and the government indicator of efficiency tend to be those with a higher number of parties on average. This relationship is reversed in the case of the government indicator of effectiveness. A higher degree of political competition, measured as closeness of victory in mayoral elections, is associated with lower, rather than higher, service coverage. Again, the relationship is reversed in the case of the government's effectiveness indicator.

Figure 16. Correlations among Political Competitiveness or Electoral Turnout and Performance Index



(a) Water coverage (b) Sewerage coverage

(c) Efficiency (d) Effectiveness

Source: Authors' calculations.
Note: OLS bivariate regressions of the sector performance indicators on each political variable with year fixed effects. Indicators of number of parties were scaled to range between 1 and 100. Acronyms refer to mayor elections (ME) and council elections (CE).

3. Water and Sanitation Providers

In addition to municipal-level data, the Colombian government provides information about both the finances and structure of water and sanitation providers. While in many cases these data are for municipalities, some providers service multiple municipalities and some municipalities are serviced by multiple providers. The main source of information about providers of public

services in Colombia is the Sistema Unico de Información de Servicios Públicos (SUI), which contains administrative, commercial, financial and technical reports.[13]

Note that the data for providers are very sparse. In total, the World Bank estimated that in 2004 Colombia had about 1,500 water and sanitation urban providers and more than 12,000 (mostly small) rural service providers. The data set created for this project ("provider_sample.dta") contains 1,462 providers for which information on some key variables is available, and for many variables only a subset of providers have information.

3.1 General Characteristics

Water and sanitation providers are classified into two groups depending on how many households they serve. Small providers, defined as those supplying less than 2,500 houses, are subject to special regulations, in particular concerning the tariffs they charge.[14] This group of providers includes over 2,000 suppliers, while those serving more than 2,500 households total less than 500.

The variables for each provider are the following: date they began their activities (*activity_start*), provider nature (*type_clas*), provider size (*users_clas*), municipalities served by provider (*mun(number)*), revenue from billing (*bill_vol*), number of users (*users*), project investment (*projects*), tariffs (*tariffs*), and a number of quality and quantity indicators discussed in more detail below.

It is important to note that not all information is available for all providers in the dataset.

Table 2 lists for each of the variables the number of providers in the municipalities for which information is available. While we cannot observe how the data selection process occurs, where we have some information about providers we can make comparisons between those that give information and those that do not. Figure 17 shows the distribution for the providers that are below the 95th percentile of the whole sample.[15]

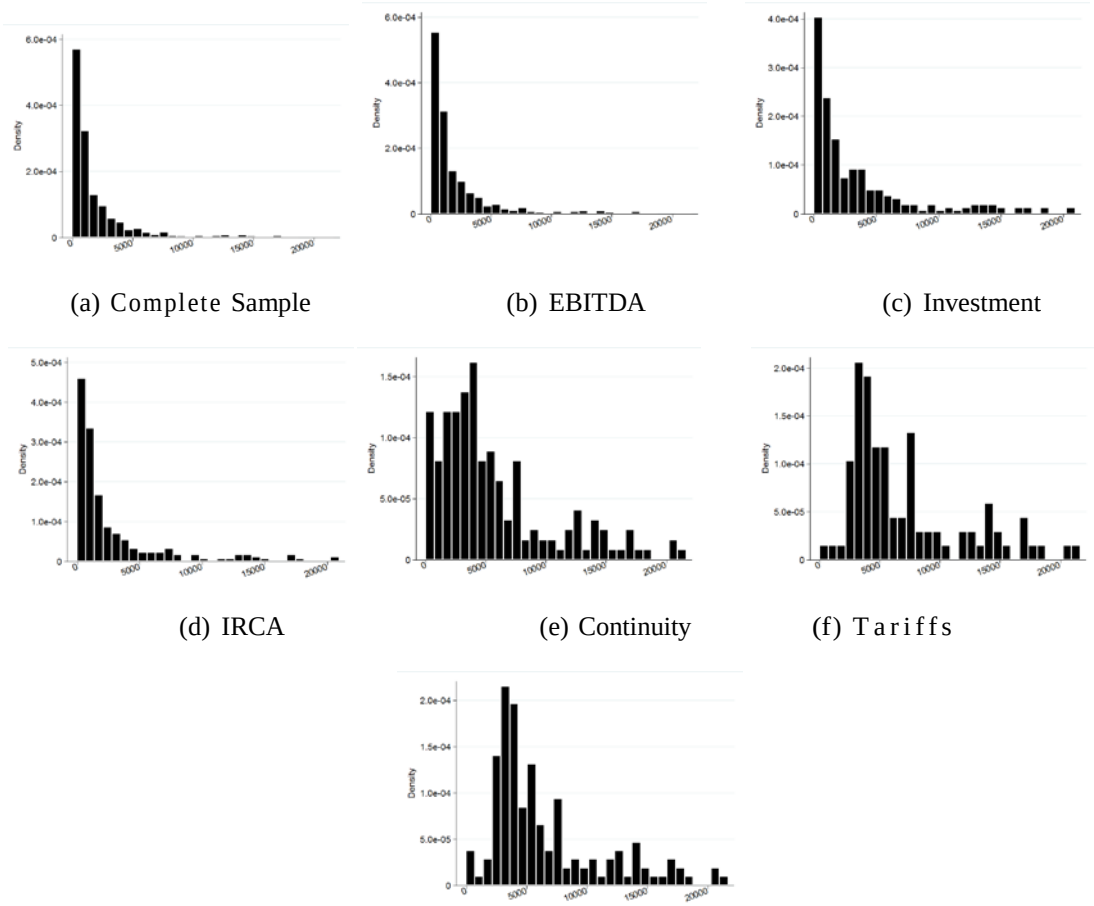
[13] See: http://www.sui.gov.co
[14] See: http://www.cra.gov.co/apc-aa-files/32383933383036613231636236623336/compilacionCRA.pdf
[15] The last 5 percentiles of the distribution are not shown in order to make it easier to see differences among subsamples. It is nonetheless important to highlight that almost all the big municipalities are included in all the subsamples, hence not much difference is seen from the 95th percentile to the end of the distribution.

Table 2. Number of Observations in Each of the Main Variables

Information	Number of Observations	Percentage of Sample
Provider Nature (e.g., public, private)	1,395	95.42
Provider size	972	66.48
Year activities began	1,145	78.32
Billing revenue	201	13.75
Number of users	972	66.48
Tariffs	140	9.58
Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA)	1,360	93.02
Project investments	326	22.30
Quality risk indicator (IRCA)	325	22.23
Continuity	221	15.12
Municipalities supplied	1,026	70.18

Source: Authors' compilation based on SUI data.
Note: Total number of providers in sample is 1,462.

Figure 17. Comparison of Users Distribution across Subsamples



(a) Complete Sample (b) EBITDA (c) Investment

(d) IRCA (e) Continuity (f) Tariffs

(g) Billing

Source: Authors' calculations.
Notes: Graphs show distribution of providers across subsamples that have number of users below the 95 percentile of the complete sample (21,694 Total Users).

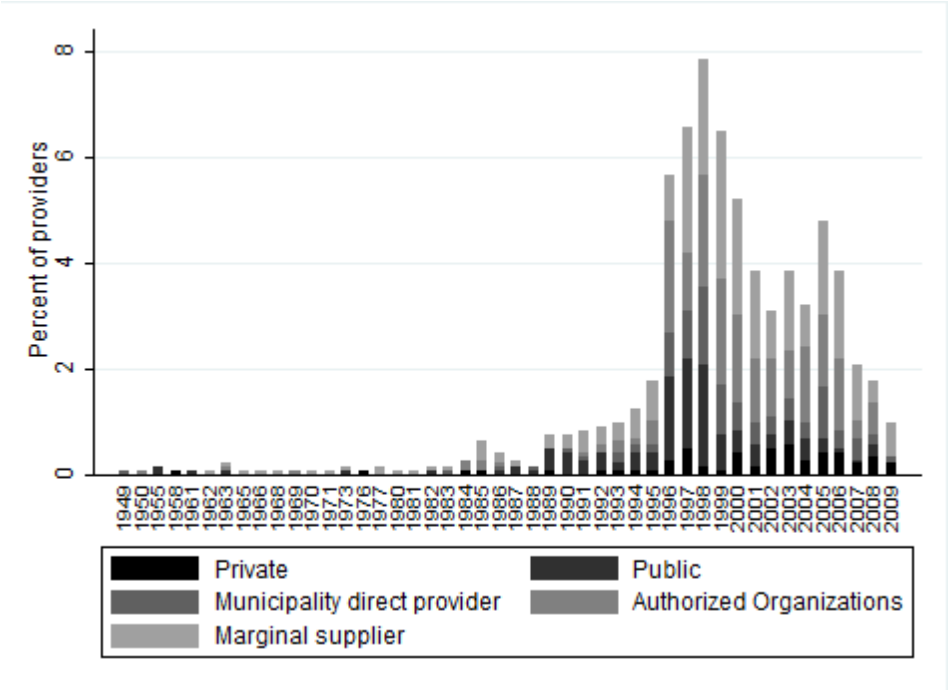
Providers in the water and sanitation sector can be classified as small, medium or large based on the number of households they supply.[16] As noted above, the majority (76 percent) of providers are small, serving less than 2,500 households (see Figure 18(a)).

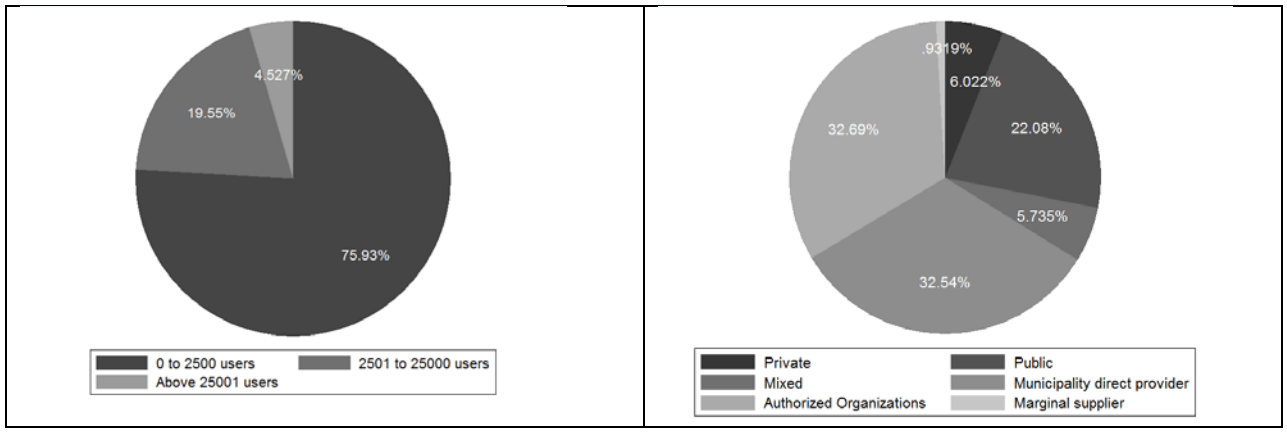
Since the adoption of Law 142 of 1994, Colombian providers of water and sanitation services are allowed to operate not only with public but also private capital. We group providers into three categories according to the amount of private capital involved: i) those operating on private capital only, ii) those operating solely on public capital and iii) those mixing both. In addition to the source of capital, providers are grouped into five organizational types: i) private companies, ii) public companies, iii) municipal government provider,[17] iv) small authorized organizations and v) marginal suppliers. Figure 18(b) shows the distribution of providers across those categories. A majority of providers are the ones managed directly by the municipal government, followed by those that are public companies.

Figure 18 shows the percentage of providers that began their activities in the water and sanitation sector from 1916 until 2009. This information is available for 1,145 providers. Around 40 percent of them started their activities in the period between 1996 and 2000. In terms of type of provider,[18] every category is represented in each year.

[16] In order to classify providers we rely on the number of users reported in the previous year for which information is available. The classification was made according to SSP (2010: 16).
[17] This is distinct from public companies in that no firm is created, usually because after a public call no proposals have been presented. For further information see Law 142 of 1994, Article 6.
[18] The categorization follows the one created by the SSPP in SSP (2010: 16).

Figure 18. Beginning Year of Activities



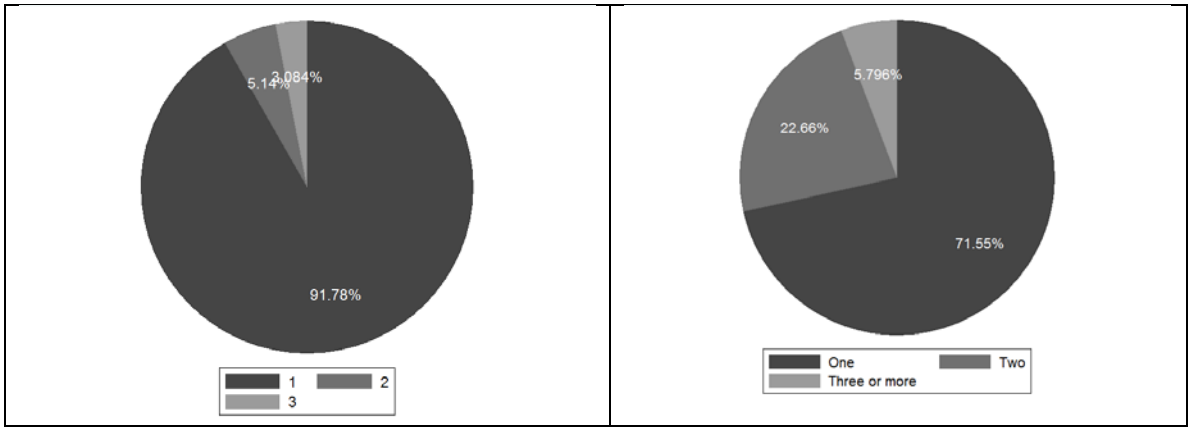


(a) Size of provider (b) Type of provider

Source: Authors' compilation based on SUI data.
Notes: The category "public" includes different types of providers: public companies, state industries and commercial companies (Empresa Industrial, Comercial del Estado y sociedad pública). The categorization follows the one created by the SSPP in SSP (2010: 16).

As previously noted, some providers supply services to more than one municipality, and some municipalities are supplied by more than one provider. A full accounting of relationships is available for 73 percent of our sample. Figure19(a) shows the percentage of providers that supply one, two, three or more municipalities, and, in a similar way, Figure19(b) shows the percentage of municipalities that are supplied by one, two, three or more providers. While most providers supply one municipality only and most municipalities are supplied by only one provider, 9 percent of providers supply multiple cities[19] and 28 percent of cities are supplied by more than one provider. These latter cases pose a problem for analysis that takes into account the characteristics of the municipality, or when the variables of interest are measured at the municipal level. This is because there is not a one-to-one match between the two.

Figure 19. Providers and Municipalities



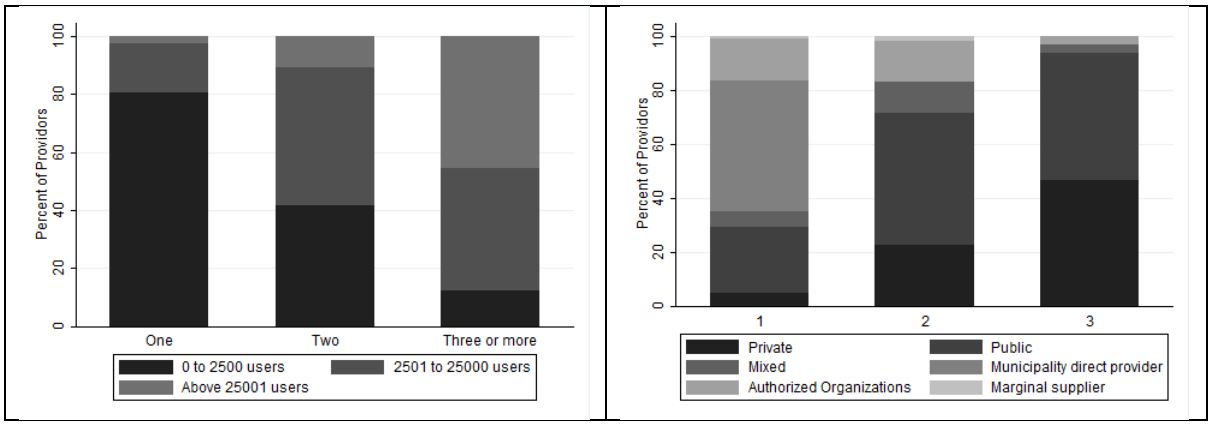
(a) Number of providers serving one municipality (b) Number of municipalities served by one provider

Source: Authors' compilation.
Notes: Total number of municipalities: 949. Total number of providers: 1,070.

As shown in Figure 20, and as we would expect, larger suppliers (in terms of number of households served) are more likely to supply multiple cities (anywhere from three to 23), whereas smaller ones tend to supply a single municipality. The other important difference we note is that multiple city suppliers tend to be either a private or a public company, while almost half of single-city suppliers are suppliers managed directly by the municipal government.

[19] This information was collected mainly from the users' database. For providers that are municipality direct supplier, which were not included in it, municipalities were assigned searching on the web and other documents at SUI.

Figure 20. Providers by Number of Municipalities



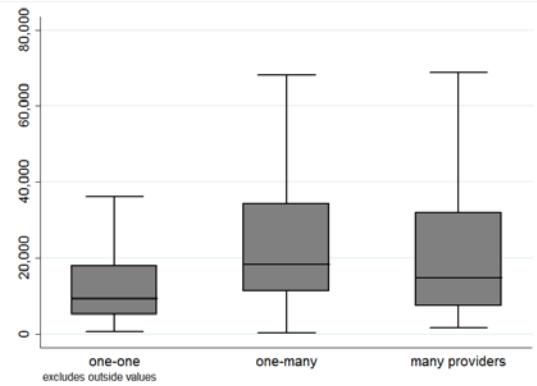
(a) By size of provider (b) By type of provider

Source: Authors' compilation.

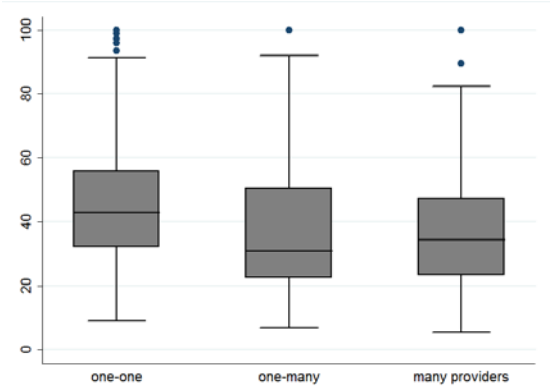
Our sample of providers covers 921 municipalities, of which 72 percent are supplied by a single provider. The remaining 28 percent have anywhere from two to 11 different providers. In order to compare municipalities under these different arrangements we categorize them into three groups: municipalities with a single provider that does not serve any other municipality (532), municipalities with a single provider that supplies other municipalities (147), and finally the municipalities supplied by more than one provider (270). Figure 21 compares these different groups of municipalities based on their scores on a number of performance and quality of life indicators, plus distance to the capital. Municipalities supplied by more than one provider are those with the highest populations and highest income, followed by municipalities supplied by a single provider that supplies other municipalities. The group of municipalities with the lowest average populations and the lowest income are those with providers that supplied only one municipality.

Additionally, as shown in Figure 21, municipalities with more than one provider have on average the best performance in almost all variables, followed by the municipalities with only one provider (first group). This means that municipalities with more than one provider are on average closer to the capital, have a higher quality of life, present a higher comprehensive indicator, and display the highest water and sewerage coverage rates. Those municipalities do not, however, have the best effectiveness and efficiency rates. The first and the second group, respectively, display the highest effectiveness and efficiency rates in 2009.

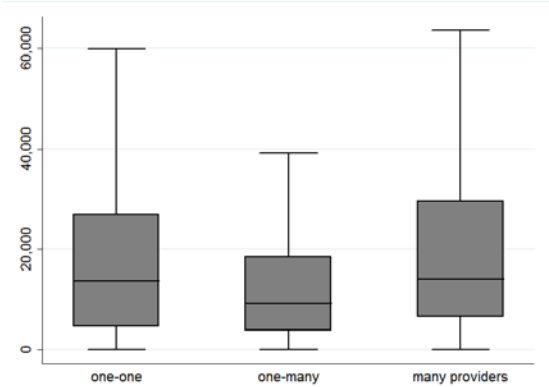
Figure 21. Characteristics of Municipalities by Number of Providers



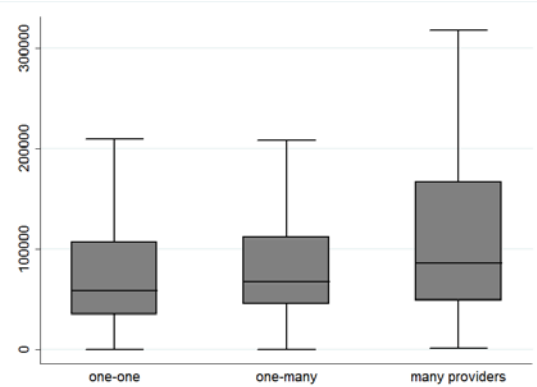
(a) Population (Number of inhabitants)



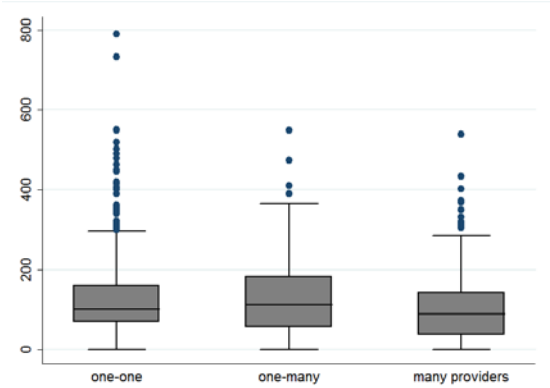
(b) Unmet basic needs indicator



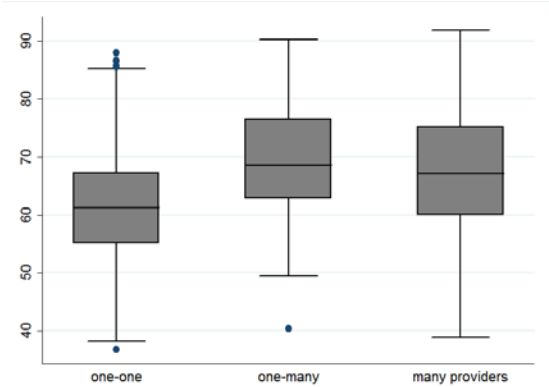
(c) Per-capita non-tax revenue (2008 constant prices)



(d) Per-capita tax revenue (2008 constant prices)

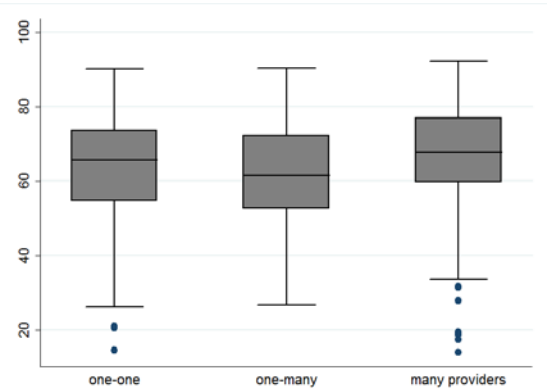


(e) Distance (KM) to the capital

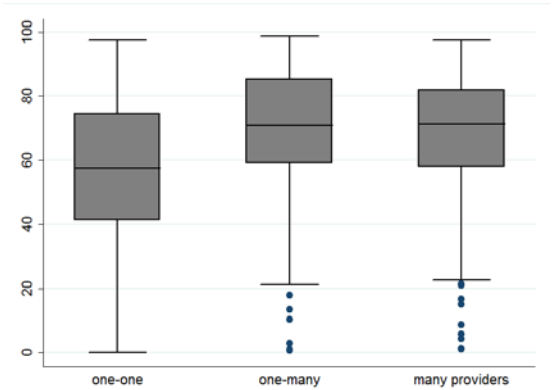


(f) Quality of life index

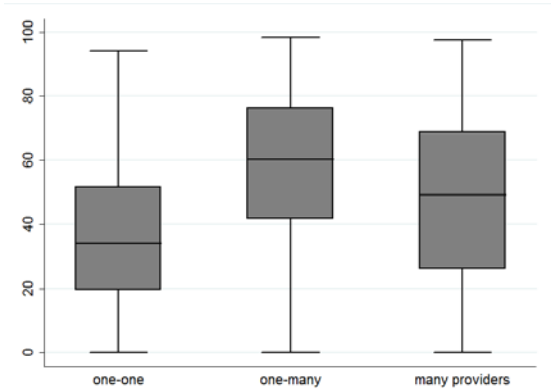
Figure 21, continued



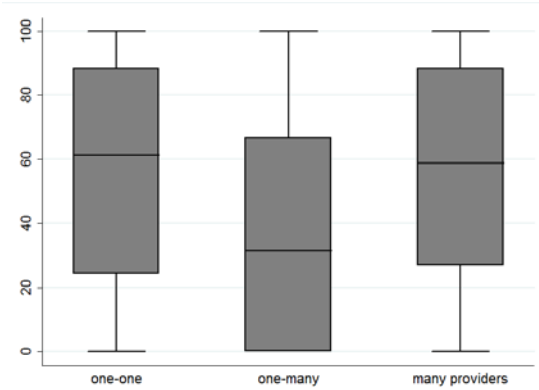
(g) Municipal Comprehensive Performance Indicator (2011)



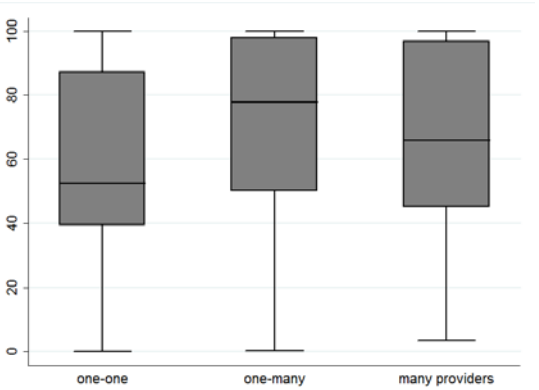
(h) water coverage



(i) sewerage coverage



(j) water effectiveness rate-2009



(k) water efficiency rate-2009

Note: Outliers are excluded in panels a, c, d and j.

3.2 Financial Performance

Financial indicators are also only available for a subset of providers. In this case we are considering two financial indicators: i) Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) in water and sewerage and ii) amount of investment. The number of observations available in each indicator covered is shown in Tables 3 and 4.

3.2.1 Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA)

The EBITDA is a financial indicator that reflects the borrowing capacity of a firm. It captures the firm's profitability, serving as an approximation to its market value. This measure is obtained from the firm's income declaration and reflects Earnings before Interests, Taxes, Depreciation and Amortization (thus EBITDA).

Data for this indicator are available for the period 2001-2012 for the water and the sanitation sectors separately. The databases are called "acueducto_Ebitda.dta" and "alcantarillado_Ebitda.dta." As shown in Table 3, the dataset is not a balanced panel and includes a total of 1,332 water services providers and 957 sewerage services providers. Approximately one fourth of these providers have information spanning the whole period (see Table 4).

Table 3. Providers with Data Available in Each Year

Variable		Year												
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
		%	%	%	%	%	%	%	%	%	%	%	%	%
Ebitda	Water	7.88	39.56	48.2	54.05	61.04	73.2	73.5	72.6	64.94	57.36	55.11	31.46	-
		(105)	(527)	(642)	(720)	(813)	(975)	(979)	(967)	(865)	(764)	(734)	(419)	-
Ebitda	Sewerage	8.99	38.56	46.19	51.62	56.95	69.91	72.62	71.06	64.89	59.46	58.62	32.71	-
		(86)	(369)	(442)	(494)	(545)	(669)	(695)	(680)	(621)	(569)	(561)	(313)	-
Investment					47.32	51.01	57.05	62.75	69.8	75.84	66.44	49.33	30.87	8.39
					(141)	(152)	(170)	(187)	(208)	(226)	(198)	(147)	(92)	(25)

Source: Authors' calculations.

Notes: Number of observations are displayed in parentheses. Percentages for the data set with EBITDA information are calculated based on the subsample of 1,332 water providers and 957 sewerage providers for which data are available. Additionally, percentages for the data set with investment information are calculated over the subsample of 298 providers for which data is available.

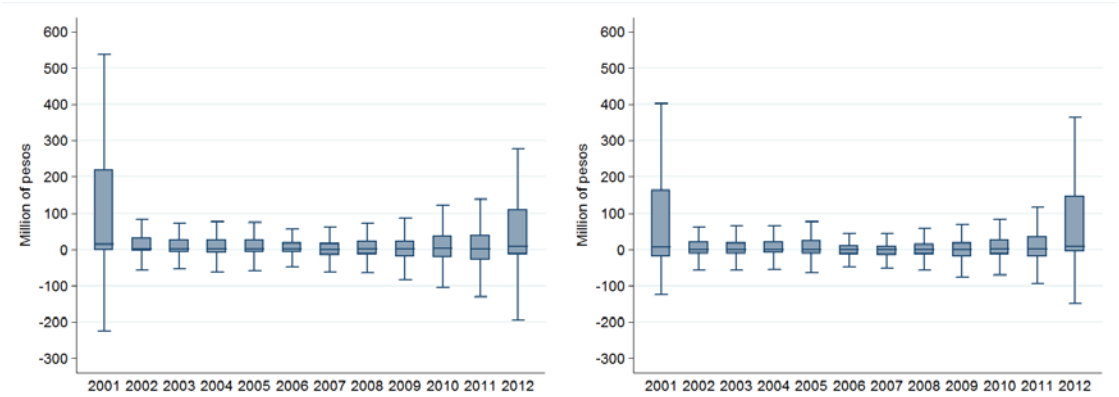
Table 4. Providers by Number of Nonmissing Information in the Period

Variable	Number of no missing											
	1	2	3	4	5	6	7	8	9	10	11	12
	%	%	%	%	%	%	%	%	%	%	%	%
Ebitda Water	8.33	8.63	8.56	8.71	9.23	6.91	9.08	8.48	7.28	8.63	11.86	4.28
	(111)	(115)	(114)	(116)	(123)	(92)	(121)	(113)	(97)	(115)	(158)	(57)
Ebitda Sewerage	8.67	10.03	8.25	8.99	9.2	7.42	8.67	6.27	6.79	8.57	11.7	5.43
	(83)	(96)	(79)	(86)	(88)	(71)	(83)	(60)	(65)	(82)	(112)	(52)
Investment	14.43	12.08	9.73	8.05	7.05	8.05	12.75	11.07	10.4	6.38		
	(43)	(36)	(29)	(24)	(21)	(24)	(38)	(33)	(31)	(19)		

Source: Authors' calculations.
Note: Percentages for the data set with EBITDA information are calculated based on the subsample of 1,332 water providers and 957 sewerage providers for which data are available. Additionally, percentages for the data set with investment information are calculated based on the subsample of 298 providers for which data are available.

Figure 22 shows the distribution of the EBITDA measures across the years covered by the data. On average, providers during the period had positive but small EBITDA. This mean in part reflects the fact that in every year about 40 present of providers, mostly of small size or those managed directly by the municipal government, present negative values. There seems to be little variation over time in these values, with the exception of some providers with more than 25,000 users. Providers that on average have positive EBITDAs are the ones operating with both private and public capital.

Figure 22. EBITDA by year



(a) Water (b) Sanitation

Source: SUI.
Note: Outliers are excluded.

3.2.2 Sector Investments

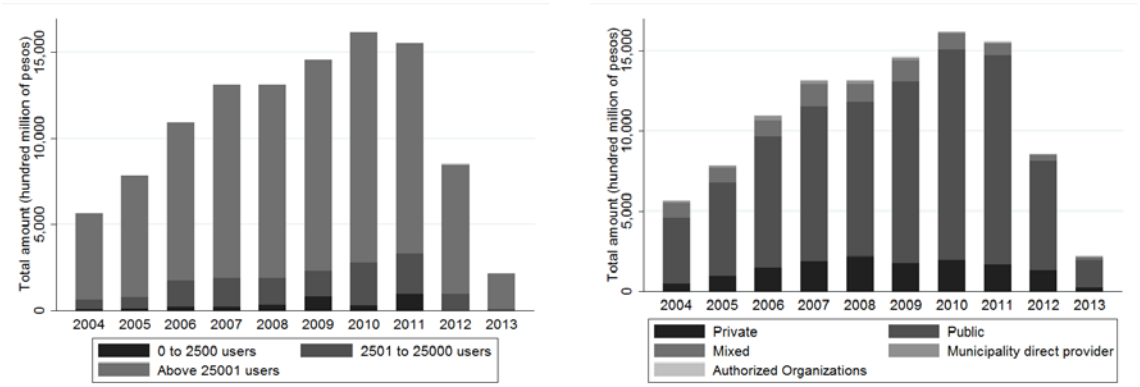
Given the importance of investment in infrastructure for the quality of water and sanitation service provision, data on its levels are particularly relevant. The dataset called "projects_prov.dta" includes information on the total amount of investment made by each provider during the period 2004-2013. This information comes from more detailed data at the project level available at SUI. It includes the name of the project, the status of the project (in progress or finished), starting and completion dates, goal of the investment, price per unit, quantity and total value. It also provides information on the resources used to finance the projects. Those resources could be own resources collected with tariffs, resources from the

general participation system, royalties, decentralized entities, or internal or external debt, among others.[20]

The dataset for investment is composed of 1,546 observations for a total of 298 different providers. As shown in Table 3, only about 5 percent of providers report a project during the period covered. The data are incomplete, so it is not clear whether those not reporting projects did not have any projects or simply did not report them.

Figure 23 shows a steady increase in the total amount of investments by providers over the years. The patterns are not as clear if these amounts are expressed in "per user" terms, that is, weighting the total investment by the number of users the provider serves.[21] According to the data, bigger providers and those operating on public capital account for the largest share of investment.

Figure 23. Total Investment by Year



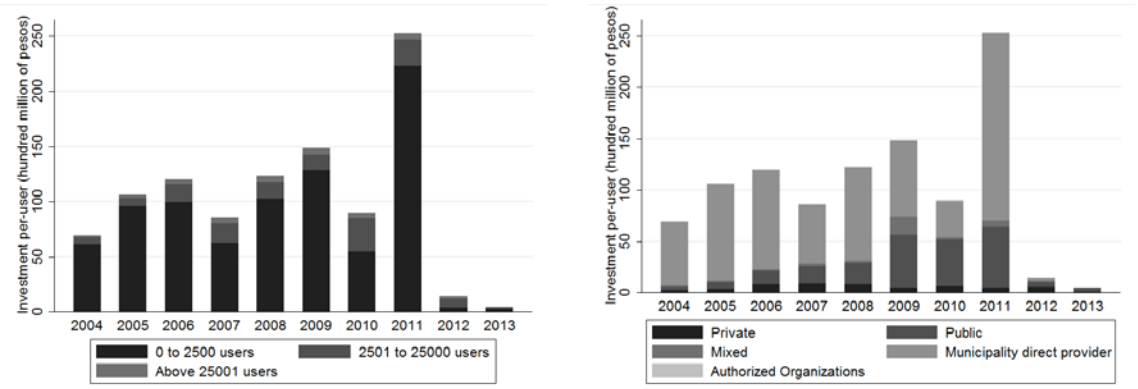
(a) Size of provider (b) Type of provider

Note: Amounts are in constant values of 2008.

[20] See projects form in ANEXO RESOLUCION No. SSPD - 20101300048765 DEL 14- 12- 2010.

[21] The drop seen for the last two years could be explained by the low number of providers that reported projects for those years. Although the SUI has a process for revising information, that process is lengthy and it can result in a substantial amount of missing information for more recent years.

Figure 24. Investment per User by Year

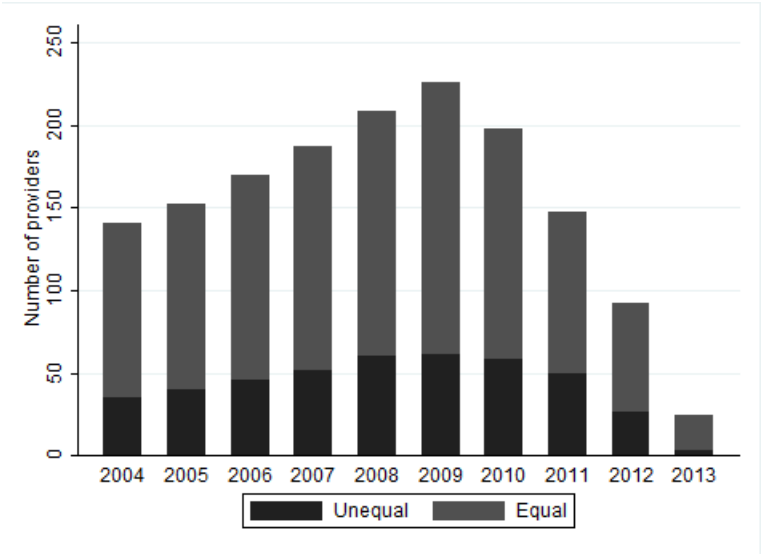


(a) Size of provider (b) Type of provider

Note: Amounts are in constant values of 2008.

While the SUI breaks down investment by type of funding, these numbers do not add up to the total amount invested.[22] The reason might be misunderstanding on the part of providers regarding how to report resources across categories. These discrepancies occur in 28 percent of the observations, suggesting caution when analyzing these data (see Figure 25). In 143 observations total investment amounts are higher than the sum of resources and in 187 observations the totals are lower.

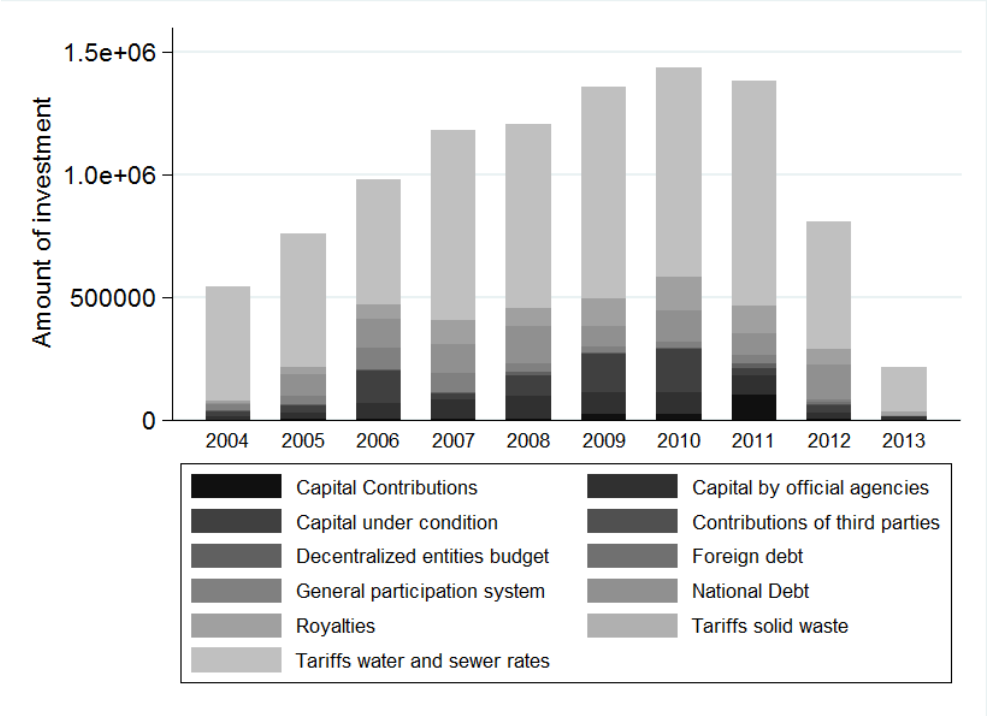
Figure 25. Inequality: Investment vs. Sum of Resources



[22] The discrepancies between the sum of funding sources and investment can be both positive and negative.

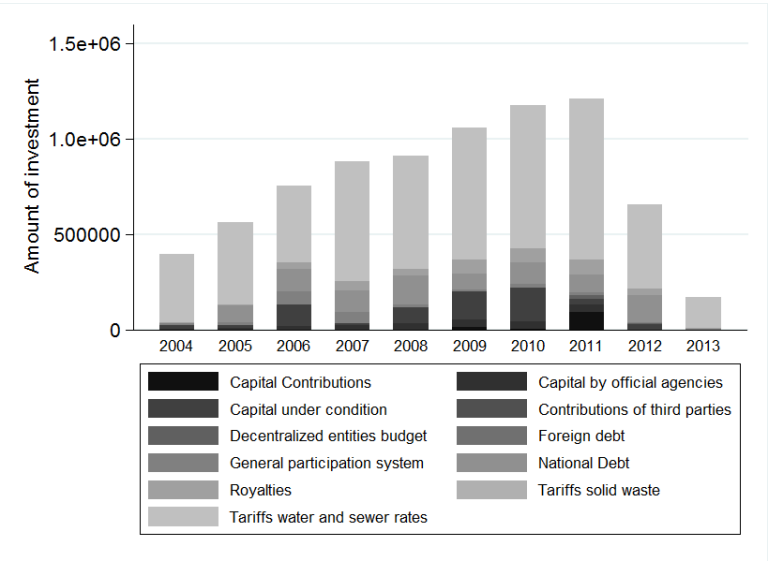
If we restrict the sample to those observations where the sum of funding sources is equal to the total investment, the main funding source is the tariffs charged by providers (shown in Figure 26). This seems to hold in the case of public, private or mixed financed providers. In cases where the municipality is listed as the direct supplier of these services, resources from the general system of participation gain considerable importance and are the main funding source. Private providers report two additional important funding sources: royalties and "resources, assets, rights or capital provided by official agencies or authorities."

Figure 26. Total Investment by Funding Source

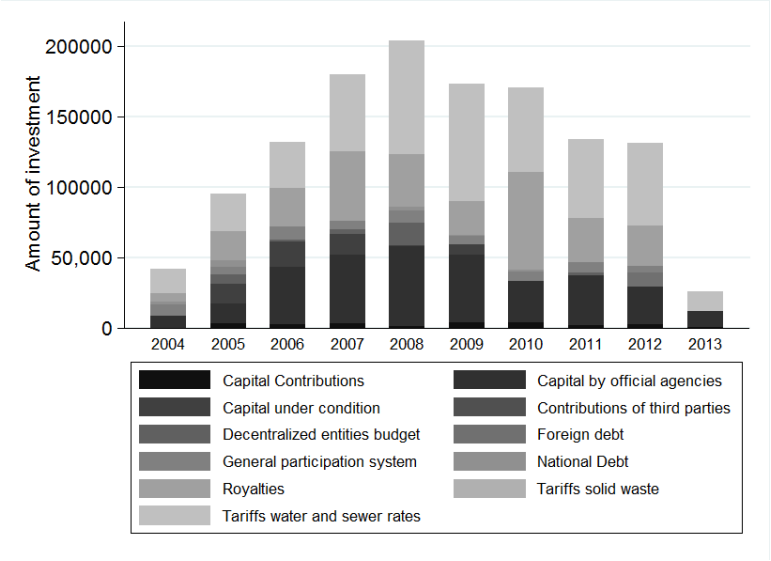


Note: Amounts are in constant values of 2008.

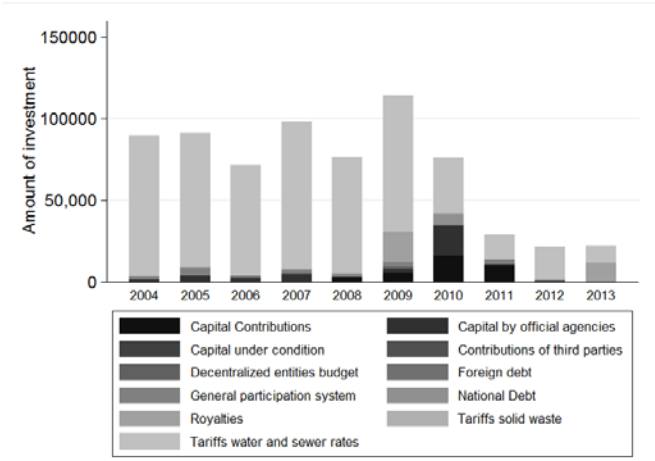
Figure 27. Total Investment by Funding Source and Type of Provider



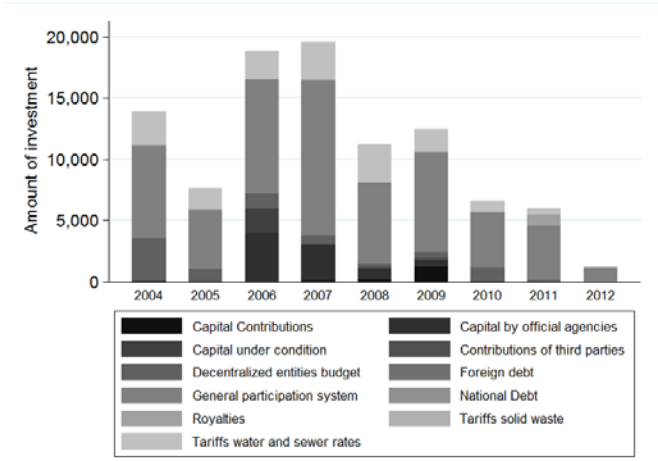
(a) Public



(b) Private



(c) Mixed



(d) Municipality direct provider

Note: Amounts are in constant values of 2008.

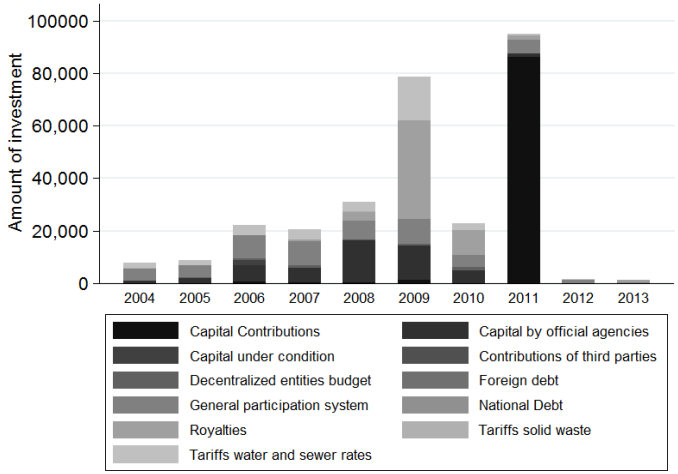
3.3 Sector Indicators

3.3.1 IRCA

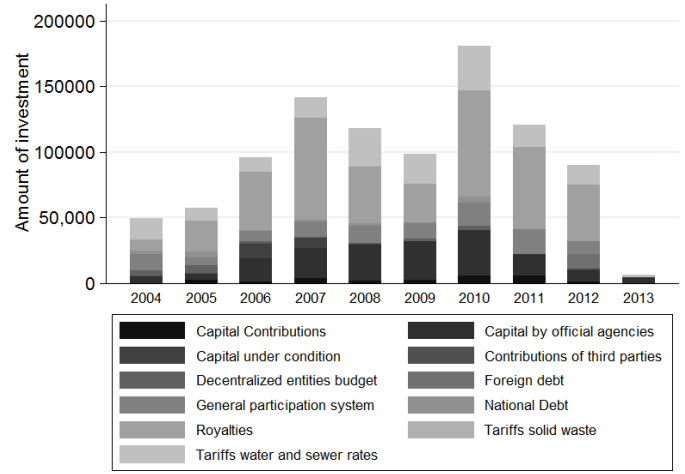
Sector performance can be gauged through different outcome measures. An important one refers to the quality of the water being provided. The IRCA is a risk index for the quality of drinking water calculated as a weighted average of test results on several organoleptic samples. It can take values from 0 to 100, 100 being the worst. Taking into account the regulations guiding the sector, it classifies water into five levels of risk. The first level presents no risk for human health and represents the range 0 to 5 percent. The remaining four levels encompass various levels of unsuitability for human consumption. The second level is low risk, taking values from 5.1 percent and 14 percent, meaning the provider's water can be improved. The third level is classified as medium risk, ranging from 14.1 percent to 35 percent, meaning the provider's management needs to get involved in solving the problem. The fourth level, between 35.1 percent and 70 percent, is one of high risk, requiring special oversight. The fifth and last level ranges from 70.1 percent to 100 percent, meaning that the water is unhealthy and unsanitary, requiring urgent measures.

The database containing the index is called "IRCA.dta." It is an unbalanced panel at the provider-municipality level, containing a total of 847 observations on 415 provider-municipality pairs for a period of three years (2009 -2011). These observations represent 325 different providers that supply a total of 282 municipalities. Table 5 shows the composition of the database in terms of total number of observations, providers and municipalities, by year. About 40 percent of the sample has data available for the whole period (Table 6).

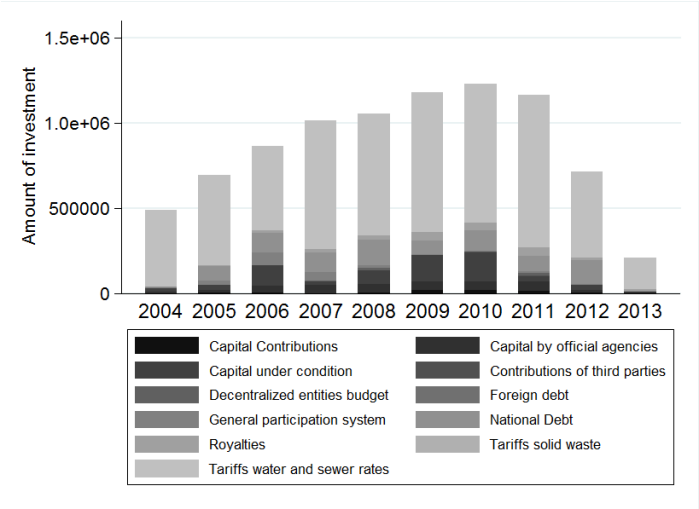
Figure 28. Total Investment by Funding Source and Size of Provider



(a) Less than 2,500 users



(b) From 2,501 to 25,000 users



(c) Above 25,001 users

Note: Amounts are in constant values of 2008.

Table 5. Observations by Year: Sector Indicators

Year	IRCA Observations	IRCA Provider	IRCA Municipalities	Continuity Observations	Continuity Provider	Continuity Municipalities
2005				246	124	235
2006				259	135	251
2007				285	149	273
2008				264	155	252
2009	395	309	273	289	149	278
2010	259	197	189	250	128	240
2011	193	129	148	241	107	236

Table 6. Non-Missing: Sector Indicators

	IRCA		Continuity	
Number of non-missing	Freq.	Percent	Freq.	Percent
1	163	39.28	14	4.26
2	72	17.35	19	5.78
3	180	43.37	20	6.08
4			28	8.51
5			35	10.64
6			81	24.62
7			132	40.12
Total	415	100.00	329	100.00

Figure 29 displays the percentage of observations falling into each of the index classifications by year. A large majority of providers are supplying water that is considered of no risk for human consumption, and that share is increasing over the three years covered by the data. Moreover, in both 2010 and 2011 there were no cases of unsanitary water being supplied. Nonetheless, in 7.4 percent of the observations the quality of the water is considered poor and unsuitable for human consumption. These higher levels of risk tend to come from small providers or providers that are authorized organizations or marginal suppliers (see Figure 30).

Figure 29. Water Risk Level

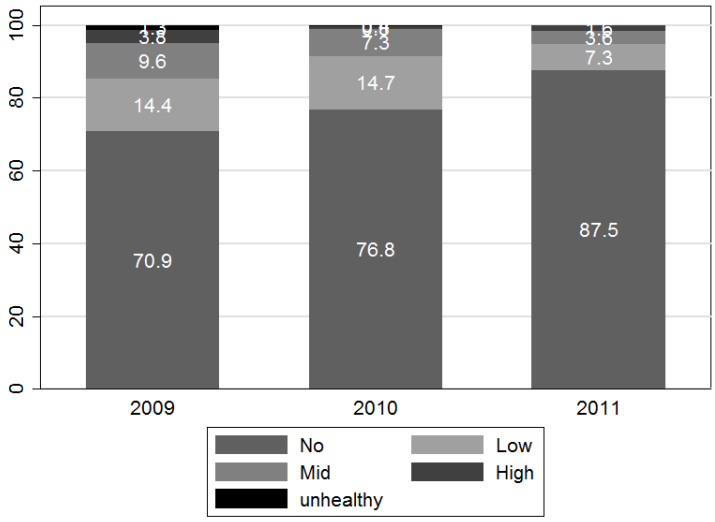
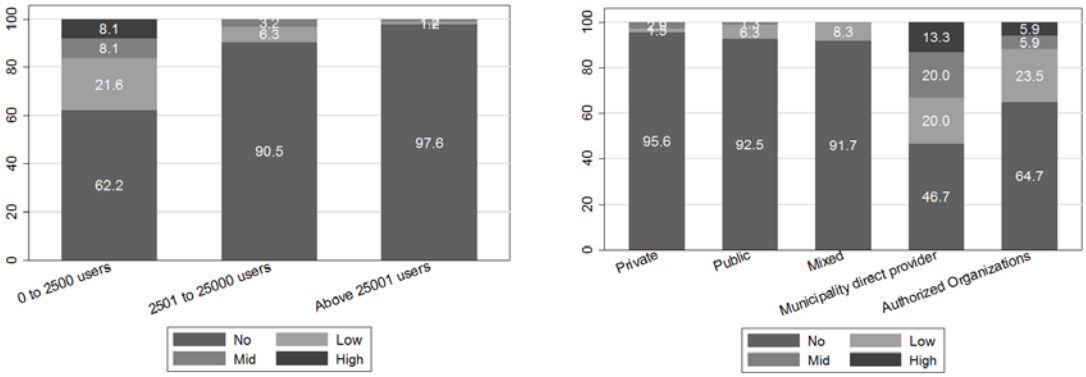


Figure 30. Risk Levels by Provider's Size and Type



(a) Size of provider (b) Type of provider

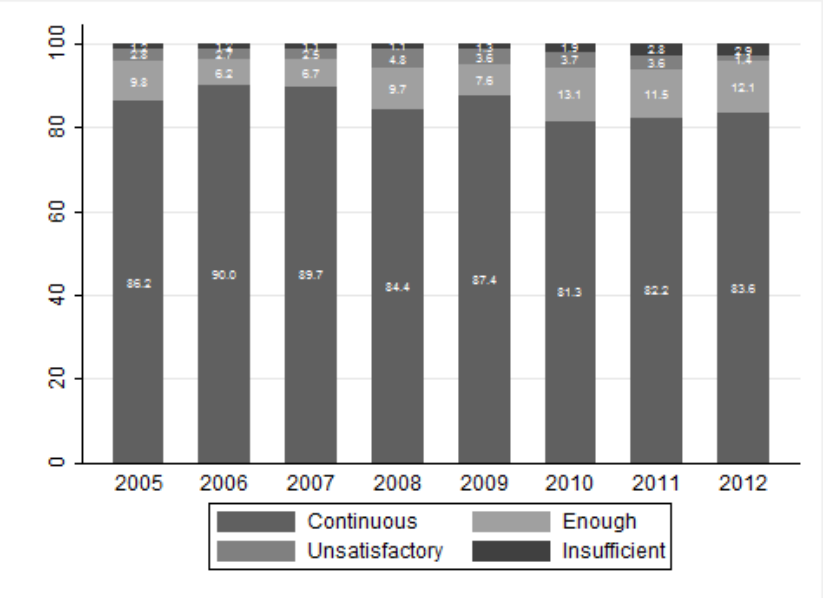
3.3.2 Continuity

Other important measures of the sector's performance are coverage and continuity. While the percentage of households with access to water and sanitation is an important performance indicator, continuity goes a little further in quantifying the quality of that access. The database "IndicadorContinuidad.dta" includes data on the number of hours per day households have access to water on average and the continuity index (which follows Resolution 2115 of 2007). The database additionally includes a variable that classifies observations into one of the four categories of continuity in supply: continuous, enough, unsatisfactory, and insufficient.

The database contains 1,834 data points and is a non-balanced panel for the period from 2005 to 2011. It includes information for a total of 176 providers that supply 309 different municipalities. Table 5 provides information on the total number of observations, providers and municipalities. It is important to remember that a provider can supply more than one municipality and that a municipality can be supplied by more than one provider. The data are organized in wide format, with 329 unique provider-municipality observations. About 40 percent of those have information for the whole period (see Table 6).

As shown in Figure 31, each year approximately 15 percent of the observations are classified as non-continuous service provision. The average rate of continuity is between 95 percent and 98 percent. It declined by 1 percentage point between 2007 and 2008. Private capital operated providers tend to display the lowest performance, while those operating on a mix of public and private capital tend to exhibit higher levels of continuity in service provision.

Figure 31. Continuity Service Classification



3.4 Additional Information

3.4.1 Tariffs

When it comes to providers, a final and relevant piece of information regards the tariffs they charge for the services they deliver. This information is available on the "Tariffs.dta" dataset. The database is composed of 14,791 observations, of which 10,735 refer to water services and

4,565 to sanitation services. Observations are at the stratum-provider level,[23] and information is available for the period 2002 to 2011 (see Table 7). As in previous cases, this is not a balanced panel. While tariffs charged for water provision may change across different income strata,[24] those for sewerage are constant. The number of observations is therefore smaller in the case of sanitation, since the unit of observation is the stratum-provider level.

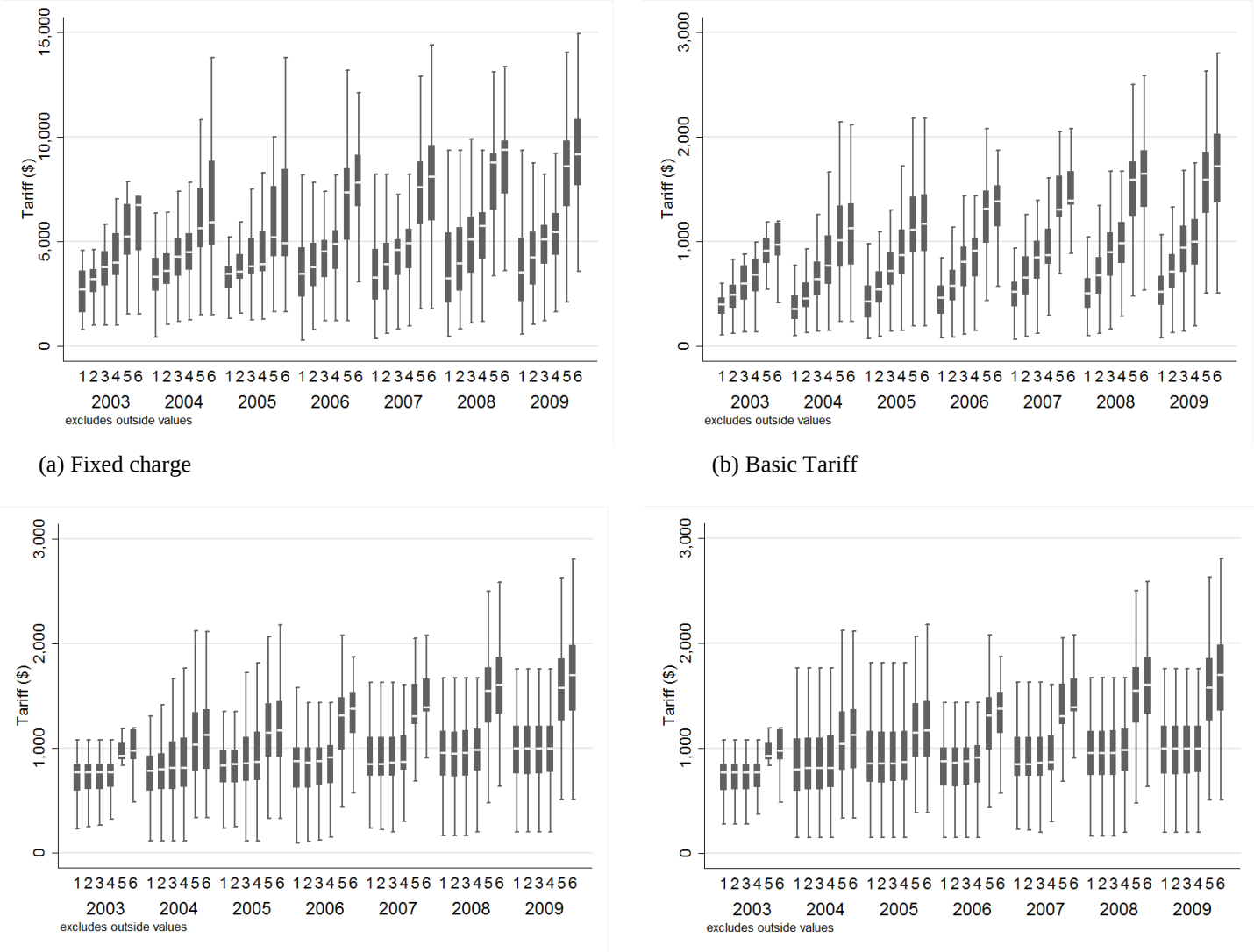
Colombia's tariff scheme for the sector is defined by Law 142 of 1994, which applies to all providers independent of their type (public, private or mixed). The law takes into account disparities in purchasing power across individuals in the population and stipulates a different tariff for each pre-defined income stratum.[25] Tariffs are made up of a fixed (base) charge and a variable charge that depends on the user's consumption. The fixed charge is determined by average administrative costs, and the variable charge is determined by average operational and investment costs in addition to environmental fees.[26] The variable charge is categorized into three groups: the first 20 cubic meters are charged the basic tariff, the next 20 cubic meters are charged a complementary tariff, and finally any consumption greater than 40 cubic meters is charged the luxury tariff. Figure 32 shows the distribution of residential tariffs by year and households' strata.[27]

Table 7. Observations by year: Tariffs

Year	Water	Sanitation
2002	0	40
2003	326	170
2004	1,543	589
2005	1,558	606
2006	1,589	760
2007	1,944	820
2008	1,920	831
2009	1,839	697
2010	16	42
2011	0	10

[23] The strata are residential, from 1st to 6th strata, and non-residential (commercial, industrial, official, special and provisional).
[24] Twenty-one providers, however, report different tariffs for the same stratum.
[25] The adjustment factors for the basic tariff are 30 percent, 60 percent, 85 percent and 100 percent for the first to fourth strata, respectively, and 120 percent for the fifth and sixth strata.
[26] For further information see CRA resolution No. 287 of 2004.
[27] The database includes 7,413 observations for residential tariffs in the water sector.

Figure 32. Tariffs for Households by Year and Strata



(a) Fixed charge

(b) Basic Tariff

(c) Complementary Tariff

(d) Luxury Tariff

Source: SUI. *Note:* Tariffs are in Colombian pesos.

4. Public Opinion

Colombians were annually interviewed as part of the Latin American Public Opinion Project (LAPOP) from 2004 to 2012.[28] The data, representative at the national level, tap into citizens' attitudes, experiences, values and beliefs about their lives and political institutions. The survey covers four regions and both urban and rural areas. The sample averages 1,500 individuals per year, covering approximately 5 percent of the country's municipalities.

Table 8. LAPOP Observations by Year

year	individuals	municipalities
2004	1,479	53
2005	1,487	53
2006	1,491	53
2007	1,491	53
2008	1,503	54
2009	1,493	53
2010	1,506	56
2011	1,503	53
2012	1,512	47

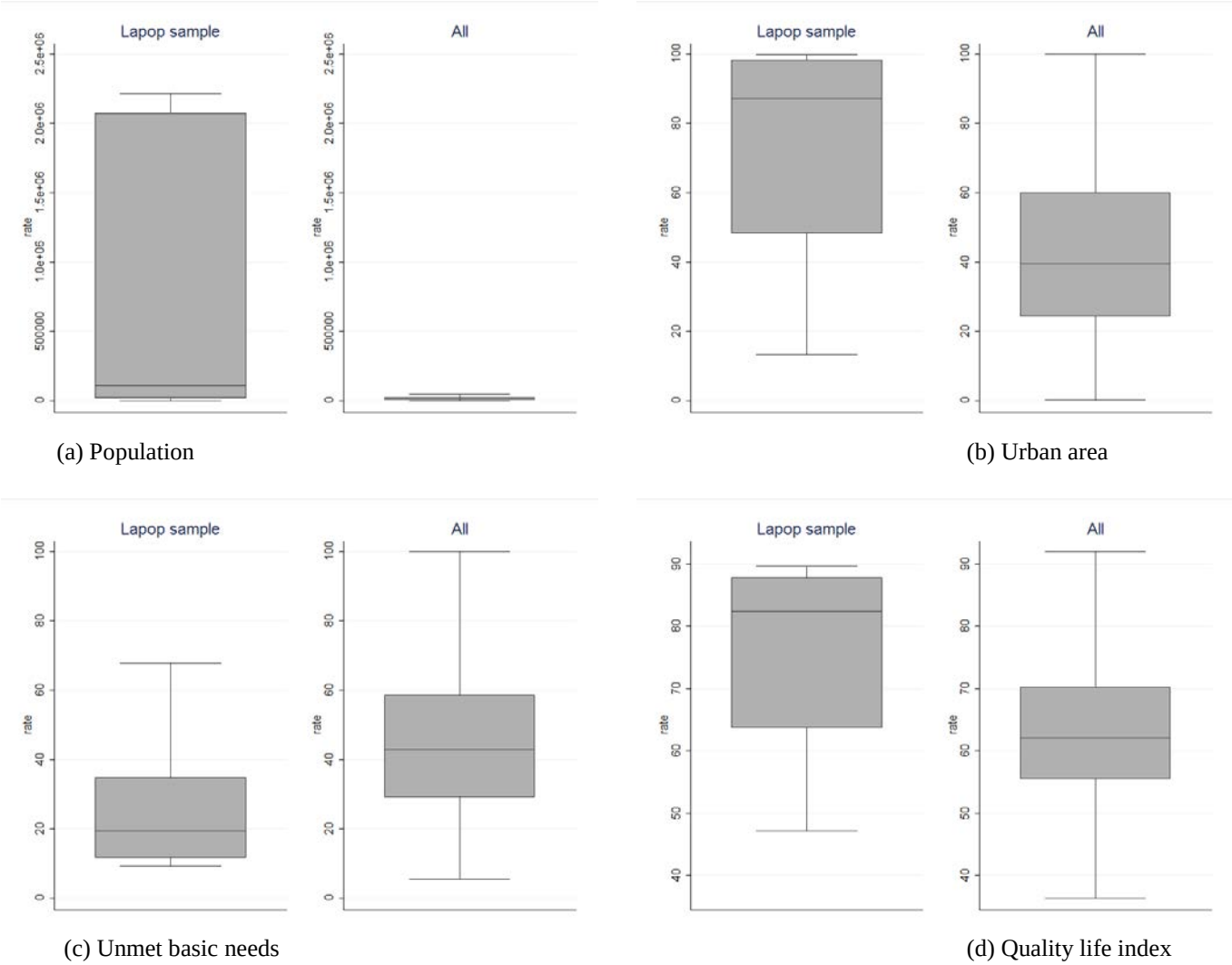
Source: LAPOP Colombia for the period 2004-2012.

To test how well the survey sample represents the country, in Figure 33 we compare characteristics of the sample of municipalities in the LAPOP with those of all municipalities in the country. In general, there are many similarities between the two groups. As expected, the LAPOP tends to reach municipalities that are predominantly urban, more densely populated, slightly richer and more developed, and located closer to capitals.

A quick overview of the main characteristics of the respondents to the LAPOP survey is shown in Figure 34. Gender is well balanced, more than 40 percent of the sample have at a minimum 11 years of education, the average age at the time of the survey is 37 years old, and the average number of children is around 2. Income level is categorized into four levels where "Low" represents income below US$2 per day, "Low-middle" represents income from US$2-US$10, "Middle" represents income from US$10 to the 95th percentile of the income distribution, and "High" represents the top five percentiles of the income distribution. Most individuals have a middle household income, while low and low-middle household income individuals represent only 12 percent of the sample.

[28] www.LapopSurveys.org

Figure 33. Municipalities Characteristics: LAPOP Subsample vs. All Municipalities



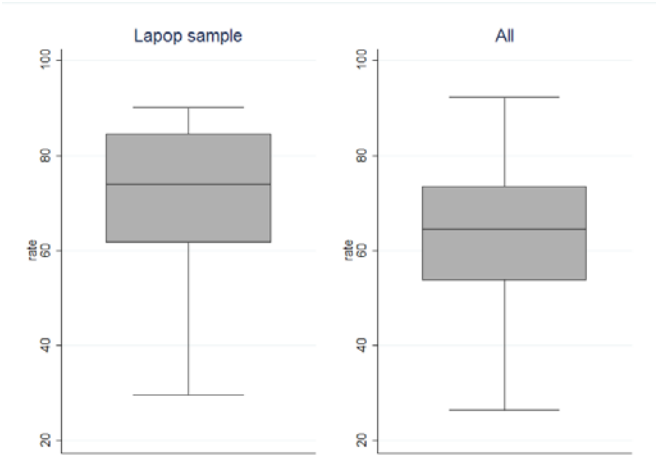
(a) Population

(b) Urban area

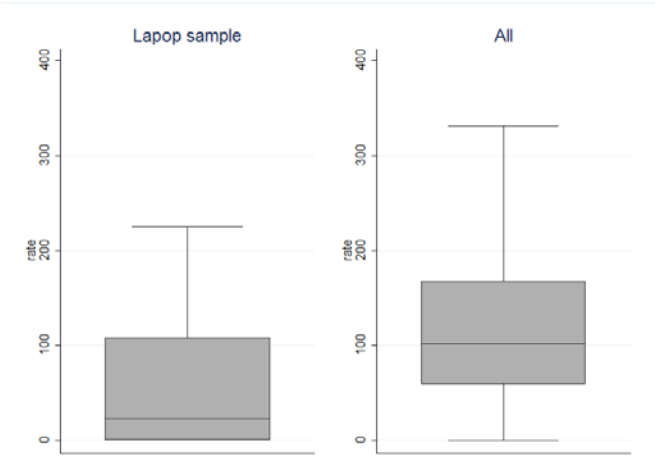
(c) Unmet basic needs

(d) Quality life index

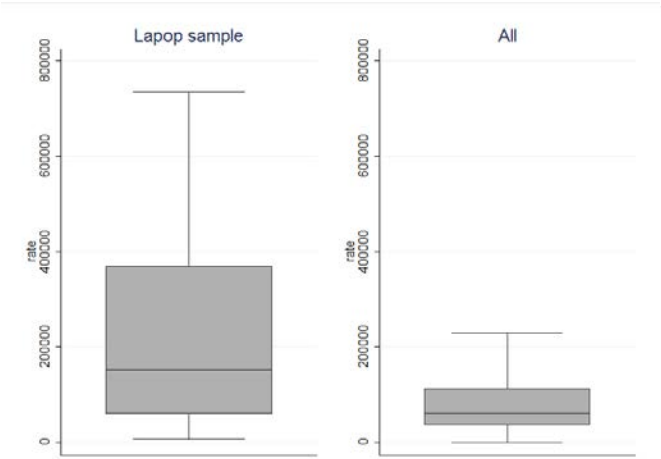
Figure 33, continued



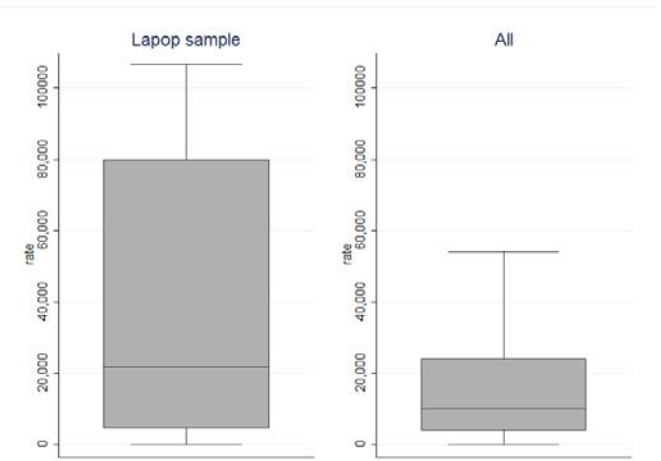
(e) Comprehensive municipal performance indicator



(f) Distance to capital



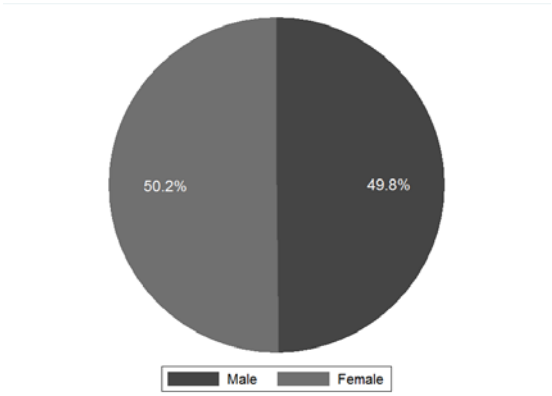
(g) Tax income



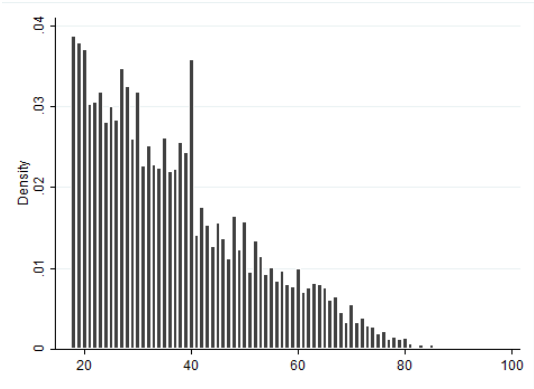
(h) Non-tax income

Source: LAPOP, Census 2005.
Notes: Outliers are excluded.

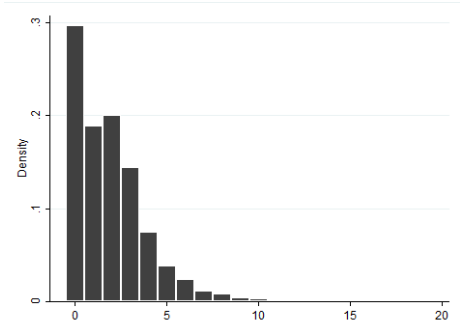
Figure 34. Individuals Characteristics: LAPOP Subsample



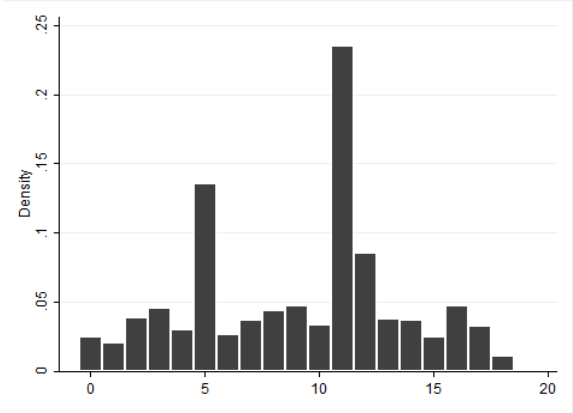
(a) Gender



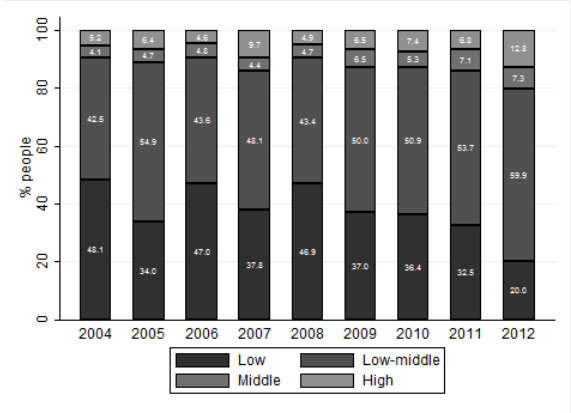
(b) Age



(c) Number of children



(d) Years of Education



(e) Income level

Source: LAPOP 2004-2012.
Note: Income is categorized into four levels where "Low" represents income below US$2 per day, "Low-middle" represents income from US$2-US$10, "Middle" represents income from US$10 to the 95th percentile of the income distribution, and "High" represents the top five percentiles of the income distribution.

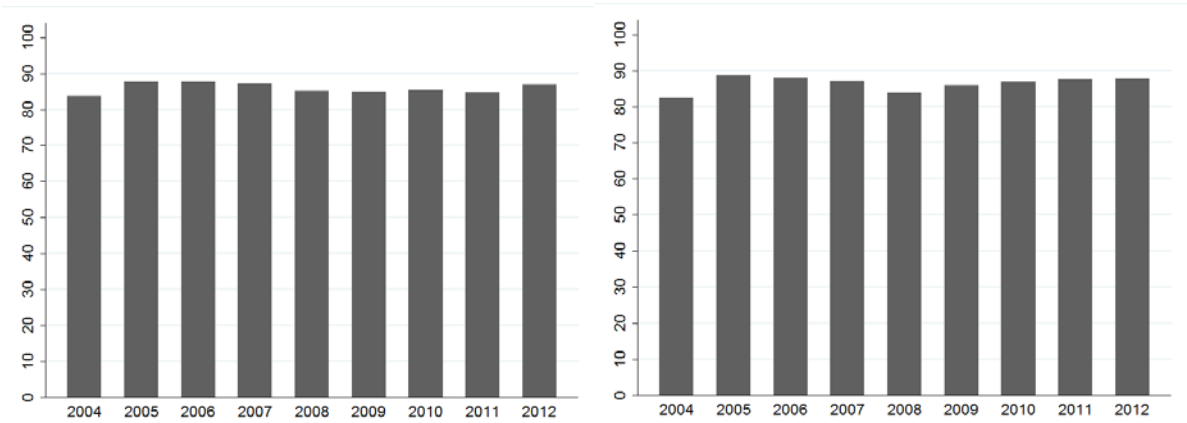
4.1 Water and Sewerage

4.1.1 Water and Sewerage Coverage

The LAPOP questionnaire includes questions on whether respondents' houses have indoor plumbing and bathroom. This information corresponds to questions "R12" and "R14" and is available for each of the nine waves. Figure 35 shows the percentage of respondents who gave a positive answer to these questions by year. Both percentages for the whole period are well above 80 percent.

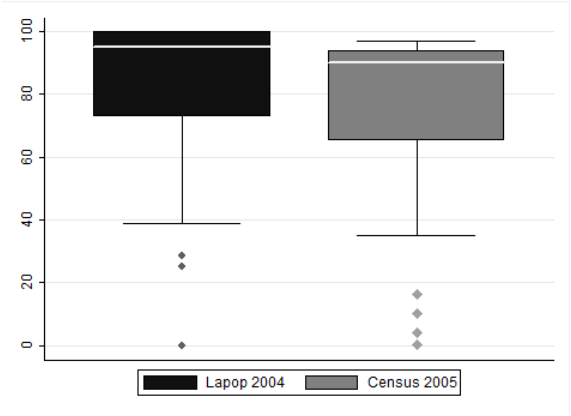
It is important to note that, while representative at the national level, the LAPOP data are not representative at the regional or local levels. In regard to access to basic services like water and sanitation, such surveys usually miss individuals in more precarious living conditions, if for no other reason than access. This is clear when we compare service access at the municipal level between the sample of respondents in the LAPOP and the rates based on the census. This is shown in Figure 36 using 2004 LAPOP data. The LAPOP sample displays on average higher levels of coverage than would be expected based on official estimates.

Figure 35. Indoor Plumbing and Bathroom by Year

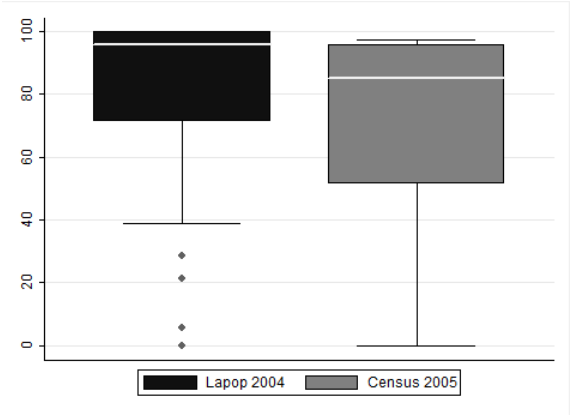


(a) Indoor bathroom (b) Indoor plumbing

Figure 36. Indoor Plumbing and Bathroom Access



(a) Indoor plumbing



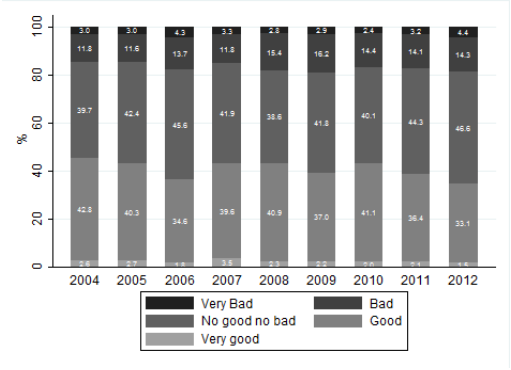
(b) Indoor bathroom

Source: LAPOP (2005) and Census.

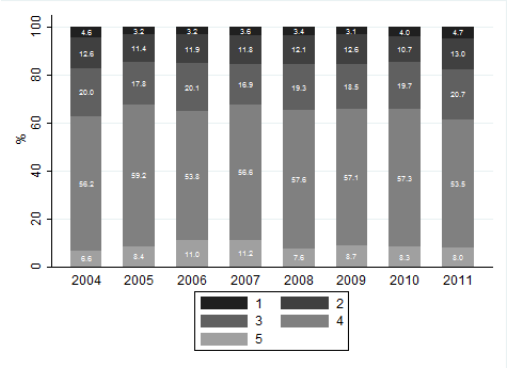
4.1.2 Water and Sewerage Performance

Besides access, the survey asked respondents about the quality of the services provided by their municipality. In the period 2004-2012 respondents were asked whether local services in general were very good, good, neither good nor bad, or very bad in their opinion. An additional question specifically asked individuals to rate the quality of water provision. The responses are shown in Figure 37. The average rating is good, particularly in regard to water services. Still, more than one third of individuals are either unimpressed or believe these services are of low quality.

Figure 37. Satisfaction Levels with Local Services



(a) Municipal services



(b) Municipal water services

Source: LAPOP.

4.1.3 Willingness to Pay and Quality of Services

In the 2004 and 2006 waves, individuals were asked a question about their willingness to pay higher taxes to the municipality in order to improve the services it provides. Responses are displayed in Figure 38. A substantial majority (85 percent) of respondents reported no willingness to pay higher taxes. It is difficult to gauge satisfaction with services using this question alone, as low willingness to pay more taxes can stem from being satisfied with the current levels of service being provided (no need to spend more) or simply mistrust in local governments managing tax money. We thus explore the association between willingness to pay more taxes and a host of personal characteristics and beliefs about the municipality and the local government.

Figure 38. Willingness to Pay More Taxes for Better Services

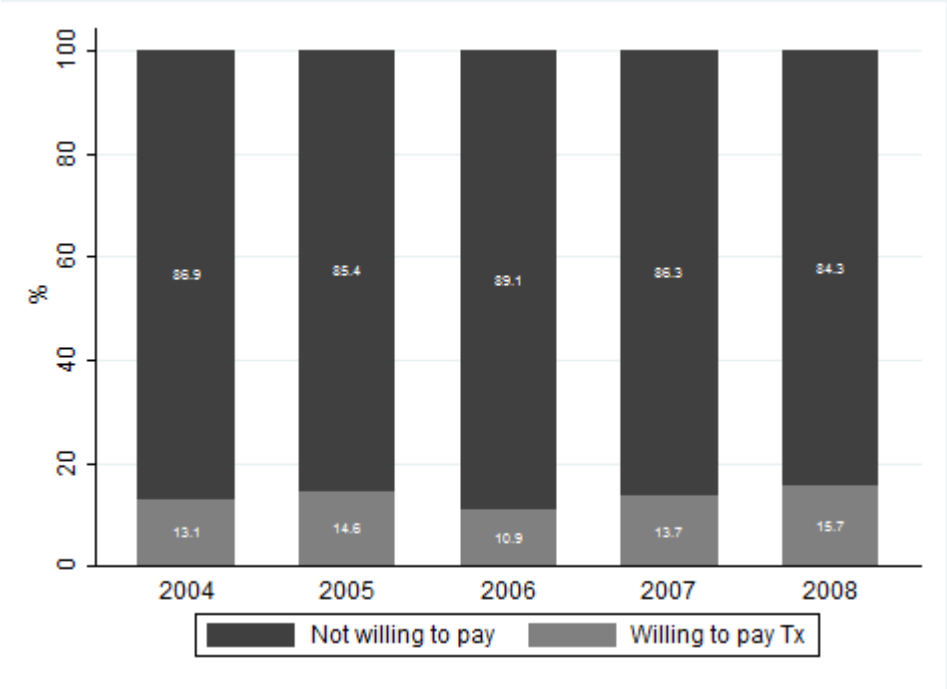
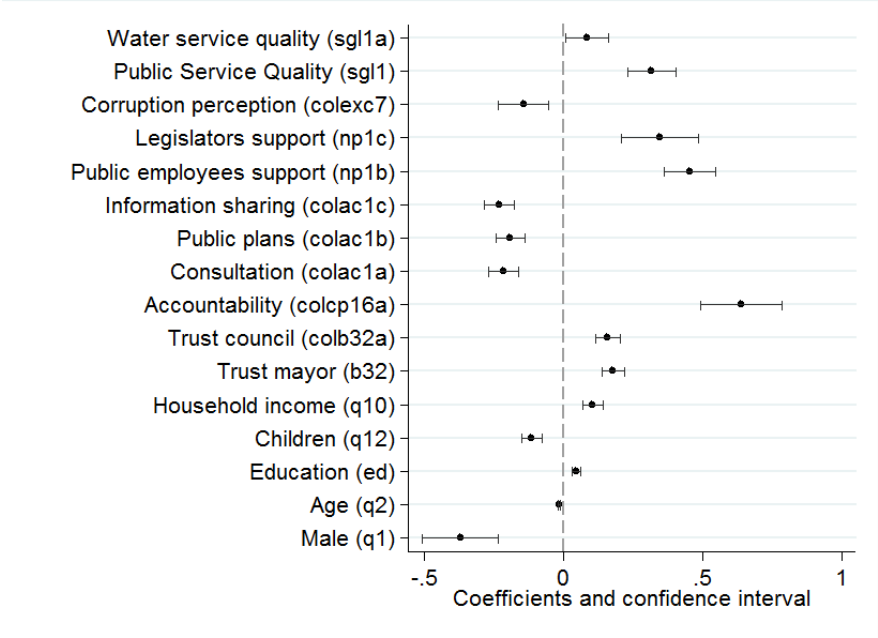


Figure 39 displays the estimated coefficients of a series of bivariate logit regressions of willingness to pay more taxes to increase provision of local services on individuals' evaluations of local government and personal characteristics. In general, positive evaluations of the government and the services it provides are associated with higher likelihood of agreeing to more taxes to improve services. In terms of personal characteristics, richer female individuals with higher education are also more likely to agree to higher taxes. In contrast, higher perception of

corruption in public service and a higher number of children in the household seem to be associated with lower probability of agreement to pay higher taxes for local services.

Figure 39. Willingness to Pay More Local Taxes



4.2 Citizen Participation

The extent to which citizens are engaged in social and political activities can play an important role in their disposition to place demands on their governments and hold them accountable. The literature in political science suggests three important forms of such engagement: general participation in social meetings and activities, voting, and participation in protest. The first form of participation is usually gauged by several items, such as community and party meetings, oversight committees, and municipal councils. Most of these items are not available for the entire period. For turnout we report rates for local elections, asked in 2004 and 2006, and willingness to vote in local elections, asked from 2007 to 2011. Participation in protest has been asked since 2009. While citizens tend in general to approve of participation in protests, actual participation levels are much lower. While approval has been above 60 percent,[29] real participation is below 30 percent.

[29] Rodríguez (2011: 130, Figure V.1).

4.2.1 Meetings

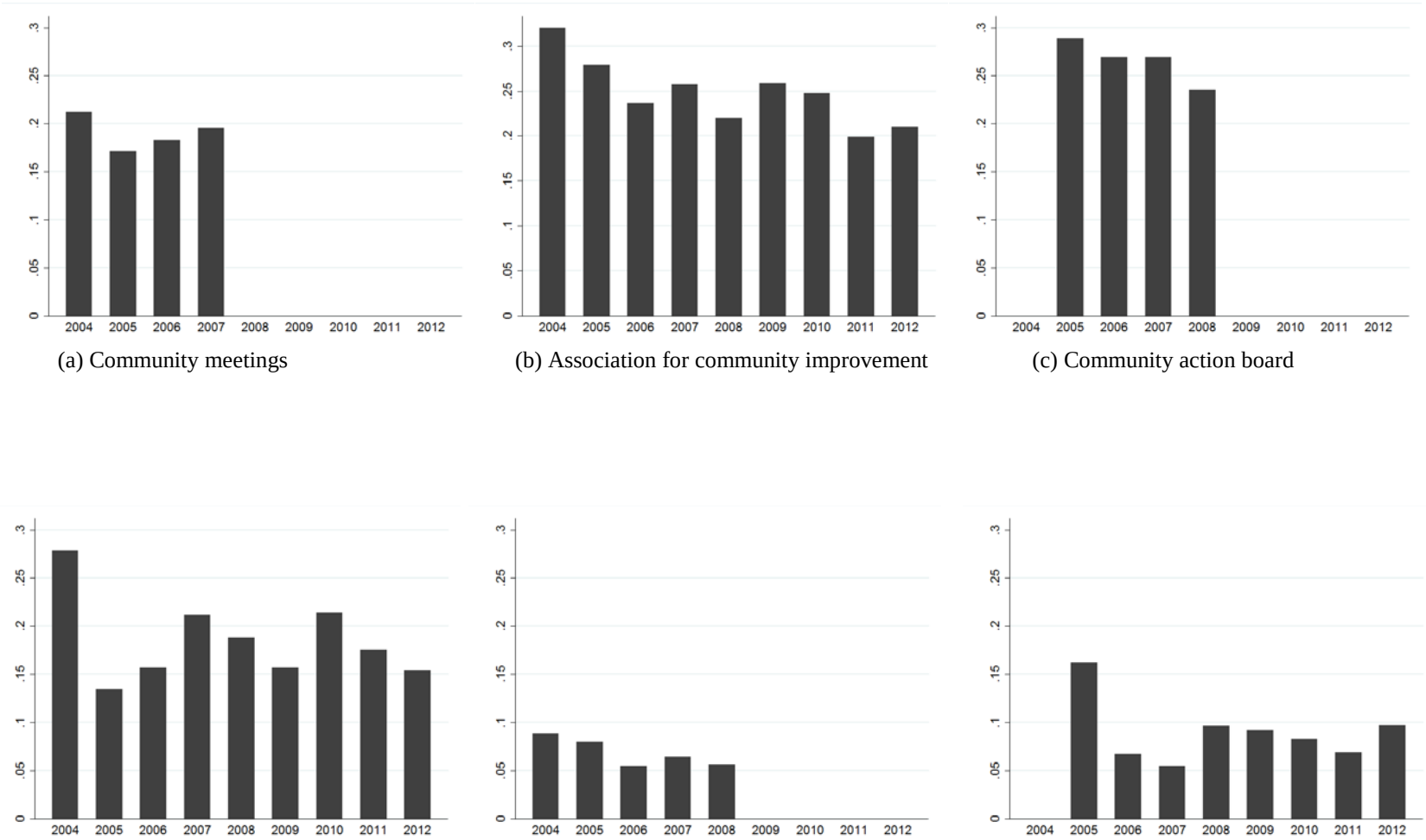
Figure 40 shows participation rates in different types of gatherings at the local level. More specifically, questions involve attendance at community meetings (*cp5c*), meetings of a community improvement committee or association (*cp8*), meetings of a community action council (*colcp8a*), participation in a citizen oversight committee (*colcp15a*), a party or political movement meeting (*cp13*) or meetings called by the mayor in the last 12 months (*np1*). The meetings with the lowest engagement rates are oversight committee meetings. The highest participation seems to be in meetings of a community improvement committee or association, followed by meetings held by political parties.

The low rates of participation in oversight committees represent a potential cause for concern, as the presence of those committees in every municipality[30] is intended to help supervise providers in the water and sanitation sectors. Ideally, the committee would create additional pressure to improve performance. A case study in Antioquia with the provider Conhydra S.A. E.S.P. shows that civil and local participation in oversight played key roles in strengthening the sector's system.[31]

However, even in successful cases participation is not as high as expected. As shown in Figure 40, participation is below 10 percent and has been decreasing over different LAPOP waves. As argued by Andres et al. (2010), low participation rates could stem from lack of awareness or promotion of these meetings by the local authorities.

[30] Judgment C-585/95 calls for civil participation in the services system; Law 142 of 1994 states that the committees should have one member per 10,000 inhabitants of the municipality.
[31] Andres et al. (2010: 104).

Figure 40. Percentage of Engagement in Local Meetings



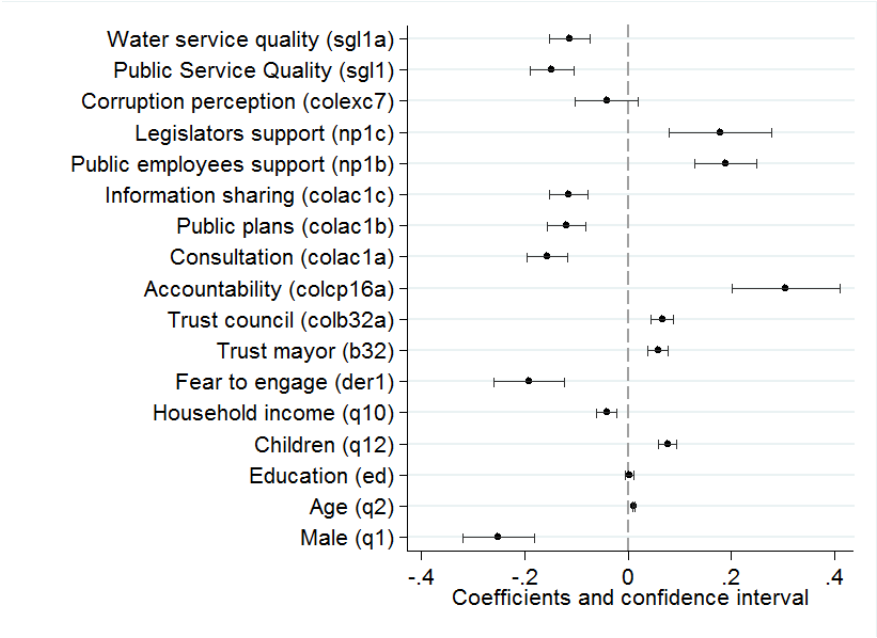
(a) Community meetings (b) Association for community improvement (c) Community action board

(d) Political party meetings (e) Citizen oversight committee (f) Municipal council

Source: LAPOP 04-12.

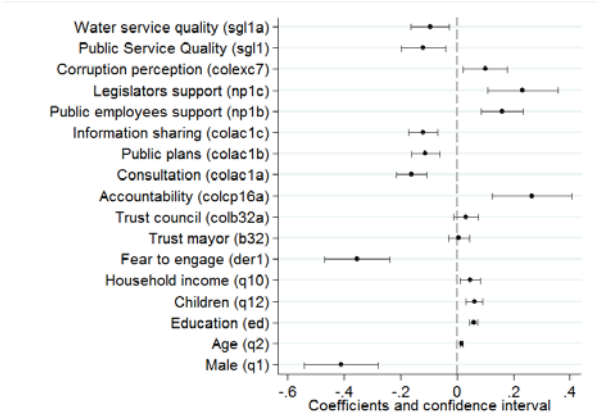
In Figure 41 we explore some bivariate associations between participation in meetings and evaluations of local government and services and individual characteristics. As shown in the figure, results are quite similar to those obtained in the case of willingness to pay higher taxes to improve local services when it comes to evaluations of local conditions, but distinct in regards to individual characteristics. In general, positive evaluations of services and the government are associated with higher levels of participation in community meetings and committees. When it comes to individual characteristics, these meetings tend to be attended with higher frequency by women, older and poorer individuals and those with children in the household. Moreover, individuals who believe they are listened to and that their options are taken into account are also more likely to participate in particular in municipal councils, committees, or associations for community improvement.

Figure 41. Probability of Participating in Meetings

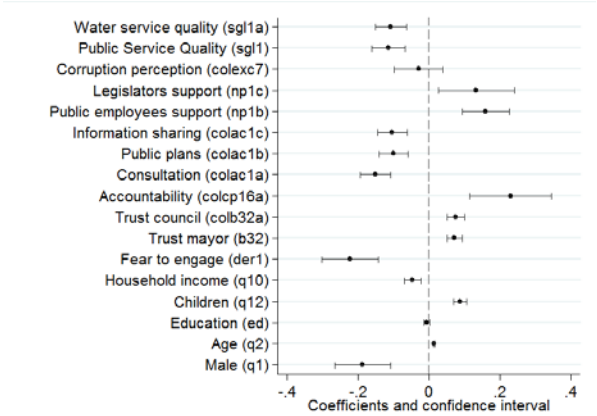


Notes: The dependent variable is a dummy that takes value of one if the citizen has participated in any local meeting.

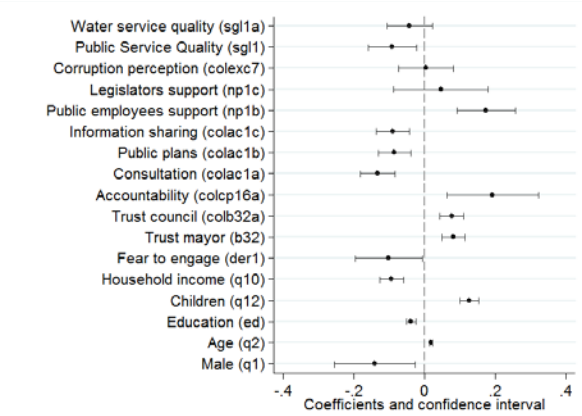
Figure 42. Probability of Engaging in Local Meetings (by type)



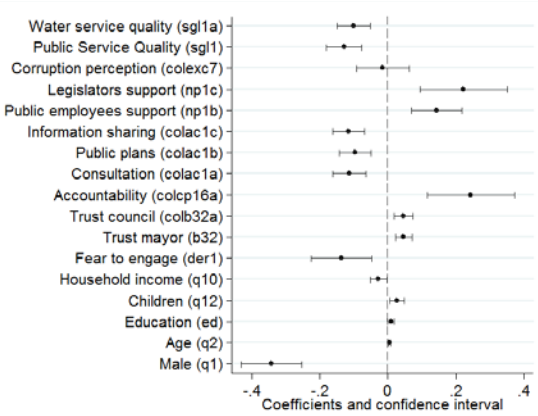
(a) Community meetings



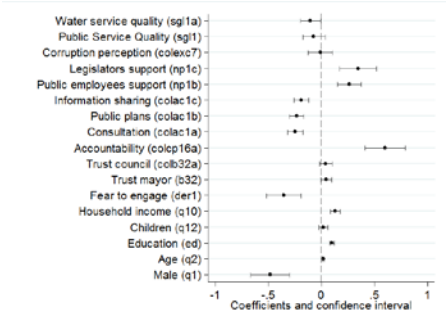
(b) Committee or association for community improvement



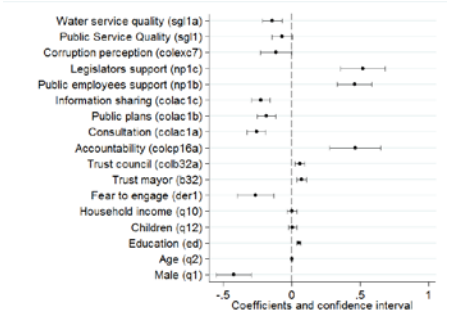
(c) Community action board



(d) Political Party meetings



(e) Community meetings

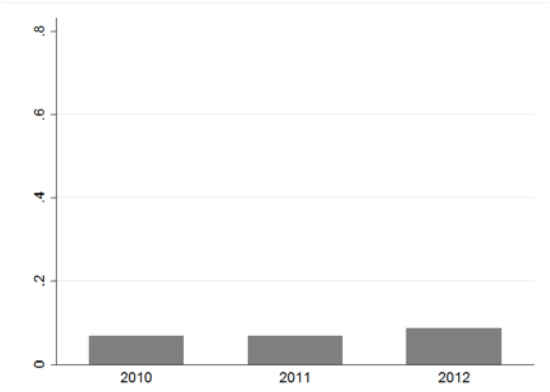


(f) Municipal council

4.2.2 Protest

Another important type of citizen participation is protest. The LAPOP contains an item asking respondents if they have ever engaged in protest. Figure 43 shows the percentages of positive responses. What can be seen is that the percentage is below 10 percent for three years and increased from 6.8 percent in 2010 to 8.7 percent in 2012.

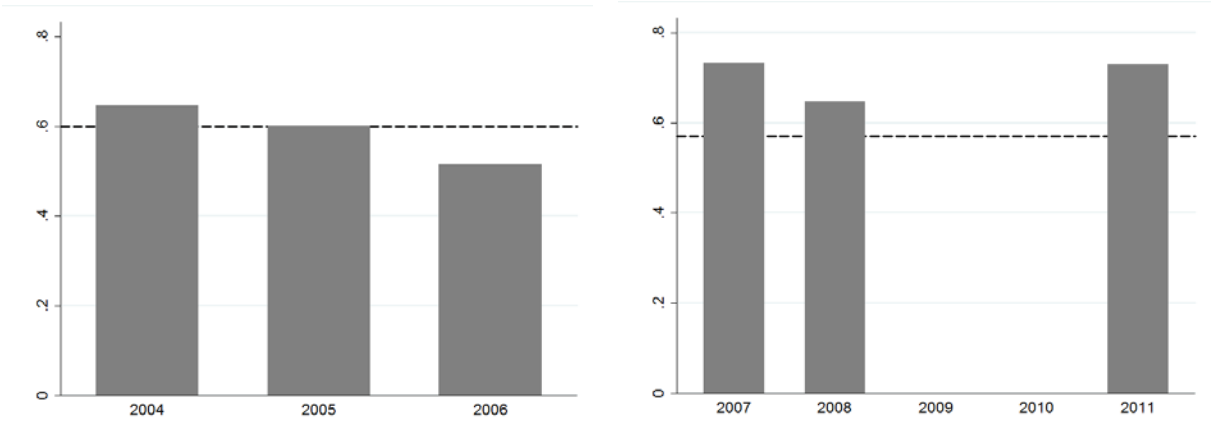
Figure 43. Engagement in Protests



4.2.3 Elections

The most commonly used proxy for citizen political participation is voting. There are two relevant questions available for the Colombian waves of the LAPOP with respect to that. The first one is whether the respondent voted in the previous mayoral elections (*vb5*), which took place in 2003. This retrospective question is available from 2004 to 2006. In 2007, 2008 and 2011 respondents were asked about their willingness to vote in the upcoming local elections to take place in 2011 (*colvbloc1*). Figure 44 shows self-reported turnout in 2003, which is around 35 percent, the graph shows a different percentage, and the percentage of people willing to vote in 2011 is around 40 percent (20 percent below the actual turnout in the mayoral elections of that year) the graph shows a different percentage.

Figure 44. Self-Reported and Official Turnout Rates at Local Elections

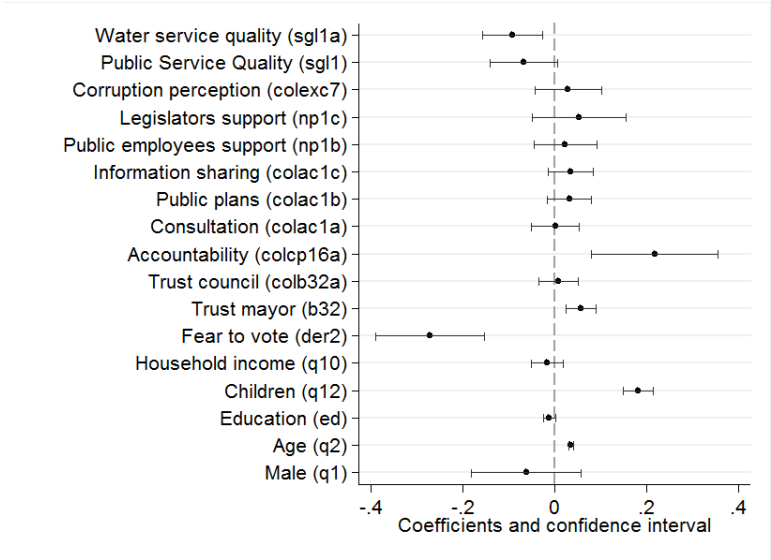


(a) Retrospective turnout in 2003 (b) Prospective turnout in 2011)

Source: LAPOP and Colombian Electoral Office.
Note: Dotted line represents actual turnout rate for mayoral elections in 2003 and 2011, respectively, according to the Colombian Electoral Office.

Following the exercises done with "willingness to pay taxes" and "participation in meetings," we estimate simple bivariate logits of reported participation in local elections on several personal characteristics and perceptions about the local government, controlling by year. As shown in Figure 45, older individuals with children in their household were more likely to report voting in local elections. In addition, those reporting higher trust in their mayors and perceiving local government to be more accountable had a higher probability of reporting participation. Individuals who reported being afraid to vote were significantly less likely to report showing up at the polls.

Figure 45. Probability of Voting (Mayor elections)

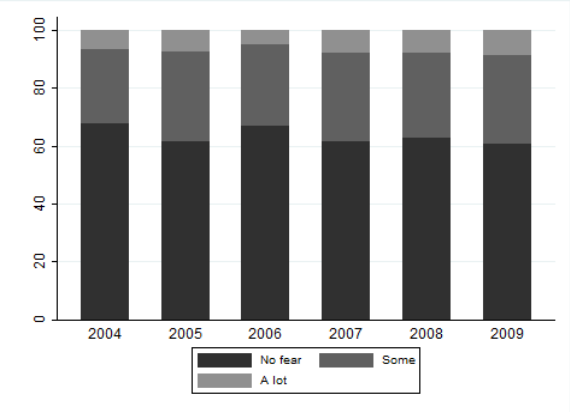


4.2.4 Determinants of Citizens' Engagement

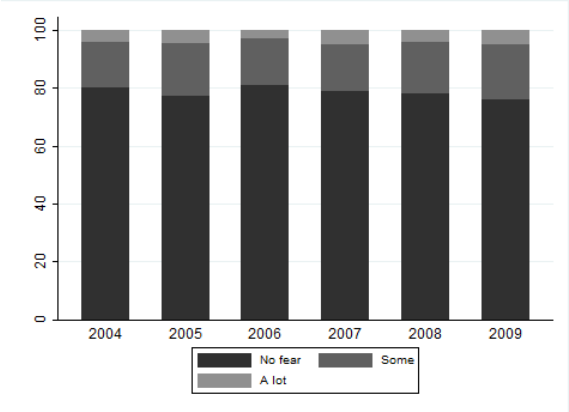
Citizens' participation can be affected by fear of exposing themselves and or by threats of being exposed for their participation. The LAPOP, for the period 2004-2009, asked individuals how afraid they were to participate in meetings to solve problems in the community (*der1*), to vote in elections (*der2*), to engage in peaceful protests (*der3*) or to run for a position in popular elections (*der4*). Individuals have the option to report "some" fear, "a lot," or no fear in each case. With particular respect to voting, they were asked about their perceptions of how threatening different groups could be during the upcoming elections (2007 and 2011). They were presented with a seven-point scale ranging from no threat to high levels of threat and prompted for an answer considering the following groups one at a time: paramilitary groups (*colvbloc3*), gangs (*colvbloc3a*), guerrillas (*colvbloc4*), and drug traffickers (*colvbloc5*), as well as clientelism (*colvbloc6*). Finally, they were prompted for their level of agreement with the statement that elections are free and fair (*colvbloc2*).

In general, the percentage of respondents reporting a lot of fear remains below 10 percent. Among the case scenarios presented, Colombians seem to fear the most running for a position in popular elections and participating in peaceful protests. When it comes to threats, most respondents tend to disagree that elections are affected by threats from clientelism and groups associated with violence. Overall, they tend to believe that elections are free and fair.

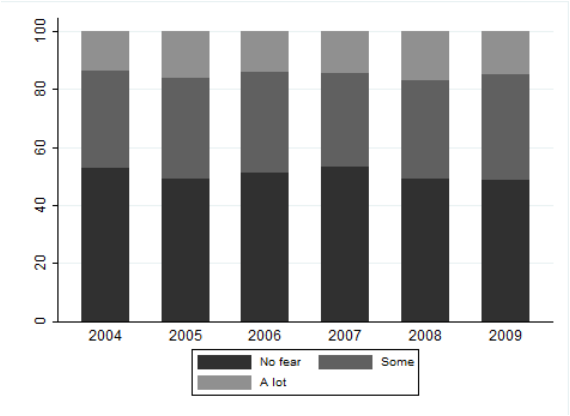
Figure 46. Level of Fear of Engagement



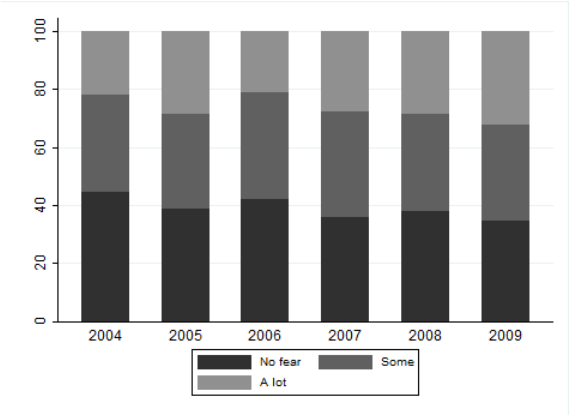
(a) Solve problems in the community



(b) Vote in elections



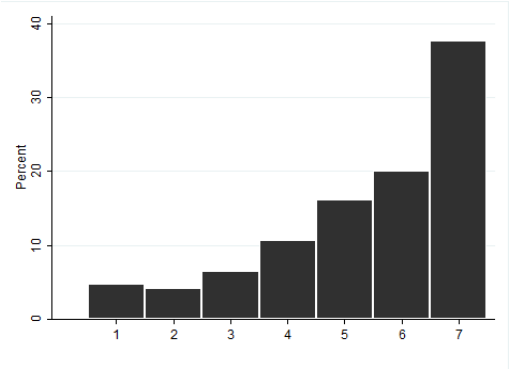
(c) Peaceful protest



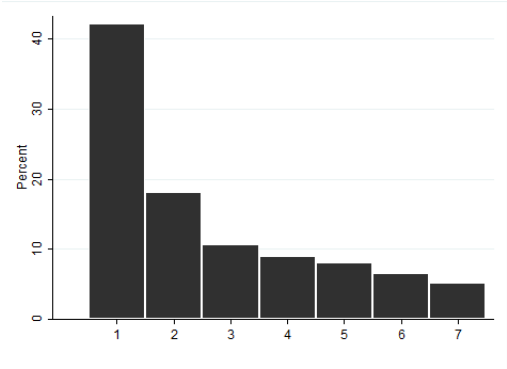
(d) Run in a popular election

Source: LAPOP 04-09.

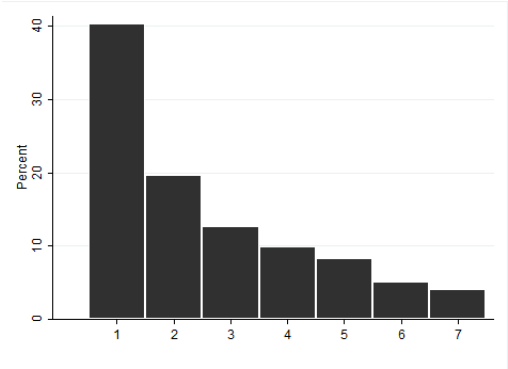
Figure 47. Next Local Elections Are



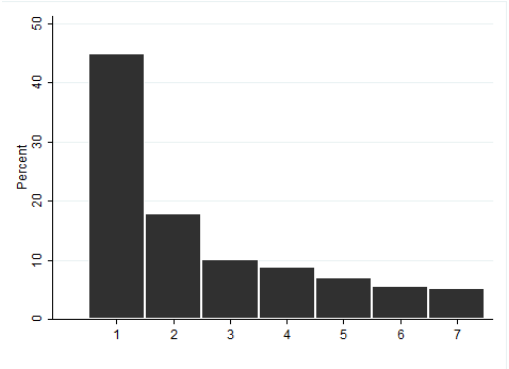
(a) Free and fair elections



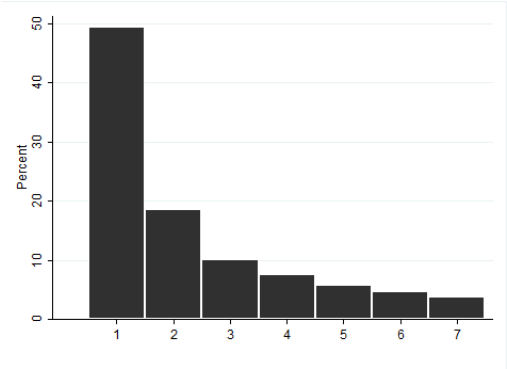
(b) Threatened by paramilitary groups



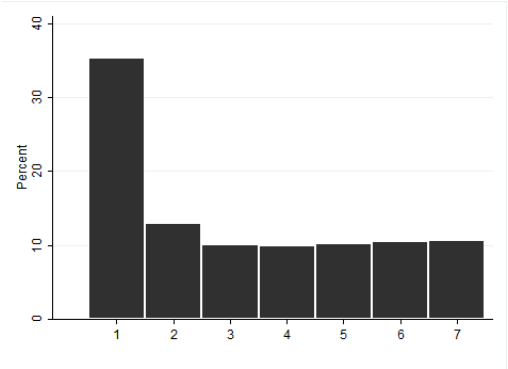
(c) Threatened by gangs



(d) Threatened by guerrillas



(e) Threatened by drug traffickers



(f) Threatened by clientelism

Source: LAPOP 2007, 2008 and 2011.
Note: Graphs pool answers across all waves.

4.3 Trust and Perceptions of Local Government

An important aspect of the relationship between citizens and their government is the trust they have in local political institutions. As pointed out by Krause (2007), low-quality governance of sub-national governments can compromise the internal efficiency of service delivery and the widespread access to services. The LAPOP has a battery of items tapping into this issue. More specifically, respondents were asked about their level of trust in the mayor (*b32*) and the legislators (*colb32a*), and about their perceptions of corruption and accountability levels in local government. On corruption, respondents were asked about their perceptions of the level of corruption among public employees. On accountability, respondents were asked if they thought local government was accountable when it came to resource management (a "yes" or "no" question *cocp16a* available from 2004 to 2008).

In addition to these items, respondents were prompted about their perceptions of the frequency ("Never," "Rarely," "Sometimes," "Almost always," "Always") with which the following takes place at the local government level: citizen consultation before making a decision (*coac1a*), publication of plans and decisions (*coac1b*), and information being shared openly and on time (*coac1c*). Finally, they were asked about how often their complaints are taken into account by the officials (*np1b*) and by the Council (*np1c*). Response options were "a lot," "some of the time," or "never."

Answers to these items are displayed in Figures 48, 49, 50 and 51. Overall, respondents do not perceive municipal governments as frequently displaying transparency and accountability in their practices. On average, only 35 percent of Colombians think municipalities are accountable in resource management, and more than 40 percent believe they are not consulted before decisions are made and that information or public plans are not shared with the public. Moreover, approximately 70 percent of respondents believe that their complaints are either not taken into account at all or only sometimes by the local government. Finally, an overwhelming 70 percent see corruption among public employees as either common or very common.

These generalized levels of skepticism seem to translate into moderate levels of trust in local government, both in regards to mayors and the local legislature. As shown in Figure 52, on a seven-point scale ranging from no trust to a lot of trust, respondents tend to bunch at the middle. Over the years, the percentage of respondents that trust the local government a lot decreased from 10 percent to about 5 percent.

Figure 48. Positive Views of Local Accountability in Resource Management

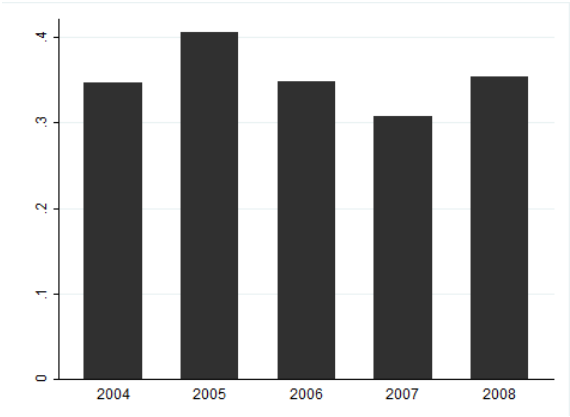
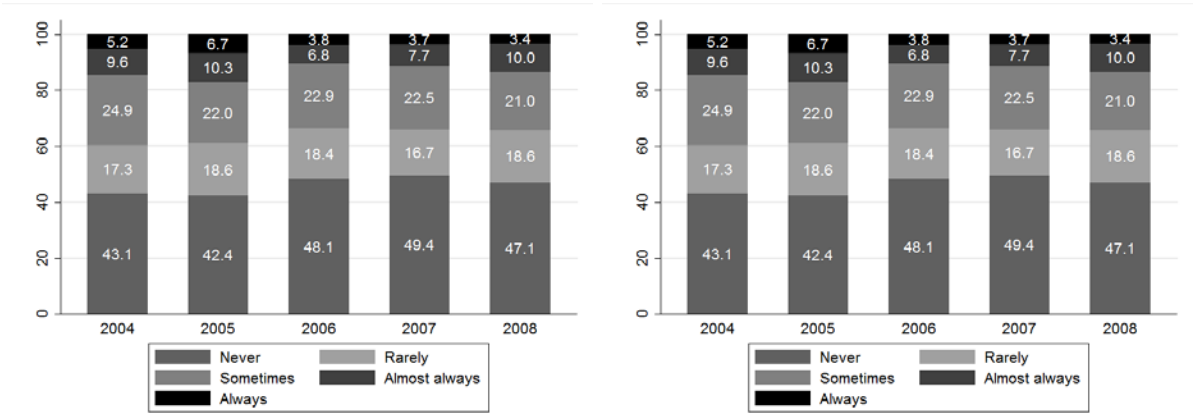
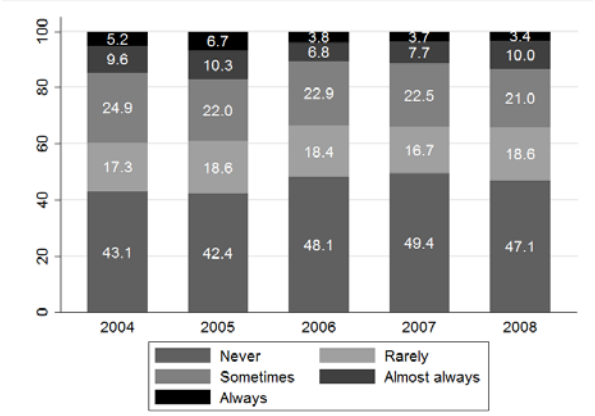


Figure 49. Perceptions of Transparency in Local Government



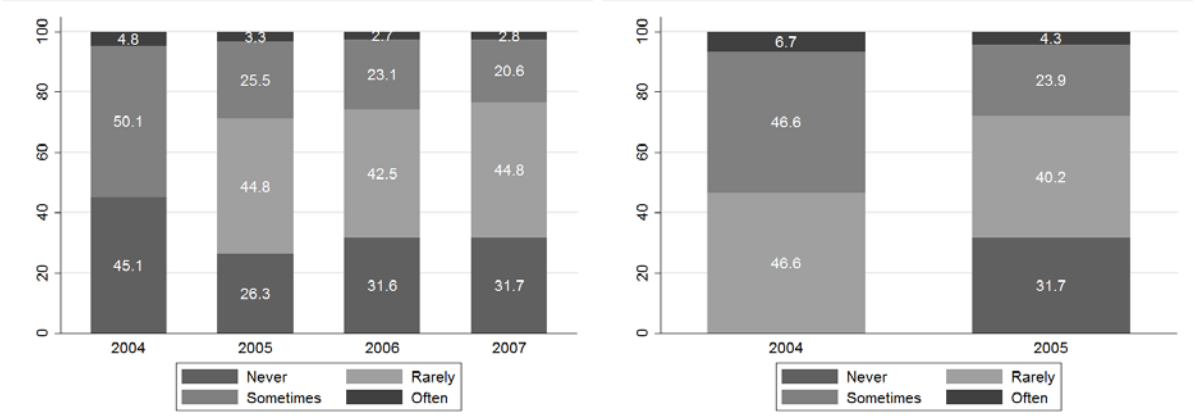
(a) Citizens consulted in decision making

(b) Plans and decisions made public



(c) Information shared

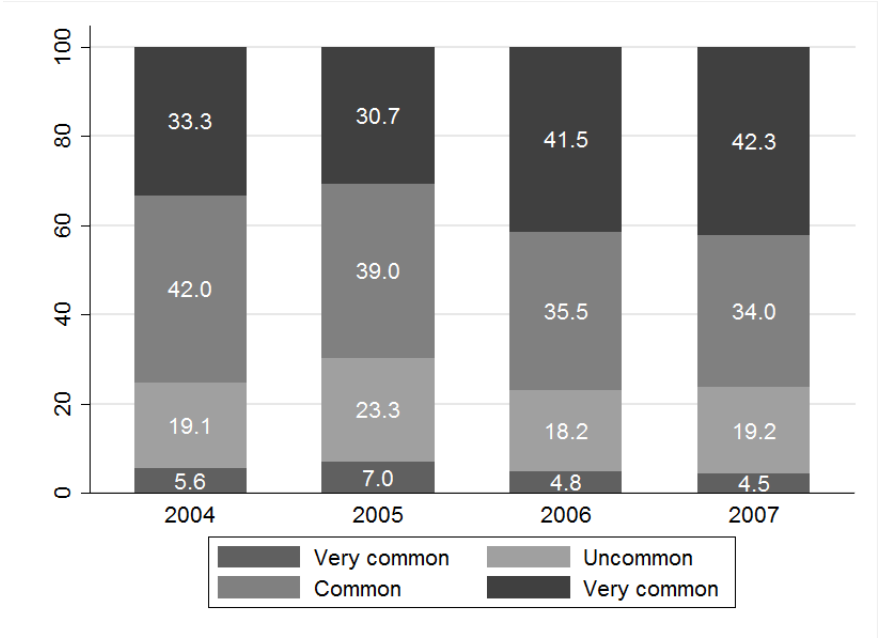
Figure 50. How Often Individuals' Complaints Are Heard



(a) By government officials (b) By legislators

Note: Unlike the other years, 2004 has only three categories.

Figure 51. Perception of Levels of Corruption among Public Servants



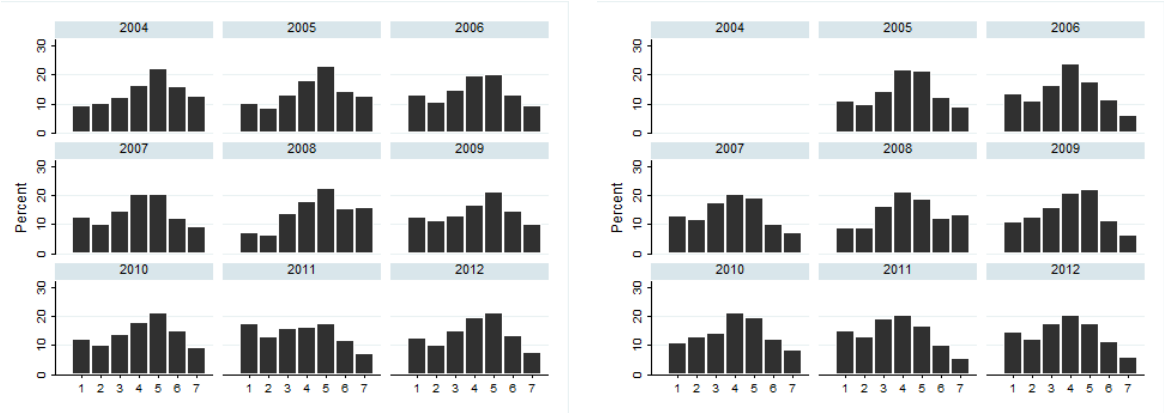
Source: LAPOP 2004-2007.

4.4 Preferences on Resource Allocation: Sector Salience

With so many issues competing for citizens' attention and limited time to devote to them, it is important to understand the salience of the sector relative to other areas in public opinion. A couple of items can help clarify this issue. The LAPOP usually begins the interview with a general question about the most important problem affecting the country. In addition to that, the

latest wave in 2012 included a question about what should be the government's investment priorities. Respondents were asked for their opinion on what should be the top two priorities (*soc2a* and *soc2b*). Only half of the sample was asked those questions, but are still representative of the general population. Finally, in 2012 respondents were asked about what they thought was the best policy to reduce poverty and inequality; infrastructure was included as one of the possible answers (*soc10*).

Figure 52. Level of Trust

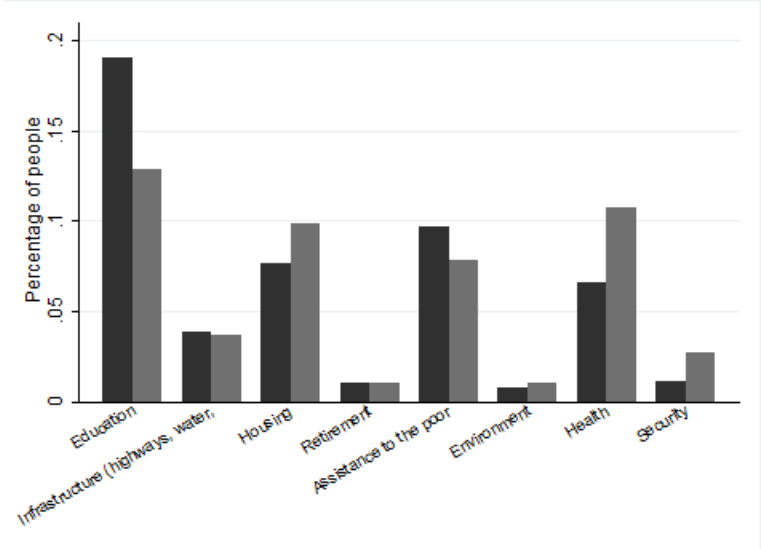


(a) Mayor (b) Legislators

Source: LAPOP 2004-2012.
Note: The level of trust is on a scale from 1 to 7, where 1 represents a low level of trust and 7 a high level of trust.

Relative to other areas of concern to citizens, water and sanitation concerns (or infrastructure in general) are not very important. Figure 53 shows the percentage of respondents mentioning each of the different areas as government investment priorities (both their first and second ranked options). Just 4 percent believe that infrastructure is either the first or second most important area. Percentages shown in Figure 54 are consistent with this result, in that less than 2 percent of the individuals named infrastructure as a way of improving the lot of the poor and reducing inequality.

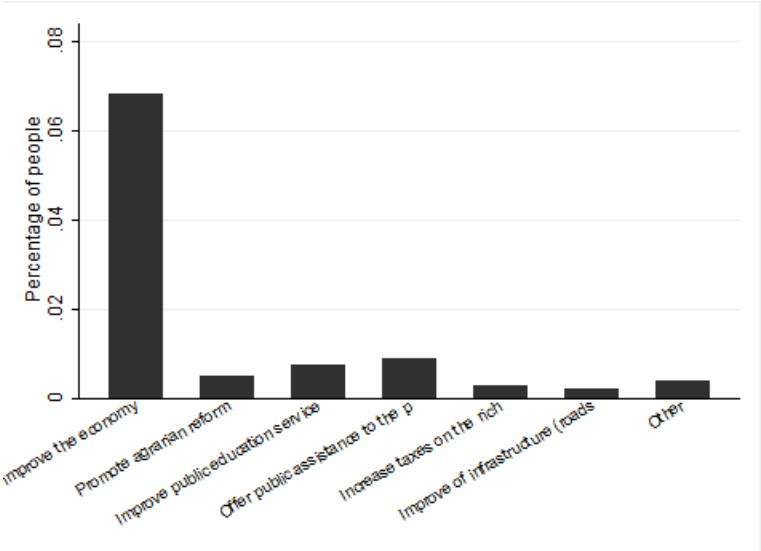
Figure 53. First and Second Place: Preferences for Investment



Source: LAPOP 2012.

Note: This question was asked for the half of the sample. The darker bars show the percentage of people that choose that specific area as an answer to "Tell us, please, in which of the following areas should the government invest more" and the lighter bars show the percentage of people that choose that specific area as an answer to "And in second place?"

Figure 54. Policy to Reduce Poverty and Inequality



Source: LAPOP 2012. Note: This question was asked of half of the sample.

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