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The Case of Peru's Water and Sanitation Sector

Miguel Jaramillo
Lorena Alcázar

2013

Inter-American Development Bank
Water and Sanitation Division

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Miguel Jaramillo
Lorena Alcázar*

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*Senior Researchers at the Group for the Analysis for Development – GRADE.

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Abstract[1]

Since 2004 the government of Peru has implemented a process of participatory budgeting (PB), which is mandatory for every sub-national government. We analyze the link from PB to coverage and water service quality indicators. We find no statistically significant relationship between PB and our measures of coverage and service continuity, regardless of whether the outcome variables are measured in levels or in changes. Qualitative evidence collected in a sample of municipalities is consistent with this result. Further, PB in the water sector may also lead to inequitable outcomes as the poor may confront greater costs of participation. At the root of this lack of connection we find weaknesses both in the PB process itself as well as among the different actors in the process: citizens, municipalities and water service providers.

JEL codes: H42, H72, D7

Keywords: participatory mechanisms, service delivery governance, local governments.

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1. Introduction

Since 2004 the government of Peru has implemented a process of participatory budgeting (PB), which is mandatory for every sub-national government.[2] PB is a process oriented to democratizing and making more transparent public budgeting by creating formal channels of participation, thus promoting the inclusion of politically and economically weak sectors of society in the budget allocation bargaining process.

Participatory Budgeting is inserted in Peru's decentralization process. According to the Law for the Participatory Budget Process, the objective of this legislation is to design "a mechanism to assign public resources in a just, rational, efficient, effective and transparent manner, so as to strengthen the relationship between the state and civil society". It is a tool to generate greater voice for citizens and accountability by public officers in matters related to budget allocation at the sub-national government level. PB in Peru is: (i) backed by a constitutional norm, (ii) implemented at a regional, provincial and district level and (iii) discretional in terms of the amount of spending made through this mechanism.[3]

The structure of investment budget across government levels in Peru enhances the power of the PB. For the year 2009, 56% of the total investment budget was under the administration of municipalities (province and district level), while 22% was in charge of regional governments and only the remaining 22% was managed by the central government. Although available public budget data does not allow us to identify the share of the budget coming from PB at the regional and municipal levels, we can say that in our sample the PB importance at municipal level is 27% of the investment budget in year 2009. Thus, PB is an important part of public investment at the sub-national government levels, which together explain about three quarters of total public investment in Peru.

PB may have an effect on the composition of investments by sub-national governments, prioritizing projects in some specific sectors. In effect, World Bank (2009) argued that PB promotes a pro-poor logic in the allocation of public resources, prioritizing much-needed basic infrastructure. In this study we focus on its effects on the provision and quality of service delivery. Prioritizing basic infrastructure projects is only a first step towards reducing poverty and improving the welfare of the population. Just as important is to have in place an efficient and

[2] Three sub-national government levels exist in Peru: regional governments (23 in total), and two levels of local governments: provincial municipalities (numbering 169), and district municipalities (totaling 1,833).
[3] According to law, the mechanism is only used for capital investment related spending.

inclusive service delivery system. In this context, the study looks at the effects on PB on water and sanitation coverage and quality of service delivery.

Conceptually, PB should have an effect on the quality of public services through three channels. First, PB provides greater voice to the population, which, in turn, puts pressure on local governments to provide better public services. Second, PB prioritizes investment in basic services, leading to higher coverage and quality of services. Third, as people prioritize investments in certain services, they are better motivated to monitor their quality of such services. However, several conditions (or assumptions) need to be fulfilled in order for these mechanisms to work. First, poor people, who are in greater need of basic services, but at the same time face the largest costs of participation, do participate. Second, people have the capacity and means to adequately identify needed investments and to monitor service quality. Third, mechanisms of accountability do exist, hence majors and municipality representatives in general are responsive to people's needs expressed in the PB results. Fourth, municipalities have both the technical capacity and the resources to carry out the prioritized investments. This is particularly key when investment is as complex as that in water and sanitation. In sum, it is not clear that PB may live up to its promise of contributing to improvements in basic public services.

Using econometric techniques, we analyze the link from PB to coverage and water service quality indicators, showing that there is no evidence of a positive relationship. In effect, we do not find a statistically significant relation between PB and water and sanitation coverage and service quality indicators (mainly water continuity), regardless of whether they are measured in levels or in changes. We complement and reinforce these results with a qualitative analysis, based on interviews with relevant actors in the PB process and the water sector.

The organization of the text is as follows. Following this introduction, Section 2 presents a conceptual discussion of the potential effects of PB on coverage and quality of public services. Section 3 summarizes the characteristics of the PB process in Peru and the main institutional characteristics of the water sector. Section 4 discusses the methodological issues around identifying the effect of PB on quality of services. It also describes the strategy for the qualitative fieldwork. Section 5 presents the data used for the analysis as well as descriptive statistics for the variables included in the analysis. Section 6 explores socio-demographic and political determinants of PB intensity. Section 7 presents the results of the econometric analysis and discusses them bringing in also the qualitative data collected. Section 8 concludes and discusses

policy implications of our findings. We also include two appendices. Appendix A presents the distribution of our different PB variable definitions. Appendix B compares districts in our sample with the rest of Peruvian districts.

2. Conceptual framework

When the use of certain resource by an individual does not affect resource availability by other potential users (non-rivalry) and both users have difficulty to exclude others (no exclusion), we are facing a public good. The central problem with a public good is that encourages its over-use or a shortage in its supply (Hardin 1968, Orstrom 1990). The effective solution to these problems requires collective action by the actors involved or the existence of an external agent to impose rules that limit the overuse or overcome the shortage in supply. Privatization (more or less regulated) is a solution to this problem, but not the only one. Recent empirical research in the school of new institutionalism have established that local institutions, whether formal or informal, not only play a fundamental role in mediating and filtering the effects of Central Government's policies, but also can solve the problems of collective action (Olson 1965; Ostrom 1990, 1994; Oakerson 1999; McGinnis 1999, Gibson et al 2000). If this is so, public policy instruments that take into account local institutions to solve problems related to collective action, in general, acquire more importance in the public policy agenda.

The present study hypothesizes that a key determinant of public service performance is the kind of institutional arrangements that seek to overcome the problems of managing a public good. The reforms of decentralization and participatory mechanisms represent, at least on paper, an effort to establish a government system more responsive to local requirements for the effective resolution of the problems of providing services at the local level, generating increased opportunities for the organized participation of population. This process is uneven in different countries. In the case of Peru, this is a relatively incipient process. In this context, this study seeks to identify the role played by the local formal participatory budget process in the quality of services that are provided through public budgets. The specific focus is on coverage and quality of water services.

Participatory mechanisms, such as PB, may influence public service outcomes by changing the incentives political actors, policy makers and government officials' face. Specifically, it is expected that PB will generate greater accountability for them (Genro and

Souza 1994, Utzig 1996, Seragelding 2003, Goetz 2003, World Bank 2009). However, other factors will also affect public service governance: information problems (missing or asymmetric information), the role of political organizations and special interest groups, technical capacities of the participatory agents, technical skills in the public sector, coordination problems among different public agencies, and the political economy of water sector and other public services investment decisions. Thus, in order to assess the effects of participatory budgeting one needs to control not only for the socioeconomic characteristics of the communities involved, but also for the local political context, and the technical capabilities in local governments and public services providers.

Actual coverage and quality of public service provision, such as that of drinking water, may be below citizens' expectations if the operator is accountable only to government agencies, as supply driven approaches to service delivery may generate services that are inefficient and unresponsive to local needs (Reuben W. and Belsky L., 2006; Henry, 2002). The consequences of these failures are of particular importance to the poorer that typically lack effective mechanisms to ensure that their voice is heard in service delivery. Therefore, the success of service delivery depends on whether institutions of service provision are accountable to citizens (Ahmed et al, 2004). It is of general opinion among international agencies and academia that improved outputs, greater responsiveness to the needs of service users, and sustainability may be enhanced by greater public service accountability (Hordijk, 2009).[4]

The participation of ordinary citizens in the prioritization of service delivery investments increase service users' opportunities to express their demands through voice as well as making the sub-national government more accountable in service provision. Through PB, a principal (service users) attempts to secure services from an agent (service providers). Agents are expected to hide the information that principals require to monitor their performance. Through PB, the principal, who is the direct recipient of the service, has the opportunity to demand better services, reducing the transaction costs of individual service users in monitoring service delivery. Besides enhancing the quality of the provision of public goods, greater accountability of service providers and policy makers can be used, if the poorer do participate, to extend service access to

[4] Of course, participatory budgeting is just one of several mechanisms that may enhance accountability for public services at the local level. Other mechanisms, more geared towards accountability for service quality, include participation of user representatives in the board of service companies and monitoring of service quality by consumer protection groups.

the marginal and excluded groups in society. Thus, investments made through the participatory budgeting may be poor-driven. In this way, this participatory mechanism does not only focus public investment in basic service provision, but it also may concentrate it in areas in which there is less coverage.

Starting from the experience of Porto Alegre, Brazil in 1989, participatory experiences have expanded throughout Latin America (Goldfrank and Schneider 2006b). A recent balance of these experiences suggests that despite significant accomplishments in places as diverse as small rural villages or large cities, PB has not had widespread local success in encouraging citizen participation, fiscal transparency, and effective municipal government (Goldfrank 2006a). The experience is quite diverse and important factors for success include: committed support by the authorities (mayor, regional presidents), institutions providing technical and financial support and a tradition of collaboration among civil society organizations. A recent analysis of the experience of Porto Alegre stresses the advantages and limits of PB (World Bank 2008). Participation has indeed been enhanced and the process is socially quite legitimated, though certain groups remain under represented because of insufficient incentives. However, the interface between participation and budget management is complex and there is no evidence that PB has contributed in this case to better fiscal management: the role of fiscal oversight has taken second place *vis-á-vis* incorporating citizens demands.

A much smaller literature has linked participatory mechanisms to water service provision, despite the importance of institutional arrangements for the latter (Straub 2009). A few papers have looked at the link between participatory mechanisms and water provision. Tankha and Fuller (2009) find that this type of experiences are expanding in India and Brazil, but suggest that more attention is needed to administrative reforms and capacity building. Also, other authors, like Beall et al. (2011) and Neare and Keck (2009) look at process measures and opinions of participants to suggest a positive link between participatory mechanisms and water provision. However, to our knowledge, so far no attempt has been made to quantitatively link participatory mechanisms to water service coverage and quality measures.

Channels through which participatory budgeting (PB) may affect the provision and quality of water and sanitation services

PB is a process oriented to democratize and make more transparent public budgeting by creating formal channels of citizens' participation and promoting the inclusion of politically and economically weak sectors of society in the budget allocation bargaining process. Looking at cross sectional data for Peru, World Bank (2009) provided some evidence showing that PB has effects on the composition of investments by sub-national governments.[5] Specifically, evidence pointed out that the new budget allocations respond to the results of PB prioritizing and that priorities set on basic infrastructure projects tend to correlate with an index of needs. Thus, they conclude that evidence from Peru suggests that PB effectively promotes a pro-poor logic in the allocation of capital expenditures by sub-national governments.

While some evidence has been provided pointing to a the link between PB and the composition of investment, as priorities set by PB processes are put into execution by local governments, the link between PB and the effective provision and quality of public services seems more long winded, at best.

We identify three possible channels through which PB may affect quality of public service provision:

- PB provides greater voice for the population to express its opinions on municipal matters in general. Enhanced voice puts pressure on local governments (i.e. make them more accountable) to provide better services accordingly and show more transparency on reporting on capital investments.
- PB results on more local governments' investment in basic services and this higher investment result in greater coverage and/or better service quality.
- As people prioritize investments in a public service, they are better motivated to monitor the provision and quality of such service and represent a signal to the authorities of the community's interest in those services.

[5] The Word Bank (2009) results on investment composition were based on the analysis of all sub national governments (638) with available information on PB in the year 2007 comparing municipalities with low and high PB intensity. However, these results are based on only one year observations and without a control group.

On the other hand, several conditions may limit or even obstruct the effectiveness of PB in inducing better basic public services. First, poor people, who are in greater need of basic services, but at the same time face the largest costs of participation, may not participate. Second, people may not have the capacity or the means to adequately identify the required investments and monitor service quality. Third, because of the composition of their political clientele or because of the lack of accountability mechanisms, majors may not be responsive to people's needs expressed in the PB results. Fourth, municipalities may not have either the technical capacity or the resources to carry out the prioritized investments. This is particularly key when investment is as complex as that in water and sanitation. In sum, conceptually it is not clear that PB may live up to its promise of improving basic public services.

To test whether PB has an effect on coverage and quality of water and sanitation services, we propose the following hypothesis:

- H1: "Greater involvement in PB causes greater coverage and/or better service quality"
- Channels 2 and 3 require that a public service being a priority for PB is associated with greater coverage and/or better services. The hypothesis in this case is:
- H2: "Prioritizing a public service investment in PB causes greater coverage and/or better service quality".

3. Institutional Background

The general goal of this section is to identify the main institutional features that may be relevant for understanding the potential impacts of PB on water and services quality in the Peruvian case. Specifically, we have two objectives: (i) to briefly describe, legally and in practice, the Participatory Budgeting (PB) process in local governments (provincial and district municipalities), and identify and discuss the roles of the main actors involved in the process; and (ii) to understand how does the Water and Sanitation Provider Companies (WSPCs) work and their relations with sub national governments.

This section is based on a review of the legal documents and previous studies about participatory budgeting. This is complemented with qualitative information collected from

interviews in four local governments and three WSPCs in a first exploratory stage of our qualitative work. Specifically, we revised norms and regulations, articles and web information of WSPCs, local governments and other public institutions and reports regarding the progress, results and limitations of the PB and the water and sanitation services in Peru. The four local governments, all outside the Lima region, visited in the exploratory qualitative fieldwork were: i) the Provincial Municipality of Huancayo, Junin, ii) the Provincial Municipality of Arequipa iii) the Provincial Municipality of Santa (Ancash), and iv) the District Municipality of Chilca, in Huancayo . The three WSPCs visited were: i) SEDAM Huancayo SA, in Huancayo, ii) SEDAPAR Arequipa SA, in Arequipa, and iii) SEDACHIMBOTE SA, in Chimbote, Ancash.

3.1 The Process of Participatory Budgeting

The objective of the Participatory Budget Law is to establish "a mechanism to assign public resources in a fair, rational, efficient, effective and transparent manner, in order to strengthen the relationship between the state and civil society".[6] It is a process "oriented to democratize public budgeting by creating formal channels of participation thus promoting the inclusion of politically and economically weak sectors of society in the budget allocation bargaining process".[7] First implemented in 2004, by 2009 27% of the investment related spending at district level was decided through this mechanism[8]. This is particularly important if we consider that more than half (56%) of investment in the country comes from the municipal level.

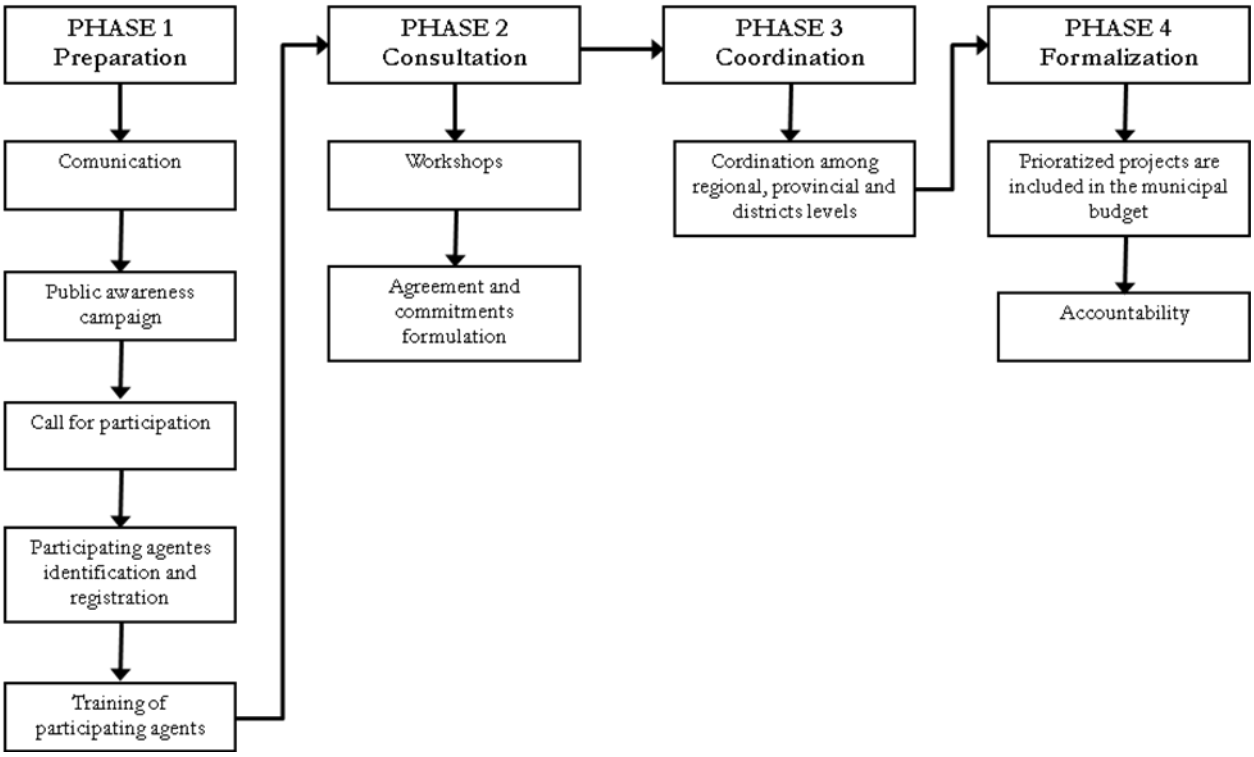
Four features characterize PB in Peru: (i) it is backed by a constitutional norm, (ii) it is mandatory at all sub-national government levels (regional and local), (iii) it is discretional in terms of the resources allocated through this mechanism and (the Ministry of Finance supervises that the process is implemented but not if prioritized projects are actually implemented), (iv) it has to be oriented to investment expenditures.[9]

PB in Peru is accompanied by a legal framework that has the objective of ensuring the transparency of the process. The law itself defines the PB process characteristics, but, in

[6] Ley Marco del Presupuesto Participativo. Capítulo I: Disposiciones Generales. Artículo 1: Definición.
[7] Banco Mundial (2011), Evaluación del Presupuesto Participativo y su relación con el presupuesto por resultados. Documento Resumen., pg. 3.
[8] This percentage is estimated using our calculations and correspond only to the sample used in this study.
[9] Article 6 of the implementing regulation states that authorities responsible for the budget report the percentage of the government entity's investment budget that corresponds to the participatory budgeting (D.S. 142-2009-EF, Reglamento de la Ley 28056 - Ley Marco del Presupuesto Participativo).

addition, every year the Finance Ministry sends a document of instructions ('*Instructivo*') with details for the implementation of the process. Based on the *Instructivo* for 2010, Diagram 1 defines the different phases in the PB process.

Diagram 1: Phases of the Participatory Budgeting Process



Source: MEF, Instructivo 2010.

As shown in Diagram 1, first, we have the preparation phase, where the communication campaigns should take place and the participant groups should be identified and trained. Then comes the consultation phase, probably the most important and complex one, when the municipality should work with the civil society together in the diagnosis, identification and prioritization of investment projects. This phase involves workshops and formalization of agreements of the PB, processes that are conducted by the Technical Team. Then, projects are ranked by a score that considers both priority and cost of the projects.[10] Later on, in the coordination phase selected projects are presented to the Major to be discussed with participatory

[10] Previously determined by the technical team.

agents and decide the definitive projects and amounts of investment in these projects. Finally, the Commitments and Agreements Act is elaborated and the Vigilance Committee is formed. In June, agreements of the PB should be formalized into the Initial Institutional Budget (formalization phase).

According to exploratory interviews with agents active in the process, almost all the phases are normally fulfilled, though usually late and not necessarily in the order mentioned in the "*Instructivo*".[11] The phase that faces more difficulties and generally does not even take place is the coordination one, mainly due to lack of agreement on large-scale projects, i.e., projects that involve more than one district. Unfortunately, it is also usually the case that the phase of preparation does not include communications and awareness campaigns. Furthermore, the training workshops in this phase often do not fulfill their formal functions and focus on "convincing" the participatory agents to accept the projects developed by the local government, instead of training and guiding them.

The most important group involved in the process is the Technical Team, which should be especially conformed by the municipalities to work on the PB.[12] These groups are normally constituted but in many cases their members do not fulfill their functions mainly due to their knowledge limitations or limited experience in participatory activities. On the other hand, the participatory agents are usually represented by neighborhood organizations, as the municipalities do not promote the participation of universities, unions or educational associations. These "neighborhood organizations" prioritize small-scale projects and generally do not have any experience in project development.

Finally, in the formalization phase the Vigilance Committees present the mandatory multiyear projects which execution has already started and will continue in the next fiscal year.[13] The PB process concludes with a report that describes all the process, which is then sent to the Local Coordination Councils for review and approval.[14]

[11] The interviews were conducted in four municipalities: Huancayo (provincial), Arequipa (provincial), Santa (district) and Chilca (district), and with representatives of the Economics and Finance Ministry.

[12] The Technical Team consists of professionals and technicians from the Planning, Budget and Territorial Office from the Regional and Local Governments; Programming and Investment Office from the Regional and Local Governments; and professionals experienced in planning and budgeting from the civil society who were hired as consultants by these government during the PB process. The technical team provides support to the participating agents and the municipality.

[13] Because of their high cost the execution of these mandatory projects is divided over several years.

[14] Many times, the participatory agents disagree with the Technical Team decisions but are finally convinced to sign the Agreement Act.

Participatory Budgeting within municipal budgets

Municipalities manage two types of public expenditures: i) current expenditures and ii) investment expenditures. Only the latter are subject to participatory budgeting. By law, each sub-national government has to make public the amount of investment expenditures that should be discussed and allocated through the PB mechanism. Thus, the amount of resources that are put in referendum is basically a political decision of the mayor and may end up being a very small portion of the municipal budget.

According to the municipal representatives working on PB, the unwillingness of local governments to allocate all or most of the investment resources through the PB is mainly due to two limitations of the PB outcomes: i) the fragmentation of resources for investment in several projects, and ii) the implementation of low impact projects. First, municipality officials think that the participatory agents (PA) do not have the broader context of the local situation and mostly care about their neighborhoods. Also, we find that governments' representatives think that the participatory process prevents the implementation of high-impact projects that benefit a larger population.

Finally, we have that the allocation of resources for the PB may vary significantly from year to year. Furthermore, when the PB takes place, during the first half of the year, the referential budget is the Initial Institutional Budget, which is normally significantly changed later on when the final budget (Modified Institutional Budget) is approved.

Participatory Budget Projects

We find two kinds of project in the PB: i) multi-year or mandatory projects, which require resources from several consecutive fiscal years, and ii) annual priority projects, smaller projects which are executed with the PB resources in one fiscal year.

Generally, projects are presented at the PB meetings as ideas, which are later developed, including the elaboration of a profile and technical file during one or more years until they meet the requirements and are finally eligible to be prioritized. Even though the projects requirements for municipalities are quite basic, as shown in Table 1, in many cases they are not fulfilled due to the lack o experience and capabilities of most participating agents.

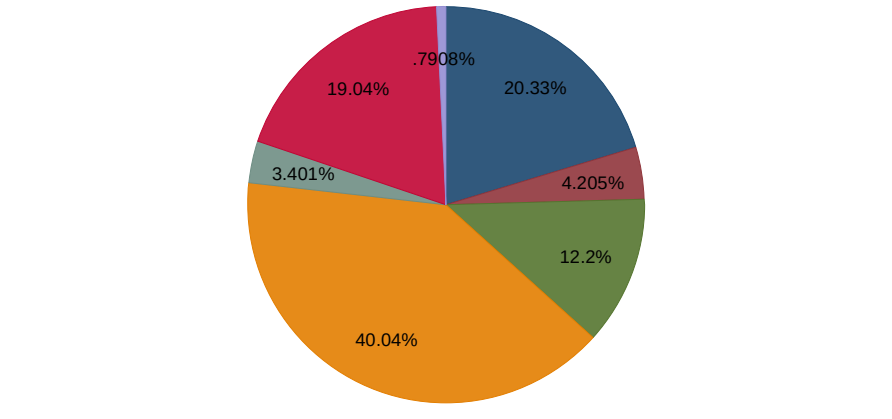
Table 1. Criteria in Local Governments (Province)

Scope	Coverage	Investment amount
Provincial impact project, multi-district, benefits a minimum of two jurisdictional districts	Provincial impact project, their coverage in the target population is not less than 5% of the total population of the province	The total amount of the investment should not be less than S/. 1, 200,000

Source: Provincial Municipality of Santa website.

Figure 1 presents the distribution of resources allocated through PB by sector for year 2009 for the municipalities included in the sample of this study. As it is shown, roads and transportation is the main recipient of resources prioritized by PB, and most works funded are road improvements and sidewalks. The next most important sector is Health and Education, which typically involves building of classrooms or toilets, and expansion or refurbishment of health facilities. Water and sanitation, including both improvement and expansion of water and sanitation networks, is the third in importance, commanding 12% of resources allocated. Other priority projects are related to improvement and rehabilitation of public areas, construction and improvement of sports complexes, improvement and rehabilitation of municipal buildings and the construction and improvement of sites and public spaces, such as multi centers, community centers, etc. These all fall under the Housing and Urban Development category.

Figure 1. PB Prioritized Budget by Investment sector – 2009



Source: MEF - SIAF. Own Elaboration

For the execution of PB-prioritized works and projects, two mechanisms are used: i) direct administration, in which the municipality implements the investment works through their respective managements offices, and ii) contracting private firms to implement the investment project. It has been observed that in general both mechanisms are used in local governments, although preferences vary from one municipality to the next.

3.2 The water and sanitation sector

Several actors play a role in Peru's water and sanitation sector. Among them the most important are the central government, represented by the Housing, Water and Sanitation Ministry, the regional governments, the municipalities, the private sector and the municipal Sanitation and Water Provider Companies (WSPCs). Within the Housing, Water and Sanitation Ministry is the Water for All Program that is responsible for financing water projects by transferring resources to regional and provincial governments. Table 2 below summarizes the roles played by different actors in both the investment and management spheres.

Table 2. Actors in the Water Sector

Actor	Investment	Management
Central Government	Water for All program, main investment mechanism	No
Regional Government	Resources for regional important projects, co-financing with Water for All, Local Governments and Water and Sanitation Provider Companies.	Has a set on the Executive Board of the Sanitation and Water Provider Companies.
	Allocate resources for large scale projects requested by the Water and Sanitation Provider Companies.	Supervise agreements and execution of important projects for the region, financed by private entities.
Local Goverment	PB/ Institutional Budget.	Mayors are part of the Executive Board of the Water and Sanitation Provider Companies.
		The Local Government proposes water projects to the Sanitation and Water Provider Companies in locations where coverage needs to be expanded.
		Coordination with other local governments.
		Evaluation of the projects presented by the Water and Sanitation Providers in the PB.

Table 2. Actors in the Water Sector

Actor	Investment	Management
		Coordination with the Water and Sanitation Provider and supervision of executed project by these providers in the locality.
Private Sector	Resources for big scope projects[15]	No
WSPC	Network renewal and expansion, reservoirs and plants projects	Responsible for the local water service. Determines the feasibility of the projects proposed by the local government.

Source: Own elaboration

The Water and Sanitation Service Provider Companies (WSPCs)

By law, the WSPCs have the status of public companies subject to private companies' law, governed by the Comptroller and obliged to present their investment projects to the National System of Public Investment.[16] The WSPCs objectives are written on their Optimized Master Plans, which define the guidelines, investment estimates in water and sanitation, and determine their work areas.

According to Law No. 28870 – "Law To Optimize Management of WSPCs" (2006), the WSPCs organization includes a General Board of Shareholders, an Executive Board and a General Manager. The General Boards of Shareholders are composed of the provincial and district mayors of the local governments in the jurisdiction of each company. There are two types of companies. The bigger WSPCs should have a Board composed of a maximum of five members. These members are representatives of the municipalities and the civil society, and they elect the General Manager. The Board of the smaller WSPCs has three members: one local government official and two civil society representatives to ensure the presence of users.

The scope of a WSPC depends on the number of local governments who make up the board of shareholders. So, for example SEDAM Huancayo is responsible for water service and sanitation in six local governments; SEDAPAR Arequipa, for the service in 34 local governments; and SEDACHIMBOTE, for the service in four local governments. The WSPCs'

[15] This is exceptional, but, for instance, Cerro Verde Mining Company has invested 300 million of soles in the Water Treatment Plant for Arequipa Region.
[16] These projects can be financed, among other sources, through PB.

budget is based on the company's resources collected from charges to the water service users. Other financing sources are the program 'Water for All', the local government- including PB-, donations, and arrangements with private companies.

The Local Governments and the WSPCs

Law 27972- Municipalities Organic Law- in its Article 4 establishes that the local governments are responsible for regulating public services provision in their jurisdictions. Also, Article 80 details the specific and shared functions of district and provincial municipalities in water, sanitation and health matters.

By law, some important specific functions are granted solely at the provincial governments' level, like managing and regulating the water services, water services investment promotion, water service provision for rural areas when they cannot be attended by the district governments, and dissemination of environmental sanitation programs in coordination with local and regional governments and other relevant national entities. By law, both municipal levels —provincial and district—manage water services through concessions in coordination with local and regional governments and relevant national entities.

From the interviews, it was observed that some of the local governments' main roles concerning water services are: (i) to propose water projects to the WSPCs in locations where the service is not available, (ii) to elaborate water projects to be presented to the Housing, Water and Sanitation Ministry in order to request funding from the Water for All program, (iii) to manage and execute the projects financed by the Water for All program that are not executed by the regional government, (iv) to evaluate and prioritize the projects presented by the WSPCs to the local PB, and (v) to supervise the execution of the projects financed with PB resources.

Through the interviews, it was found that the local governments can assign resources to the WSPCs to implement projects through two mechanisms: (i) through the PB and (ii) through the execution of water projects recommended by the companies themselves.

Water and Sanitation Investment at the Local Level

Investment in the water and sanitation sector comes from several sources. Every government level has a share, but thanks to the decentralization process regional and local governments have increasingly more participation. The central government allocates resources to investment in the

water sector through the Water for All Program. These resources may be transferred to the regional governments, local governments and/or WSPCs. Also, sub national governments may present water and sanitation projects to the Housing, Water and Sanitation Ministry for evaluation, and if they are approved, they receive the required resources through the Water for All Program.

Concerning local governments, it is clear that potentially they are a very important source of water and sanitation coverage and service quality improvements due to the high percentage of resources under their responsibility. Nonetheless, some of the resources are not executed for various reasons, mainly lack of political will or technical capacity to meet the requirements of the National System of Public Investment (SNIP). Table 3 shows the distribution of the total amount of investment budget in Peru for the water and sanitation sector for the year 2009. Local governments are responsible for 75% of the budget assigned to water and sanitation, but only execute 64%. In contrast, the share of the central level is 4% and they execute almost the entire amount of available resources. In the middle are the regional governments with 21% of the investment budget and an execution rate as low as that of local governments.

Table 3. Investment in the water and sanitation sector*, 2009

	Budget (%)	**Budget (soles)**	**% of execution**
Central government level	4%	131,189,382	92%
Regional level	21%	670,176,981	64%
Local level (districts and provinces)	75%	2,422,156,560	64%

Source: Finance Ministry, Financial Administrative Integrated System – SIAF.
* Does not include planning activities, management and public health activities.

It is important to note that although the share of investment budget in the hands of local governments is quite large, given the also very large number of municipalities, the average investment budget per district is only S/.1,320,696. Thus, the investment budget per district for water and sanitation projects in many cases is not large enough to execute projects with significant impact on access and quality and of water service. This is why sometimes regional and the national governments assume large-scale projects through the Water for All Program

(during 2009, this program had a budget of S/. 125,000,000). Nevertheless, not many large-scale projects are implemented at all.

4. Methods

4.1 Identification strategy

Our benchmark specification is:

$$Y_{ij} = \beta X_{ij} + \phi Z_j + \gamma PB_j + q_j + e_{ij},$$

Where Y is the outcome variable (access and quality of water services, measured both in levels and changes), i and j index municipalities and service providers, respectively. X is a vector of municipalities' socio-demographic, technical, and political characteristics; Z is a vector of service provider characteristics; PB is an indicator of involvement with PB; q_j is an unobserved service provider effect; and e_{ij} is the error term.

In order to test H2 we change our benchmark specification to include an interaction term of PB involvement with investment in the water sector. In addition, we also include a variable that identifies investments in the water sector that do not come from PB prioritization. This specification will be as follows:

$$Y_{ij} = \beta X_{ij} + \phi Z_j + \gamma PB_j + \eta IWPBi + \mu IWOS_i + \delta IWPB_i*PB_i + q_j + e_i,$$

Where IWPBi is investment in water sector prioritized by PB; $IWOS_i$ is investment in water sector from other sources[17]; and $IWPB_i*PB_i$ is the interaction between investment in water sector prioritized by PB and PB involvement. The coefficient of interest in this specification is δ, which identifies the specific effect of PB through prioritization of water sector investments.

A condition for these specifications to identify the effect of PB is that PB is indeed exogenous. We examine the following measures of PB involvement and then argue why we believe that measure (i), our preferred proxy, fulfills the condition of exogeneity:

[17] All the investment taken into account comes from the local level because our database does not include information for the regional and national level.

i. Percentage of the total amount of investment executed by the sub-national government that was allocated through the PB mechanism in the period 2007-2010 (PB intensity).
ii. Percentage of the total number of investment projects prioritized by PB in the sub-national government in the period 2007–2010.
iii. Number of organizations participating in PB in the period 2007–2010.
iv. Number of individuals participating in PB as a percentage of total district population in the period 2007–2010.

Based on the information collected in the qualitative fieldwork, we observe that these constructed measures are good approximations to the situation of participatory budgeting in local governments. Specifically, regarding our PB intensity measure in most cases (six out of eight) the qualitative evidence confirms the empirical validity of the proxy. We only found the pertinence of indicator (ii)—the percentage of PB approved projects to the total number of municipal projects—problematic, since for officials and actors involved in the participatory budget this indicator is irrelevant if the amount of resources allocated to each of the project undertaken, with or without the participatory budget, is not taken into account.

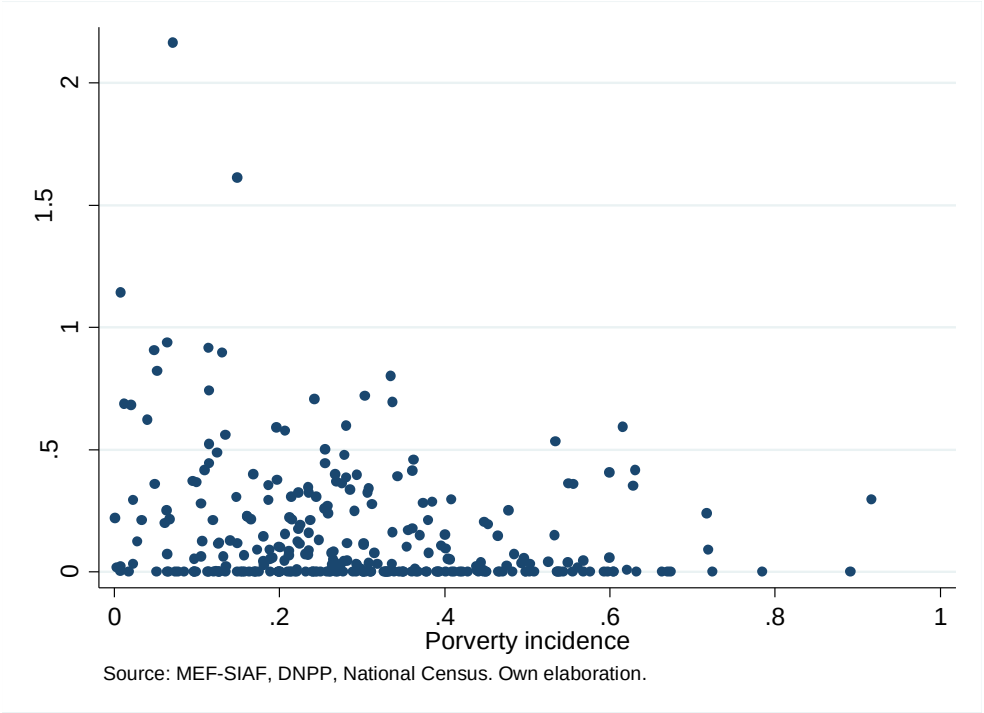
Note that (iii) and (iv) are indicators of participation, while (i) is an indicator of the effectiveness of the participatory process in influencing the local government's budget. Ultimately we want to evaluate the latter indicator in relation to the provision quality of services, since this is what potentially may have an impact. However, indicators of participation also provide useful information about the process and, consequently we incorporate them in sections of the analysis.

4.2. Exogeneity

Since PB is mandatory across all sub-national governments and its implementation started everywhere at the same time, we have no natural variation that can be exploited for identification of impacts. For our "PB intensity" measures we exploit the fact that although all sub-national governments are obliged to use the mechanism, in some municipalities the PB process may not result in budget allocation for prioritized projects or at least not in the same proportion. In other words, the degree of implementation of the PB varies significantly across sub-national

government (World Bank, 2009). These differences are important as they provide us with the opportunity to classify the sub-national governments according to the intensity in which they use PB. Specifically, this intensity is measured as the percentage of the total investment executed by the sub-national government that was allocated through the PB mechanism in the period 2007–2010. Figure 2 below shows the variability in the share of PB-prioritized projects in municipal budgets across our sample, categorizing the districts according to their poverty. In addition, the importance of PB in any given district can also be captured through measures of the participation of people or number of organizations in the process.

Figure 2. PB intensity and Poverty incidence



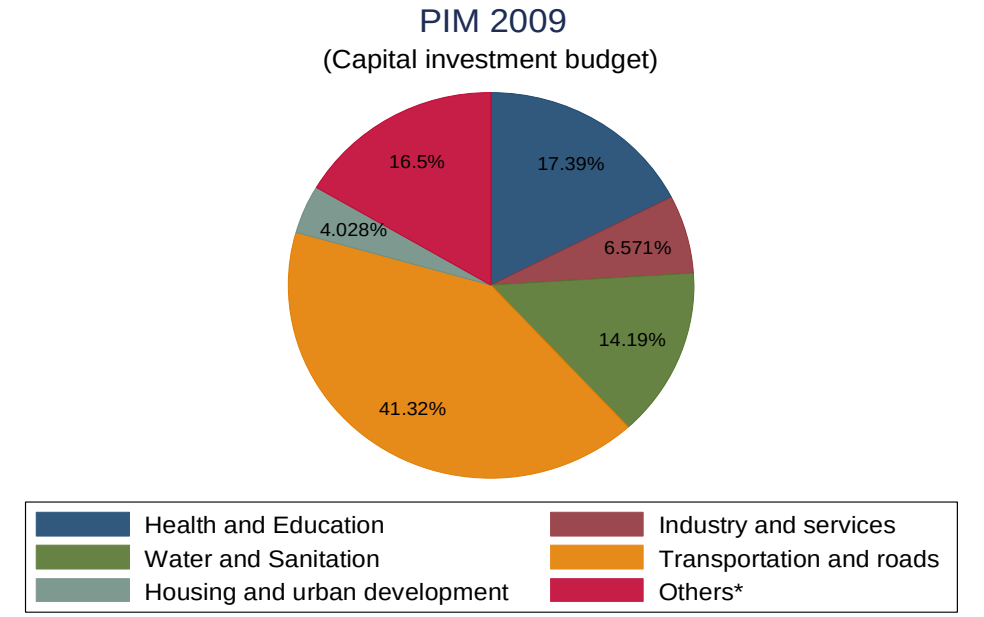
Notes: Zeros in the graph indicate districts for which we were unable to identify PB projects in the SIAF database. Values greater than 1 (for three districts) are explained below in section 5.4.

However, our identification of PB effects through the specifications proposed relies on the assumption that our measure of PB intensity is exogenous with respect to the outcome variables. This means that our PB variable is not correlated with the error term of the equation, which includes omitted variables such as preferences for participation and/or for improving

water service coverage or quality. This assumption cannot be empirically tested. Thus, we rely on conceptual arguments, sensibility tests to our benchmark specification, use of the Hausman test (1978) and the use of instrumental variables to rule out endogeneity.

Conceptually, two main reasons lead us to believe that PB is exogenous. One, the determinants of water service quality are different from the determinants of our PB intensity measure. Water service coverage and quality are a function of management quality and investments in upgrading service infrastructure, among other variables possibly closely related to the water sector. On the other hand, our PB measures depend on citizens' preferences for political participation, which, in turn, is a function of local political culture and the expected utility of participating, and capacity to translate participation into budget allocations, which involves capacities to reach agreements and to generate viable public investment projects. Two, preferences of PB participants are heterogeneous. Some of them may indeed prioritize water service over other publicly provided services, but others may have preference for better education or health or security services. In fact, on average investments in the water and sanitation sector do not account for more than 15% of the total investments prioritized through PB, as Figure 3 below shows. Thus, our selected PB intensity proxy reflects overall PB results on all investment projects, not only on water and sanitation.

Figure 3. Distribution of Sample Municipalities Capital Investment Budget



*Justice, Administration, Enviroment, Pension system, National security, External relationships
Source: MEF - SIAF. Own elaboration

It may be argued that poor water service quality may induce participation, but, by the same token, so would poor education or health or security services. Further, it may be that poor water service quality or low coverage induces prioritization of water projects. In order to control for this potential effect we include as a control variable coverage lagged by two periods.

Although, as we discuss in the results section below, Hausman tests allow us to rule out endogeneity for our two outcome variables measured both in levels and changes, we also tried an instrumental variables approach. Our instrumental variable is the percentage of voting women over the total voting population. This seems like a potentially plausible instrument. First, clearly the percentage of voting women is independent from coverage or quality of water service. Second, because of their role in the household women may have a greater concern for water and greater electoral participation by women may be associated to greater participation in PB. Thus, percentage of voting women may be partially correlated with PB intensity. However, the estimations show that this is not a good instrument. The first stage results show that there is no correlation between our instrumental variable and the importance of PB in the investment budget.[18]

4.3 Incorporating qualitative evidence

Regarding the qualitative analysis, the main objective was to collect data and insights through interviews with relevant officers of a selected sample of municipalities (municipality representatives, water and sanitation service providers, and participating agents) to validate and complement the quantitative results.

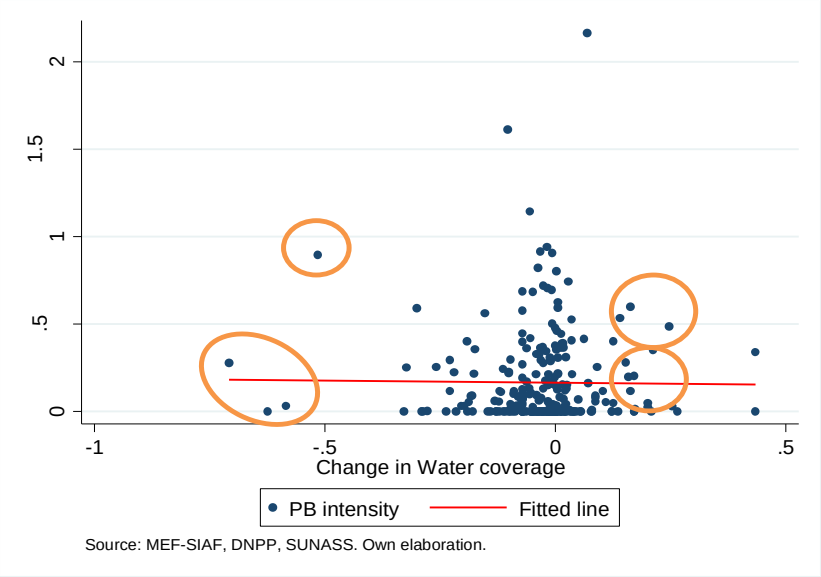
The strategy to select the sample of municipalities where interviews were conducted was to maximize the variance in both outcomes and participatory budgeting (PB) indicators. Thus, we identified four types of municipalities:

- High PB, low service quality
- Low PB, low service quality
- High PB, high service quality
- Low PB, high service quality

[18] In addition, we tried two other instrumental variables associated with the local political processes, number of political parties, and percentage of voting population. Neither turned out significant in the first stage results.

Graphically, we wanted the lower and upper extreme values in the distribution of the independent and dependent variables. Figure 4 below shows the type of observations we identified as potential interview sites.

Figure 4. Change in water coverage, PB intensity and selected groups



In a separate report we present the list of municipalities for each one of the four categories defined above (Alcázar and Jaramillo, 2012). From this list we selected two municipalities in each category. The criteria for selecting these municipalities was:

- To have a relatively proportional distribution of municipalities across the three large natural regions of the country: Coast, Highlands, and Amazonic Region.
- To have both district-level and provincial-level municipalities
- To have both municipalities in large urban centers and smaller urban-periphery areas.

Following these criteria, Table 4 below presents the eight municipalities chosen and their main characteristics.

Table 4. Municipalities chosen for qualitative data collection

District	Population according to the 2007 census	TOTAL investment budget S/	Percentage of Investment Budget corresponding to PB	PB Investment Roads S/.	% of PB in Roads	PB Investment in Water S/.	% of PB in Water and sanitation
Jaen	86,021	15'000,000	4%	9'033,302	60%	1'211470	8%
Sunampe	23,969	5'900,898	78%	2'205,214	37%	535,360	9%
Chachamayo	26,310	14'600,000	70%	5'825,536	40%	1'696,858	12%
San Ramón	26,088	8'500,622	55%	2'468,192	29%	409,253	5%
Razuri	8,330	5'379,101	19%	1'768,151	33%	1'128,806	21%
Ate	47,8278	59'000,000	6%	40'100,006	68%	-	0%
Belen	68,806	14'500,000	11%	5'440,768	38%	4'684,285	32%
Bellavista	36,072	4'501,955	102%	1'612,263	36%	1'197,177	27%

Sources: SIAF. MEF. INEI. Prepared by authors.

5. Data

5.1. Sources

Six different data sources have been merged in order to produce the data set for this study. Table 5 summarizes the different sources, the data each provides, and the period it covers. The first source of data is the water regulatory agency, SUNASS. These data include coverage and quality of service measures, as well as some of our control variables, i.e., characteristics of the service providers. The information for our outcome variables is at the firm level, and for each water supplier at the locality level.[19] Each locality may contain more than one district. There is only one firm operating for each locality, but the same firm may run several localities. This data set was especially requested from SUNASS, as the available public data (on the SUNASS website) has all the information at the firm level, but it does not allow for a link to localities (and districts).

[19] Locality is the concept used by SUNASS to identify the areas covered by every firm.

Table 5. Datasets and information provided

Dataset	Type	Coverage	Variables	Dates
SUNASS	Census	All firms regulated nation wide	Output variables: Water coverage, water pressure, water continuity. Control variables: water prices, unbilled water, arrears, number of districts attended by the firm, size of the firm	2007–2009
PB-DNPP	Census	All municipalities	PB intensity measures: Municipality projects coming from the PB, number of participating organizations, number of persons participating in PB.	2007–2009
MEF-SIAF	Census	All municipalities	PB intensity: Municipality projects coming from the PB, Control variables: Investment budget execution, Budget financed by mining royalties	2007–2009
ONPE	Census	All municipalities	Control variables: % of votes for the winner, % of voting women.	1998–2010
JNE	Census	All municipalities	Control variables: Mayor inmediatly reelected.	1998-–2010
RENAMU	Survey	All municipalities	Control variables: Municipality has investment planning office.	2007–2009
NATIONAL CENSUS 2007	Census	All municipalities	Control variables: Urban population, poverty incidence	2007

Own elaboration.

The second data source used comes from the Integrated System of Financial Administration-SIAF.[20] This source contains the budget data of every sub-national government nation-wide. Importantly, it makes possible to identify capital expenditures, as different from current or operational expenditures. Also, these data allows us to estimate the amount of budget actually executed. From this dataset we constructed the percentage of capital expenditure executed, as well as the portion of each municipality's budget financed by mining royalties or other types of rents. This dataset is also key to identify the projects prioritized by the PB, in order to construct our 'PB intensity' variables.

The third data source is the National Direction of Public Budget (DNPP) PB dataset. It contains information about the PB process; specifically, it has the lists of projects prioritized

[20] The Integrated System of Financial Administration-SIAF, which belongs to the Ministry of Economy and Finance of Peru (MEF), is the unified registration system of all public sector transactions.

through PB. It also contains information about the participants involved in the PB process, both individuals and organizations. This dataset is used to construct the participation variables related to the PB (number of participating organizations, number of individuals participating in PB as a percentage of total district population), the number of projects prioritized by the PB, and the PB intensity measures, as defined above.

Other datasets we used include the census of all of Peru's municipalities, RENAMU (*Registro Nacional de Municipalidades*) which is administered by the statistical authority (INEI) on an annual basis. The purpose of this survey is to collect information about the characteristics (staff, equipment, administrative systems) of the local authorities office. From this source we use our municipality management variables (i.e., whether it has an investment planning office responsible for formulating investment projects in the district). Data to construct political variables come from two different sources: the National Office of Electoral Processes (ONPE) and the National Election Jury (JNE). From the first source we use electoral participation and results while from the second source we identify whether the mayor has been reelected. Finally, we use the 2007 national census for socio-demographic characteristics such as poverty incidence, population, and public services coverage.

5.2 Constructing the database

The starting point to construct the database for the study was the water quality data, which we have only for those districts that SUNASS oversees.[21] Once we had the list of such districts, the following step was to identify them in the PB-DNPP dataset. It is important to note that the PB dataset does not contain information for all the districts in the country, even though PB is mandatory nationwide, because in practice reporting to the Ministry of Economy and Finance is voluntary[22] Districts in our original sample with no data in the PB dataset are assumed as missing values.

The following step was to merge the PB dataset with data from the SIAF; that is, the PB information with the budget information. Given that there is no unified coding system to automatically match the projects in the two datasets, this was done manually. We searched every

[21] This has important implications for the interpretation of results, as this is not a representative sample of Peru's sub-national governments. In effect, our district sample is basically urban.

[22] For a comparison between districts with PB data (included in our sample) and those without PB data (not included in our sample) see Appendix B. In general, districts in our sample have somewhat better indicators of general welfare, management capabilities, and water service coverage and quality.

investment project name in the PB dataset in the SIAF dataset. One issue we had to deal with is that project names were not always the same in both data sets. Because of this we did two types of matches: strict and lax. The first one involves an exact matching in the project names in both data sets. The second one involves making a judgement on whether two names may reasonably refer to the same project. For example, a strict name match was when we found "Construcción de un Parque Ornamental, Urb. El Ancashino - Vichay" in the DNPP dataset and "Construccion del Parque Ornamental de la Urbanizacion El Ancashino en Vichay, distrito de Independencia – Huaraz, Ancash " in data coming from the SIAF. On the other hand, a lax match was, for example, when we found in the DNPP data the project name "Remodelacion del Parque Dr. Jacobo Hunter de la Urb. Terminal Terrestre" and in the SIAF information the project named such as "Mejoramiento De Parques Infantiles". This way of merging the two main datasets has important implications for our purposes because it bears two different measures of our PB intensity variables, deriving from the strict and lax matching, respectively. A different but related issue has to do with the fact that for some districts we have not been able to match any project in the DNPP data set with a project in SIAF. This is true for 34 districts. We have assigned them a value of zero.

We start with 337 districts for which we have outcome data. Of these, 219 report PB activities while 118 do not (PB=missing, set apart). Thus, our sample includes these 219 municipalities. For 176 of those that report PB activities we have been able to match their projects in the SIAF data, the remaining 43 have been assigned the value of zero in all the indicators for the analysis.

One final point needs to be mentioned. The reference period for the different datasets is not the same. For example, the information coming from the ONPE and JNE is for the election year 2006, the information from the national census from 2007, the information from the DNPP dataset is for the PB process of year 2008, and the information from RENAMU, SUNASS, and SIAF is from the year 2010. This is not problematic, as mayors elected in 2006 were in office through the end of 2010, socio-demographic data form the 2007 census is baseline data, and the PB process antecedes by two years our outcomes data.

Our outcome variables capture the conditions of the provision and quality of the water service in every district of our sample. We use two of the performance indicators that SUNASS

uses: coverage, and continuity.[23] The use of these indicators is fairly standard and allows us to capture critical aspects of service provision. On its own coverage is an indicator of the direct investment made in water and sanitation in every district and is a necessary condition to discuss 'quality', while the continuity of the service is a service quality indicator easily perceived by users.

Water service coverage is measured as the percentage of houses with piped water services over the total number of houses/properties registered in the urban area. The second outcome variable is service continuity and is measured as the number of hours of service per day.

5.3. Descriptive statistics

Table 6 below sets out descriptive statistics for the variables included in the analysis. As mentioned above, the district sample is mostly urban, although it includes districts with as little as 3% of urban population. Poverty incidence numbers are consistent with this feature of our sample as it approximates the poverty rate for urban areas. Note, however, that there is substantial variability in poverty incidence, from 0,01 to 92 per cent. Outcome measures also show significant variability.

[23] We also estimated all our specifications using water pressure as an outcome variable but because of the bad quality of the information on this variable as found in several interviews, we dropped it from the report. Results are available upon request.

Table 6. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Control variables					
Urban population (%)	199	0.86	0.20	0.03	1.00
Poverty Incidence	200	0.27	0.17	0.01	0.92
Human Development Index	200	0.64	0.04	0.48	0.76
Gini Coefficient	200	0.30	0.03	0.21	0.40
Municipalities with investment planning office (%)	200	0.74	0.44	0.00	1.00
Change in investment budget execution	200	4811709	14500000	–3208174	195000000
Budget percentage financed by mining royalties	200	0.31	0.27	0.00	0.98
Water investment budget coming from the PB	200	461519.9	1765267	0.00	17800000
Water investment budget coming from other sources	200	3114438	7678772	0.00	83200000
Municipality is registered on the SNIP	200	0.48	0.50	0.00	1.00
Provincial Capital District=1	200	0.33	0.47	0.00	1.00
Mayor inmediatly reelected	198	0.24	0.43	0.00	1.00
% of the votes for winner over the total in the last election process	196	0.28	0.09	0.13	0.60
% of voting women	198	0.49	0.03	0.42	0.57
Average quarterly price	187	1.42	0.62	0.04	3.02
% of unbilled water	199	0.43	0.17	-0.44	0.93
Arrears (number of months)	195	2.18	3.37	0.37	45.05
Number of districts attended by the local water supplier (WS)	200	21.17	17.10	1.00	48.00
Water suppliers with more than 40,000 connections	337	0.46	0.50	0.00	1.00
Water suppliers with more than 10,000 and less than 40,000 connections	337	0.33	0.47	0.00	1.00
Water suppliers with less than 10,000 connections	337	0.07	0.25	0.00	1.00
Water supplier is Sedapal	337	0.14	0.35	0.00	1.00

Table 6. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Outcome variables					
Water coverage (attended population over total urban population)	185	0.77	0.21	0.00	1.00
Water continuity (hours a day)	188	15.52	7.32	0.00	24.00
PB variables					
PB intensity, lax definition	200	0.27	0.35	0.00	2.49
PB intensity, strict definition	200	0.13	0.20	0.00	1.85
Projects of the municipality prioritized by PB (%), lax definition	200	0.02	0.03	0.00	0.19
Projects of the municipality prioritized by PB (%), strict definition	200	0.01	0.02	0.00	0.17
Number of participating organization	189	84.99	91.06	1.00	670.00
People participating on the PB (% over the total district population) (x thousand)	189	4.14	5.6	0.004	36.78

Source: All datasets. Own elaboration

Finally, do note that the maximum value of our PB intensity is greater than 1. We have only three municipalities for which this is the case. In two out of these three cases it has to do with our lax-matching, which may end up grouping more projects than those originally prioritized by PB. For example, PB may prioritize improving sidewalks in a town's central avenue, but the municipality adds part of its investment budget to refurbish a crossing avenue as well. Also, it may be that in some instances non-infrastructure investments, such as training, are added to the cost of projects.

Table 7 shows the investment share composition according to our PB intensity (lax match) measure. It shows the average share that municipalities of our sample allocate to each investment expenditure function through the PB process. We can observe, first, that when we consider all districts in the sample investment on the sector Transportation and Roads is the most important component (27% of the investment budget on average), followed by Health and

Education (22%). Water and Sanitation is in the fourth place and only gets 10% of the investment budget. When we separate the results between high and low PB intensity (the threshold being the median of the distribution) some contrasts arise. In those districts with low PB intensity, Health and Education is the most important function while in districts with high PB, Transportation and Roads still gets the largest portion of resources. Water and Sanitation is more important in terms of the share allocated to this function in districts with a high PB, but the difference is unimportant.

Table 7. PB-prioritized budget by expenditure function, 2009

	Health and Education	Industry and services	Water and Sanitation	Transportation and Roads	Housing and Urban development	Others*
All districts	22%	6%	10%	27%	4%	18%
High PB intensity	21%	4%	11%	37%	4%	23%
Low PB intensity	24%	7%	10%	17%	4%	14%

*/ Justice, Administration, Environment, Pension System, National Security, External Relationships.

Looking into the PB participatory process, Table 8 sets out some characteristics of the participants. We find no significant differences between districts with high and low PB-intensity as far as gender or education. Men's participation is greater in both types of districts. Participation of individuals with no more than primary education is also similar. There is greater participation of individuals with secondary education in high PB intensity districts, but less of individuals with post-secondary education. In neither case differences are dramatic, however. One potentially important difference, though, is that in high PB intensity districts there is greater participation by grassroots organizations and somewhat less participation by government representatives. This is an important finding because it suggests that people's pressure to get investment for their projects could be an important and effective mechanism to make PB work.

Table 8. Characteristics of participants in PB processes

	Low PB intensity	High PB intensity	Total
Gender			
Female	30%	31%	30%
Male	69%	67%	68%
Educational level			
No education	4%	5%	4%
Primary education	6%	4%	5%
Secondary education	50%	54%	52%
Post-secondary education	41%	38%	39%
Organizations represented			
Grassroots social organizations	48%	54%	51%
Workers Unions	1%	1%	1%
Civil associations	36%	34%	35%
Government representatives	13%	10%	12%
Employers associations	3%	2%	2%

6. Determinants of PB

PB intensity varies significantly across municipalities in Peru. Since PB has not been randomly assigned, socio-demographic and political factors at the local level may be driving demand for PB use. In this section we present an analysis of potential determinants of PB intensity running linear regression of PB intensity measures against those variables.

Our dependent variable includes two measures of PB results: percentage of municipality's investment budget prioritized through PB, and percentage of investment projects prioritized through PB. As explained above, we use both a strict and a lax definition of matching projects in the PB and SIAF databases. In addition, we also present regression results for two measures of participation in PB: number of participating organizations and number of individual participants as a percentage of the district's population. We consider four socio-demographic

variables: percentage of urban population, poverty rate, Gini coefficient, and human development index.

Our electoral results database allows us to capture several features of the political environment. These include measures of political participation (number of political groups participating in the last election—2006—and percentage of votes cast over voting population) and authorities' political backing (percentage of votes obtained by the mayor an whether she was immediately reelected). We also include the percentage of invalid votes, which may be a measure of political dissent (if votes are consciously invalidated) or political culture (i.e., people do not know how to cast a valid vote). Another measure of political culture that we also include is the percentage of undocumented adults. Finally, we have a measure of women's participation (percentage of women among voters). Results are presented in Table 9 below.

Table 9. Political determinants of PB intensity

	PB intensity, lax definition	**PB intensity, strict definition**	**Projects of the municipality prioritized by PB (%), lax definition**	**Projects of the municipality prioritized by PB (%), strict definition**	**Number of participating organization**	**People participating on the PB (% over the total district population)**
Urban population (%)	–0.0514	0.116	–0.00398	0.00678	31.25	–0.00407
	(0.194)	(0.112)	(0.0155)	(0.0127)	(51.14)	(0.00301)
Poverty incidence	–0.162	0.0262	0.00663	0.0151	198.7***	–0.00131
	(0.286)	(0.165)	(0.0228)	(0.0187)	(74.84)	(0.00441)
Gini Coefficient	–1.321	–0.0974	–0.0479	–0.00290	–151.4	–0.0117
	(0.832)	(0.480)	(0.0665)	(0.0544)	(218.2)	(0.0128)
Human development Index	1.490	0.536	0.243**	0.152*	540.5	–0.0222
	(1.285)	(0.742)	(0.103)	(0.0839)	(334.1)	(0.0196)
Number of political groups	–0.00344	0.00636	0.000247	0.000660	8.023***	–0.000432***
	(0.00930)	(0.00537)	(0.000743)	(0.000607)	(2.515)	(0.000148)
Votes cast over voting population	–1.471	–0.230	0.0604	0.0820	435.5	0.0272*
	(0.996)	(0.575)	(0.0796)	(0.0651)	(264.4)	(0.0155)

Table 9. Political determinants of PB intensity

	PB intensity, lax definition	PB intensity, strict definition	Projects of the municipality prioritized by PB (%), lax definition	Projects of the municipality prioritized by PB (%), strict definition	Number of participating organization	People participating on the PB (% over the total district population)
% of the votes gotten by the winner over the total number of voters in the last election process	–0.631	0.0371	0.00190	0.0144	67.89	–0.00224
	(0.395)	(0.228)	(0.0315)	(0.0258)	(109.1)	(0.00643)
Invalid votes over votes cast	0.188	0.167	–0.0101	–0.0221	354.1**	0.00590
	(0.618)	(0.357)	(0.0494)	(0.0404)	(158.9)	(0.00936)
Mayor immediately reelected (yes=1)	0.0564	–0.00444	0.00694	0.00617	13.96	–0.000509
	(0.0646)	(0.0373)	(0.00516)	(0.00422)	(17.50)	(0.00102)
% of voting women over the total voting population	0.675	–1.095	0.0227	–0.0230	–426.0	0.00373
	(1.229)	(0.709)	(0.0982)	(0.0802)	(328.5)	(0.0192)
Population over 18 with no ID	0.00142	0.00154	0.00380**	0.00370***	–1.652	–0.000301
	(0.0212)	(0.0122)	(0.00169)	(0.00139)	(5.506)	(0.000324)
Constant	0.949	0.357	–0.194	–0.172*	–613.6	0.00490
	(1.540)	(0.888)	(0.123)	(0.101)	(403.7)	(0.0238)
Observations	195	195	195	195	184	185
R-squared	0.091	0.045	0.120	0.107	0.143	0.198

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Three are the main findings from this analysis. One, we do not find any strong systematic correlation between socio-demographic or political variables and PB results measures.

Particularly, our preferred measure of PB intensity (percentage of investment budget prioritized by PB) is not significantly correlated with any of the independent variables included.

Two, among political variables, we have some evidence of a relationship between political participation and PB use (not PB intensity). In effect, the number of political groups correlates positively with the number of organizations participating in PB. However, it correlates negatively with the number of individuals participating. This is consistent with a view of political groups as entities that represent different sectors of the population. In this context, a smaller number of political groups will leave more room for more participation of groups representing narrower interests (neighborhood associations, parents groups, among others). Percentage of votes cast also correlates positively with one PB participation measure, though only weakly, but not with PB results (PB intensity). Altogether these variables suggest an association between broad political participation and PB participation. The percentage of invalid votes also correlates positively with one measure of PB participation, suggesting that political dissatisfaction may be associated with PB participation. Women's political participation does not seem to have a systematic correlation with our PB intensity measures.

Three, a possible measure of social exclusion, the percentage of undocumented adults, is positively correlated only with percentage of projects prioritized by PB both under the strict and lax match.

In sum, we do not find any strong correlates of our PB results measures among the socio-demographic and political variables analyzed. This is particularly so for the case of our preferred measure of PB intensity. However, we have some evidence of a positive correlation between PB participation and broader political participation.

7. Results and discussion

Table 11 below set out our benchmark results for two different definitions of our two outcome variables. The first definition measures the outcome in levels while the second measures it as the change between a base year (2007) and the last year for which we have data (2010). For each specification we tested for endogeneity using the Hausman test. The results indicate that in none of the cases our PB indicator (PB intensity) is endogenous. Interestingly, however, in the case of PB variables related to participation the results of the tests suggest endogeneity between the water continuity variable and PB participation. This indicates that participation of the people in

the PB process and the quality of service are correlated. These two pieces of evidence together suggest that while participation is associated with the quality of water services, in the process to turn participation into municipal budget allocations, where both technical and political issues come into play, this link is severed. This interpretation underlines the weaknesses in the PB process. Finally, in the case of coverage we find no evidence of a link because there is very little investment in expansion of coverage, as qualitative evidence overwhelmingly confirms.

We find no evidence of significant effects of PB on water service coverage either defined by levels or changes. This result holds for any set of control variables used. For our outcome of water service quality, continuity, we have contrasting results when measured in levels *vis-á-vis* when measured in changes. When measured in levels, there is a significant correlation when we control only for demographics. Once we introduce additional control variables significance vanishes. In the case of our measure in changes, the association is negative, but (weakly) significant in only two specifications, before we introduce most control variables. Altogether, results suggest that there is no systematic relationship between PB and our water service quality measures.

Regarding our control socio-demographic variables, poverty incidence correlates negatively with our two outcomes when measured in levels, but is only significant for continuity. This corresponds to the intuitive notion that poor districts have less coverage and worse water services quality. When measured in changes, the association is generally not significant. Among variables intended to capture management capacity at the municipality level, the percentage of investment budget execution correlates positively with both coverage and continuity measured in levels. This seems plausible as municipalities with greater capacity to execute investments generally may equally be better at executing water investment projects that thus translate in better coverage and continuity. Also, the fact that the municipality is registered in the National Public Investment System (SNIP) correlates positively with levels of water continuity.

The importance of mining royalties for municipal finances shows a weak negative association with changes in coverage in most specifications. However, it is positively associated with changes in continuity. Since this is a key source of funding for water projects, these two findings may suggest a preference for investment in improving quality for those already served rather than expanding service to those without access, which are likely the poorer. This is related to the fact that resources are not large enough to fund significant increases in coverage. As we

indicated above the investment budget for water and sanitation per district is barely 1.3 million soles (about US$450,000), which, even if fully allocated to coverage expansion, could not have a significant impact in access. In addition, our qualitative evidence also indicates that resources are quite limited so as to permit significant coverage expansion. Two quotes from municipality officers illustrate the point quite clearly:

> *"This time it's our turn to ask for a change of network, because this is older than 35 years, but the money wasn't enough to even cover three blocks".* (Altagracia Bustamante – President of Bellavista's District Management/Steering Committee).

> *"Water ought to come first, but it's always spent more on roadwork, because investment in water and sewage is high if you actually want to do something, it's a lot of money, one of these projects does not go for less than three million".* (Mario Ferreyros – Assistant Accounting Manager. Municipality of San Ramón).

A remarkable result highlights the importance of political participation by women. In effect, we find that the percentage of voting women is associated positively with both measures of coverage (strongly) and with continuity (in levels, before we control for arrears and provider features, and in changes). There are good reasons to think that women may be more concerned about water services than men. Water is an indispensable element in the household. Since women are more involved in house work, they carry a disproportionate portion of the burden of obtaining water in the absence of connection to piped water. In addition, good quality drinking water is associated to children's health as unclean water is a major source of diarrhea. Since typically it is women that care after children's health, it is not surprising that their political participation is associated to better indicators of coverage and water service quality.

Regarding other political variables, we find that whether the mayor is re-elected correlates negatively with coverage. Also, the percentage of votes obtained by the mayor associates negatively with both coverage and continuity measured in levels. Finally, the fact that the district is the capital of the province has a positive and significant effect on water coverage and continuity in levels. This is consistent with the idea that investment in water services is constrained by the amount of available resources as provincial governments command substantially more resources than district governments.

Finally, provider characteristics seem to be associated with outcomes only in a few cases. Water price has a positive and significant, but statistically weak, effect on coverage when the full set of control variables is included. This is plausible as these providers may have better capacity to provide a better service. Much less intuitively, the percentage of unbilled water correlates positively with changes in the two outcomes, but for both only weakly. Measures of provider size generally do not correlate with outcome levels, except for continuity (negatively), but in this case the correlation is weak. Large-sized providers correlate positively with changes for both coverage and continuity.

Table 10. Effects of PB on water quality indicators: regression results

	Water coverage				Continuity			
Independent Variables	**%**	**%**	**Change 2007–2010**	**Change 2007–2010**	**Hours per day**	**Hours per day**	**Change 2007–2010**	**Change 2007–2010**
PB intensity, lax match	0.0427	0.0316	–0.00491	–0.0126	1.165	1.133	–0.403	–0.723
	(0.0371)	(0.0394)	(0.0326)	(0.0359)	(1.399)	(1.208)	(0.411)	(0.461)
Urban Population (%)	–0.0667	–0.121	0.0771	–0.0216	–3.141	0.0350	0.454	–3.295**
	(0.0966)	(0.0989)	(0.132)	(0.130)	(3.645)	(3.777)	(2.731)	(1.629)
Poverty Incidence	–0.0796	–0.0655	0.0828	–0.000585	–13.49***	–7.728*	–2.060	–2.237
	(0.107)	(0.120)	(0.116)	(0.143)	(4.132)	(3.978)	(1.831)	(2.024)
Change in Investment Budget Execution	1.07e-09**	1.01e-09*	1.11e-10	–8.77e-11	3.78e-08**	2.72e-08*	6.27e-10	–5.47e-09
	(4.85e-10)	(5.78e-10)	(3.66e-10)	(4.10e-10)	(1.51e-08)	(1.43e-08)	(5.79e-09)	(5.43e-09)
% of budget financed by mining royalties	0.0545	0.0251	-0.0649	-0.127**	–2.886	-0.0845	2.082***	2.182**
	(0.0581)	(0.0550)	(0.0479)	(0.0562)	(2.064)	(2.044)	(0.784)	(0.848)
The municipality is registered on the SNIP	–0.00332	–0.0434	–0.0203	–0.00892	4.674**	3.372*	–0.572	-0.944
	(0.0512)	(0.0555)	(0.0454)	(0.0509)	(1.983)	(1.999)	(0.806)	(0.925)
Province capital district=1	0.123**	0.0783	0.0649	0.0985	4.961**	4.819**	–1.168	–0.673
	(0.0526)	(0.0565)	(0.0573)	(0.0677)	(2.006)	(1.961)	(1.063)	(1.221)

Table 10. Effects of PB on water quality indicators: regression results

	Water coverage				Continuity			
Independent Variables	**%**	**%**	**Change 2007–2010**	**Change 2007–2010**	**Hours per day**	**Hours per day**	**Change 2007–2010**	**Change 2007–2010**
Mayor inmediatly reelected=1	–0706**	–0.0479	–0.0211	–0.00870	–0.467	–1.383	0.766	0.844
	(0.0353)	(0.0374)	(0.0323)	(0.0336)	(1.245)	(1.185)	(0.615)	(0.601)
% of votes for the winner	0.165	0.112	–0.0846	–0.100	–12.32**	–13.39**	–0.203	–1.423
	(0.150)	(0.158)	(0.133)	(0.148)	(6.204)	(5.463)	(2.923)	(3.051)
% of votind women over total voting population	3.706***	3.950***	1.582**	1.724**	51.07**	23.03	9.894	29.00***
	(0.748)	(0.838)	(0.669)	(0.728)	(23.38)	(23.22)	(15.50)	(10.90)
Average quarterly water price		0.0807**		0.0376		–0.255		0.387
		(0.0312)		(0.0344)		(1.073)		(0.554)
% of unbilled water		–0.0994		0.220*		–7.167		4.170*
		(0.122)		(0.129)		(5.591)		(2.442)
Arrears (number of months)		0.00555		0.00920		–0.932***		0.180
		(0.0100)		(0.00721)		(0.301)		(0.141)
Number of districts attended by the local water supplier (WS)		–0.000148		–0.000170		0.125**		–0.0152
		(0.00165)		(0.00200)		(0.0516)		(0.0272)
Size of the WS: big (more than 40000 conections=1)		0.0800		0.221**		–5.728*		3.068**
		(0.0627)		(0.0852)		(2.960)		(1.333)

Table 10. Effects of PB on water quality indicators: regression results

	Water coverage				Continuity			
Independent Variables	**%**	**%**	**Change 2007–2010**	**Change 2007–2010**	**Hours per day**	**Hours per day**	**Change 2007–2010**	**Change 2007–2010**
Size of the WS: SEDAPAL (more than 1000000 conections=1)		-0.0570		0.106		–1.482		2.855*
		(0.100)		(0.112)		(3.805)		(1.620)
Constant	–1.062***	–1.234***	–0.859**	–1.136***	–2.099	13.51	–4.696	–15.29***
	(0.361)	(0.434)	(0.341)	(0.392)	(11.75)	(12.39)	(6.307)	(5.661)
Observations	181	175	171	167	184	178	181	176
R-squared	0.231	0.294	0.080	0.172	0.189	0.340	0.082	0.178

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*/ Also were included the dummy variables 'The municipality has an investment planning office' and 'Size of the WS: medium'

The qualitative data collected is consistent with these results. Altogether, the perception of local actors, government officers, civil society participants, and service providers is that PB has little to no effects on coverage or quality of water. There are several reasons for this, which may be summed up in a description of PB as a mechanism with serious weaknesses to fulfill its promise as far as water service is concerned. First, institutionally, though PB is backed by several norms, the law mandate lacks "teeth" as the implementing norms (both *Reglamento* and *Instructivo*) do not contain precise indicators of results. In effect, the emphasis of these implementing norms is rather in the process. For instance, it does not make it mandatory for mayors to commit a minimum of resources to PB process, for instance, a percentage of the municipal investment budget. A consequence of this is a lot of variation on how much this amount changes from one district to the next. In this context, the role of the mayor is key, both in its decision of how much to put to public discussion through PB and how much finally gets into the budget. Further, it is the municipality's technical team that plays the key role in conducting the process. Another consequence is that districts where population organizations are weak, the Mayor faces less pressure to commit resources or abide by the decisions made in PB.

The same argument may also apply to interest groups within the same district. Those better positioned to participate may reap more benefits out of the PB process. Regrettably, those populations in marginal or remote areas of the districts do not stand the same chance of participating because of the costs. We find evidence of some municipalities adapting to these circumstances and implementing, for example, itinerant PB workshops to make sure most populations are included. Furthermore, we find that in districts where the Mayor supports PB and fosters participation, the PB process gains credibility and the population is more willing and available to participate.

A second reason is that investment resources per district are insufficient to carry out significant expansion of water services or improvement in the quality of services. Investments in public works that improve coverage or quality of water services have a very high cost that municipalities cannot cover within their limited resources. Consequently, the water projects that the municipality undertakes are basically small renovations of water and sewage networks, discarding the expansion projects due to high costs. This also explains why most of the water and sanitation work (and this also applies to roads) are concentrated in urban centers, leaving aside

the more marginal urban areas or the remote rural areas, since works are more costly in such areas. As a municipal officer told us:

> *"There are areas that don't justify [the investment] Why? Because water and sewage are still to be done, the roads are rather narrow, the houses and fences must be aligned, align telephone poles, electricity, a whole number of things. By contrast, other (areas) are more practically situated, they have water and sewage connections, the houses are aligned, everything then is most likely to be implemented in this area, which is, basically totally formalized. (José Hipólito Magallanes – Head of Urban Development Management. Municipality of Sunampe).*

This implies that, contrary to the provisions of the law, as far as water is concerned participatory budgeting primarily may benefit an already privileged sector and not the most marginalized and poor. This also calls attention to the importance of other state agencies– Regional Governments, the Water for All Program–, as it is these that are able to invest more and carry out construction projects of greater magnitude and consequently have a greater impact.

Another factor that limits concentration of investment in substantial-sized works is the tendency to disperse investment fund in different small-scale projects. In highly fragmented political environments this may make sense for the mayor as it would allow him to cater to different groups of the population.[24]

The second specification proposed, which includes our investment variables to test the H2 as explained in the methods section, provides similar results (Table 11), suggesting that there is no impact of PB coming through specific investments made in the water sector (at the local level), which is consistent with the argument in the previous paragraph. Table 6 sets out regression results from this specification. In addition, we use these results to approach the question of which set of variables (PB, socio-demographic, political or service provider) contributes most to explain the variance in outcomes. We can measure this by looking at the change in R-squared once we introduce each set of variables. The conclusion is that provider characteristics weigh the most for every variable except level of coverage. For this it is the set of political variables that induces the greatest change in R-squared. The second most important set are political variables.

[24] Wright (2011) presents evidence from Peruvian municipalities of "particularistic exchanges" driving the political process.

Table 11. Effects of PB on water coverage and quality indicators: second specification

	Water coverage				Continuity			
Independent Variables	**%**	**%**	**Change 2007-2010**	**Change 2007-2010**	**Hours per day**	**Hours per day**	**Change 2007-2010**	**Change 2007-2010**
PB intensity, lax match	0.0394	0.0305	–0.0233	–0.0311	1.467	1.533	–0.281	–0.624
	(0.0391)	(0.0414)	(0.0321)	(0.0373)	(1.355)	(1.174)	(0.412)	(0.481)
Pb intensity*district PB water investment	2.91e-08	1.37e-08	7.94e-08	7.25e-08	–1.90e-06	–1.73e-06	–6.07e-07	–6.32e-07
	(3.54e-08)	(3.80e-08)	(5.43e-08)	(5.49e-08)	(2.49e-06)	(1.99e-06)	(6.97e-07)	(6.71e-07)
District water investmen from PB	–6.81e-09	–2.78e-09	–2.27e-08	–2.42e-08	5.09e-07	5.02e-07	3.16e-07	3.04e-07
	(8.92e-09)	(1.00e-08)	(1.65e-08)	(1.64e-08)	(7.11e-07)	(5.30e-07)	(2.63e-07)	(2.26e-07)
District water investment not from PB	1.95e-09	1.30e-09	–5.90e-10	–1.66e-09	–6.13e-08	8.23e-09	3.05e-08	1.49e-08
	(1.62e-09)	(1.25e-09)	(1.21e-09)	(1.15e-09)	(6.41e-08)	(6.95e-08)	(2.92e-08)	(2.73e-08)
Urban Population (%)	–0.0673	–0.120	0.0809	–0.0220	–3.127	0.0870	0.553	–3.201*
	(0.0977)	(0.100)	(0.132)	(0.130)	(3.638)	(3.843)	(2.776)	(1.644)
Poverty Incidence	–0.0804	–0.0615	0.0732	-0.0192	–13.33***	–7.425*	-1.785	–1.964
	(0.109)	(0.123)	(0.118)	(0.145)	(4.171)	(4.017)	(1.813)	(2.026)
Change in the percentaje of investment Budget Execution	9.02e-10**	8.90e-10*	1.89e-10	8.09e-11	4.25e-08***	2.58e-08*	–3.08e-09	–7.98e-09
	(3.85e-10)	(5.23e-10)	(3.94e-10)	(4.80e-10)	(1.10e-08)	(1.34e-08)	(5.38e-09)	(5.85e-09)
% of budget financed by mining royalties	0.0352	0.0132	–0.0701	–0.120**	-2.229	-0.111	1.688**	1.866**
	(0.0646)	(0.0616)	(0.0539)	(0.0604)	(2.269)	(2.225)	(0.819)	(0.904)
Province capital district=1	0.115**	0.0743	0.0612	0.100	5.253**	4.930**	–1.302	–0.747
	(0.0531)	(0.0580)	(0.0595)	(0.0697)	(2.059)	(2.052)	(1.076)	(1.234)
Mayor inmediatly reelected=1	–0.0676*	–0.0465	–0.0184	–0.00814	–0.593	-1.430	0.809	0.856
	(0.0360)	(0.0381)	(0.0332)	(0.0346)	(1.259)	(1.189)	(0.618)	(0.606)
% of votes for the winner	0.168	0.114	–0.0867	-0.109	–12.26*	–13.07**	0.112	–1.193
	(0.152)	(0.160)	(0.135)	(0.150)	(6.224)	(5.434)	(2.950)	(3.076)

Table 11. Effects of PB on water coverage and quality indicators: second specification

	Water coverage				Continuity			
Independent Variables	**%**	**%**	**Change 2007-2010**	**Change 2007-2010**	**Hours per day**	**Hours per day**	**Change 2007-2010**	**Change 2007-2010**
% of votind women over total voting population	3.663***	3.908***	1.568**	1.747**	52.31**	22.67	8.350	26.93**
	(0.757)	(0.859)	(0.673)	(0.732)	(23.96)	(24.24)	(15.83)	(11.20)
Average quarterly water price		0.0811**		0.0382		-0.247		0.446
		(0.0314)		(0.0350)		(1.115)		(0.551)
% of unbilled water		–0.107		0.241*		-7.423		3.727
		(0.126)		(0.130)		(5.748)		(2.410)
Arrears (number of months)		0.00538		0.00973		–0.938***		0.166
		(0.0101)		(0.00741)		(0.303)		(0.140)
Number of districts attended by the local water supplier (WS)		–0.000133		–0.000460		0.132**		-0.0149
		(0.00172)		(0.00202)		(0.0526)		(0.0272)
Size of the WS: big (more than 40000 conections=1)		0.0759		0.233***		–5.854**		2.968**
		(0.0633)		(0.0890)		(2.959)		(1.326)
Size of the WS: SEDAPAL (more than 1000000 conections=1)		-0.0584		0.127		–1.904		2.693
		(0.103)		(0.115)		(3.800)		(1.648)
Constant	–1.036***	–1.208***	–0.848**	–1.152***	–2.943	13.53	–4.085	–14.14**
	(0.365)	(0.447)	(0.344)	(0.398)	(11.97)	(12.89)	(6.434)	(5.816)
Observations	181	175	171	167	184	178	181	176
R-squared	0.236	0.296	0.090	0.185	0.194	0.343	0.097	0.190

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
*/ Also were included the dummy variables 'The municipality has an investment planning office', 'The municipality is registered on the SNIP' and 'Size of the WS: medium'

8. Conclusions and policy implications

Results suggest that there is no systematic association between PB and water coverage and service quality. We find no statistically significant relationship between PB and our measures of coverage and service continuity, regardless of whether the outcome variables are measured in levels or in changes. At the root of this lack of connection we find weaknesses both in the PB process itself as well as among the different actors in the process.

The PB law and implementing regulations are focused on the process and somehow expect the process to channel demands from the population, particularly those most needy, and increase pressure on local authorities to provide better infrastructure and services. In fact, the process has important limitations that may make it ineffective in channeling resources to areas such as water and sanitation, where much investment is needed. Further, it may also be inequitable as the poor may confront greater costs of participation. For their part, municipalities have limited technical capacities and resources *vis-á-vis* investment requirements in the water sector, while mayors may not find it in their best interest to support PB. Service providers are also weak, lack financial capacity and sometimes may even lack the power to collect fees from consumers. Thus, though PB may have displaced "white elephant"-type-of infrastructure investment (stadiums, bullfighting arenas, etc.) from many municipalities and contributed to guide investment towards projects more consistent with the people's primary needs, it still needs to be strengthened considerably in order to play a significant role in the expansion of coverage and provision of better quality water services for the population and particularly for the poor. Water and sanitation projects that come from the PB process are in most cases very small (a few blocks) and basically of replacement type.

One variable that seems to make a difference, both for water coverage and service quality is women's political participation. In municipalities where women are more politically involved, water service and coverage tend to be better. This should not be surprising since it is known that women are very concerned with access to drinking water (proven that they, and their children are the ones affected by poor water service). Thus, in a decentralized context, in areas where women participate more, government officials and water providers are required to improve services.

Concerning policies to strengthen PB, a first line of action is information. It is critical to have a link between the PB database and SIAF as the basis for an information system to effectively monitor from PB decisions to effective budgeting. As part of this effort it is also

necessary to develop a set of indicators in order to measure how responsive are investments by sub national governments to local needs and how pro-poor they are.

Second, PB technical teams need to be strengthened both technically and in terms of greater independence from the municipal authorities. An autonomous technical team will be in better position to negotiate with the municipality the incorporation of investment projects prioritized by PB. Thus, though local in origin, technical teams should be funded through central government monies. Part of their work should be to develop and carry out a PB plan oriented to involve a large representation of the population. Women should be part of these technical teams, as these would encourage greater participation by this group of the population.

Third, regarding the participating agents, education and empowerment of social organizations are key for active enforcement of its auditing and monitoring capacities *vis-á-vis* the participatory budget process. Participating organizations should be provided resources, technical support, and guidance to achieve bigger more complex projects with higher impact. Women should be a priority group for these education and empowerment activities.

Fourth, concerning the water sector, an effort to enhance the involvement of PB would require specific measures to strengthen both its technical capacities and access to resources. Since funds for investment in the sector are concentrated in the "Water for All" program, a design that allows local PB groups that have prioritized investments in the sector to have access to a window in the program that could fund from technical studies to the investment itself would alleviate the main restrictions that we have identified for greater investment in the sector.

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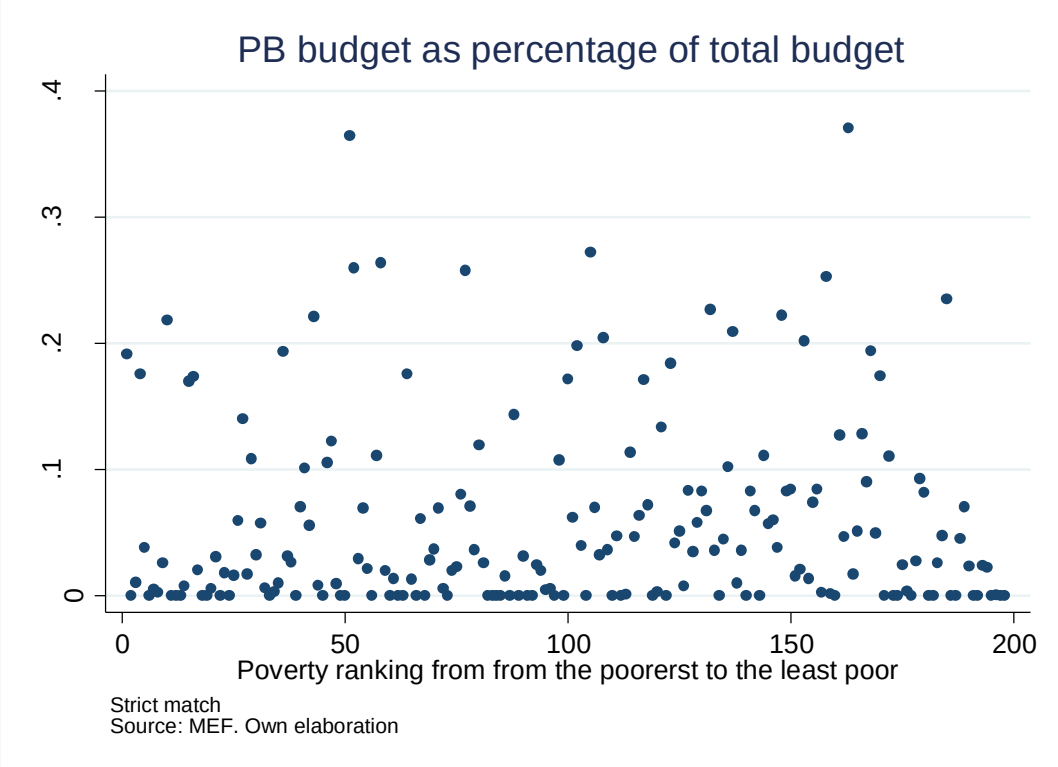
Appendix A



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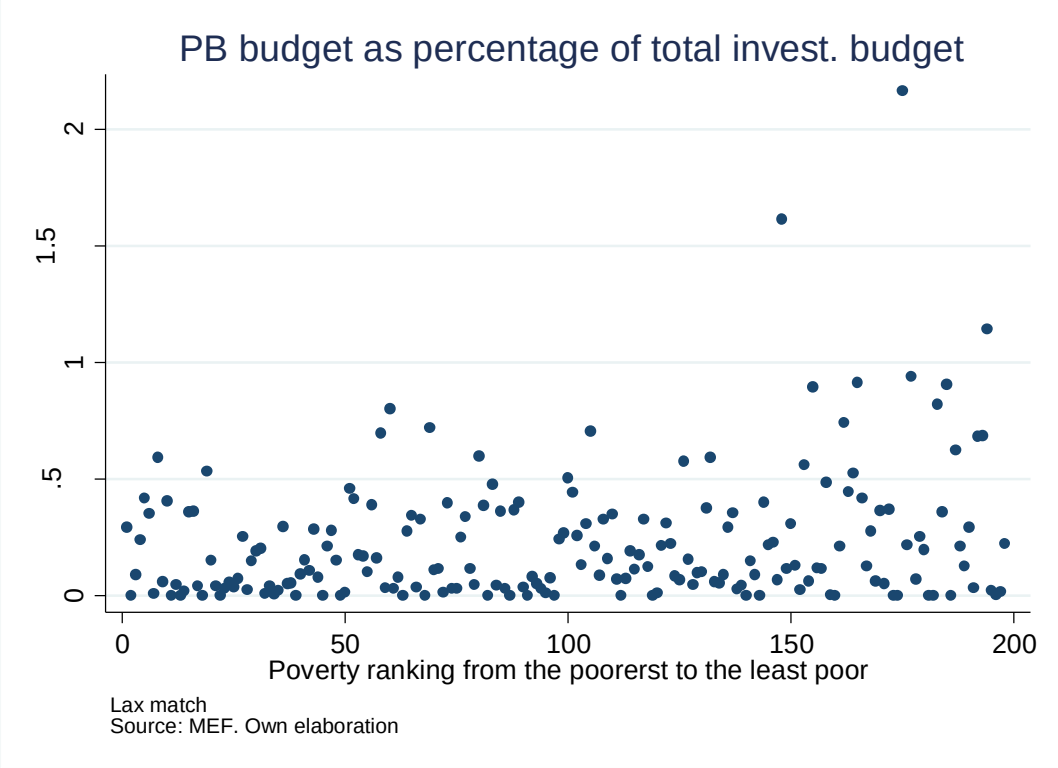

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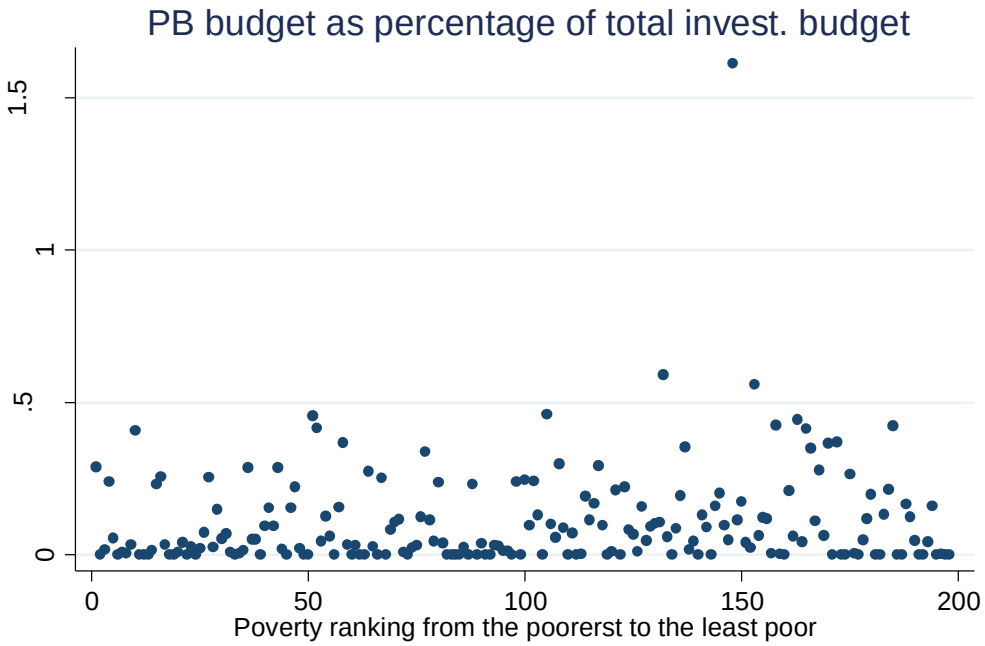

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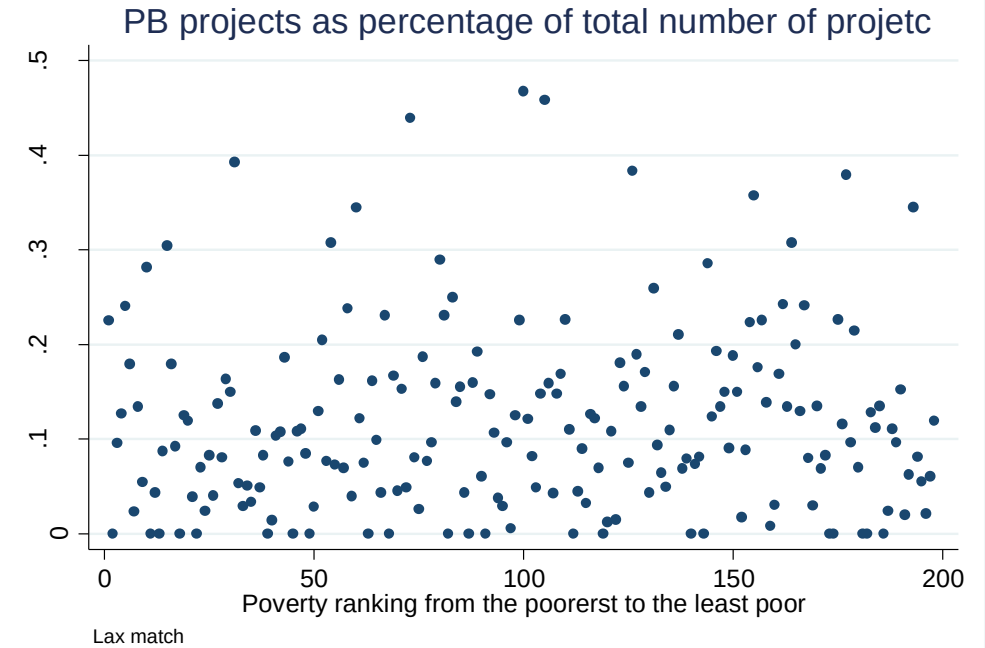

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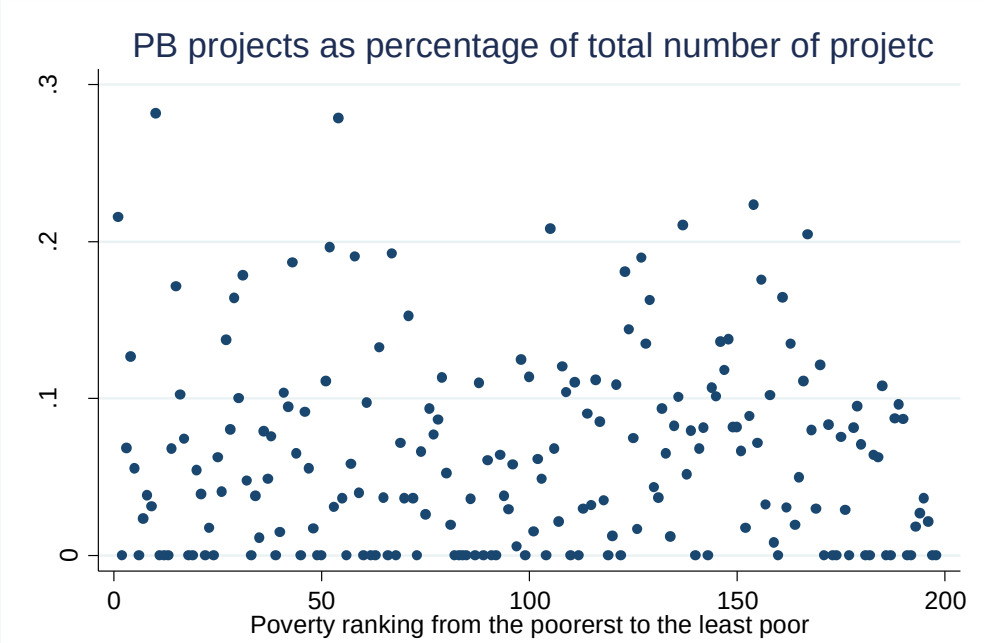

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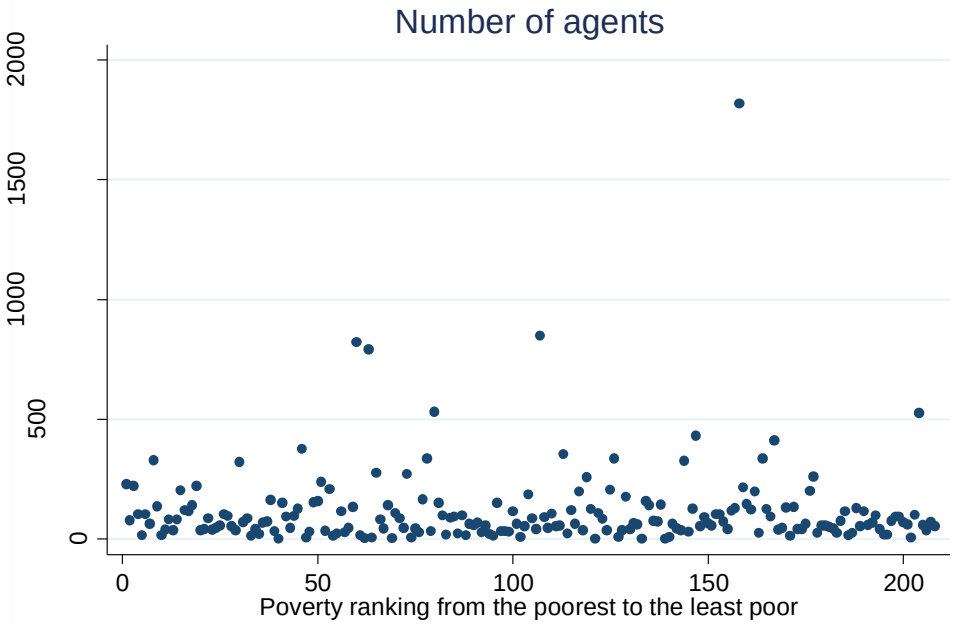

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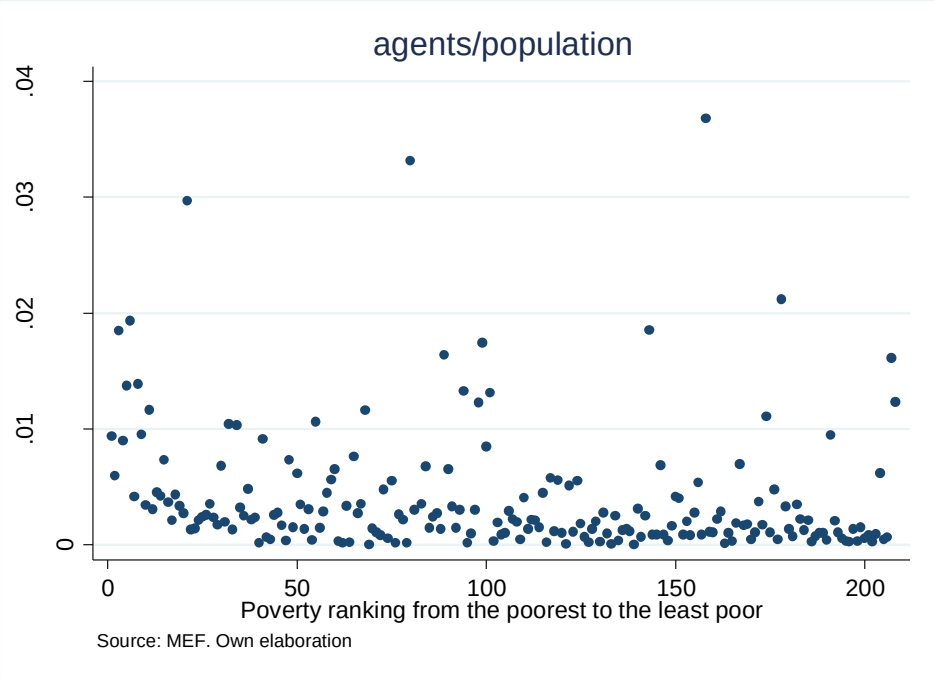

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Appendix B

Due to the characteristics of the SUNASS, DNPP and SIAF datasets we count with two groups of observations of Peru's districts. One is composed by the districts with PB information and other without it. Our sample of districts is made of the first group and as said before it is more urban and also contains the districts with better socio demographic and municipal capacity indicators. The table below shows relevant indicators in both groups, the districts "Not included" are those with no PB information and the districts "Included" are the ones we used in our analysis.

Table B1. Characteristics of districts included (with PB data) and not included (without PB data) in our study sample

Variable	Not included	Included	t-statistic	Ho: equal mean
Urban population (%)	77%	86%	–3.8739	Rejected
Poverty Incidence	33%	27%	2.8229	Rejected
Municipalities with investment planning office (%)	63%	74%	–2.1013	Rejected
Change in investment budget execution	3026386	4811709	–1.3825	
Budget percentage financed by mining royalties	35%	31%	1.2132	
Municipality is registered on the SNIP	42%	48%	–1.0238	
Professional staff (%)	15%	11%	3.4326	Rejected
Municipality has a Concerted development plan.	95%	92%	1.1877	
Provincial Capital District=1	28%	33%	–0.9238	
Mayor inmediatly reelected	21%	24%	-0.781	
% of the votes for winner over the total in the last election process	28%	28%	0.4896	
% of voting women	48.7%	49.4%	–2.4056	Rejected
Votes cast over the total voting population	88%	88%	0.3661	
Average quarterly price	1.1	1.4	–4.2915	Rejected
% of unbilled water	44%	43%	0.2066	
Arrears (number of months)	2	2	–1.1688	

Table B1. Characteristics of districts included (with PB data) and not included (without PB data) in our study sample

Variable	Not included	Included	t-statistic	Ho: equal mean
Number of districts attended by the local water supplier (WS)	19	21	–1.0816	
Water service continuity, 2007	13	15	–2.6756	Rejected
Water service coverage, 2007	83%	81%	1.0909	
Households with Electrial service	75%	81%	–3.5318	Rejected
Water service coverage according to the National CENSUS 2007	68%	75%	–2.6973	Rejected
Stunted Children, %	21%	20%	1.2231	
Percapita Monthly Income, S/.	377	482	–3.3969	Rejected
People with no education, %	13%	12%	2.6602	Rejected
People with primary education, %	33%	29%	3.9196	Rejected
People with secondary education, %	33%	34%	–1.4472	
People with higher education, %	21%	25%	–3.3191	Rejected

We also report the t-statistic of an equality of means test. However, one should keep in mind that our districts are not a "sample" in the strict sense. This is because the districts included do not come from a sampling process, but instead are the entire universe of municipalities that reported PB data and are attended by the water providers regulated by SUNASS (which are the ones with water outcome data).

The two groups of districts are similar in a number of characteristics, but they also show significant differences regarding other features. Districts in our sample are more urban, less poor, have a greater percentage of voting women, have a greater proportion of individuals with higher education, pay more for their water, and have better indicators of water coverage and quality. Their municipalities are also more likely to have an investment office. In short, they have somewhat better indicators of general welfare, management capabilities, and water service coverage and quality.