



# Is privatization of sanitation services good for health?☆

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## ARTICLE INFO

### Keywords:

Sanitation

Privatization

Health

Epidemiological indicators

## ABSTRACT

This paper investigates the effect of different modes of privatization of water and sewage services in Brazil on epidemiological indicators as an empirical strategy to assess the cost-quality trade-off claimed by received theory. Results indicate that the local private mode of organization decreases morbidity rates and that the hybrid mode of organization, where a private operator shares decision rights with the state government, does not deteriorate the quality of the services. Overall, results indicate that the privatization of sanitation services is not necessarily subject to the cost-quality trade-off, even if quality indicators are non-contractible.

## 1. Introduction

Is privatization of sanitation services good for health? It is a fair question. Privatization modifies incentives and, as such, affects the efficiency with which a service is provided. As epidemiological indicators are sensitive to the quality of sanitation services, privatization may affect health. But can we say something about the effect of different modes of privatization?

The first question has been addressed by Galiani et al. (2005), who concluded that privatization of sanitation services in Argentina decreased infant mortality rates, and Granados and Sánchez (2014), who reached the opposite result in their analysis of water reform in Colombia. Several other studies evaluate the effect of privatization in general with mixed results, claiming that variations in the institutional context, regulation, competition, and organizational design could explain variations in outcomes (Okten and Arin, 2006; Estrin et al., 2009; Hailu et al., 2012; Ménard and Saleth, 2013; Tan, 2012). All these studies suggest that it is worth pursuing with the second question: to investigate how different modes of privatization of sanitation services affect health indicators.

Privatizations of sanitation services in Brazil offer a rare opportunity to investigate the effects of different modes of private operation on epidemiological indicators. From 1995 to 2008 Brazil experienced a wave of privatizations at the municipal level in water and sewage services, providing both horizontal and longitudinal variation suitable for empirical identification. Also, the different modes of organizations

operate in the same institutional environment and in a single industry, holding constant technology and macro-institutional variables that could affect outcomes (Estrin et al., 2009). Furthermore, the Brazilian case allows us to compare two forms of private provision. The first form, henceforth *local private*, corresponds to the concession of sanitation services to a fully private company that operates locally (or in small consortia). The second form, henceforth *private with state rights*, corresponds to the concession of sanitation services to a firm controlled by a private party that shares some decision rights with the state government. As this mode of organization is in between public provision and full privatization, it may be classified as a hybrid form.

Received theory acknowledges that a private provider has stronger incentives than a state-owned firm to reduce costs since it is able to appropriate the return of its own efforts toward a more efficient provision. Nevertheless, when quality is not perfectly contractible and there is no market mechanism to pay off for quality, incentives for cost reduction may result in a lower quality of the service offered by the private operator (Hart et al., 1997). The iconic case of this cost-quality tradeoff is the prison service, for which, as this literature claims, the public provision would be a superior solution.

Basic sanitation shares some of the characteristics of the sectors that are subject to the cost-quality trade-off. Just as in the case of prisons, the consumer has no choice between different suppliers, which implies that there are no market mechanisms that ensure a desired level of quality. Moreover, enforcing quality standards in concession contracts is difficult due to a variety of contractual hazards (Ménard and Saussier,

☆ The authors thank Bernardo Mueller, Carlos Pereira, Claude Menard, Lee Benham, Rudinei Toneto, Sandro Cabral, Sergio Lazzarini, two anonymous referees, and seminar participants at the International Society for New Institutional Economics, FGV and Insper for many helpful comments and suggestions. We also are grateful to Ben Schneider and the MIT Political Science Department for providing a fruitful environment for the development of this research. This research would not have been possible without the support of CNPq. The usual caveats apply.

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2000). Therefore, sanitation services could be framed as a case in which a private operator would supply lower quality levels. As the quality of sanitation influences the incidence of various diseases, the trade-off would reflect the health conditions of individuals in locations with private provision.

Overall there is not much controversy with regard the effect of privatization of sanitation services in costs, as already documented in Jiang and Zheng (2014), for China, and Sabbioni (2008), for Brazil. The present study addresses the more controversial question about the effects on quality, and, as a consequence, on epidemiological indicators related to water sewage services.

Our empirical strategy follows Galiani et al. (2005). We profit from longitudinal and horizontal variation in our data to employ the difference-in-differences method with matching, from which we estimate the effects of two modes of private operation, both compared with the public provision, on morbidity and mortality rates. Our identification strategy relies on the epidemiological literature that associates sanitation interventions with specific types of diseases (sanitation-related diseases and other diseases) and specific age groups. Our results indicate that the *local private* mode of organization decreases morbidity rates in sanitation-related diseases and in the age groups most vulnerable to sanitation interventions. As for the *private with state rights* mode of organization, there is no robust evidence of quality deterioration in water and sewage services. In short, our findings are at odds with the cost-quality tradeoff prediction.

The main contributions of this article are two-fold. First, it provides additional evidence, in a different institutional environment, that the privatization of public utilities is not necessarily subject to the cost-quality trade-off, even if quality indicators are non-contractible, as already found in Cabral et al. (2010) for the case of prison services. Second and most importantly, the privatization of sanitation services in Brazil allows the contrast between two different modes of organization of the private provision. The effects on epidemiological indicators are clearly distinct in these two forms, suggesting that some decision rights that are kept by the state government may harm efficiency in the provision of sanitation services.

The remaining of this article is divided into four additional sections. Next section presents some institutional background about sanitation services in Brazil and the wave of privatizations from 1995 to 2008. The third section presents a brief review of the literature on the relationship between sanitation and health, as support to our identification strategy, and details on data and the empirical strategy. The fourth section presents results, which are then followed, in section 5, by a discussion and final remarks.

## 2. Modes of organization in Brazilian sanitation services

Water supply and sewage collection, in Brazil, are the responsibility of municipalities, which may opt among four different organizational modes for the provision of these services: state-level public, local public, local private, and private with state rights.

The first type is formed by the state sanitation companies (SSC), controlled by state governments and responsible for providing services to several municipalities in their respective states. All Brazilian states have their own SSC, except for Mato Grosso, whose state company was extinguished in 2008 after a long process that began in 2000, and Tocantins, which has opted to transfer control of its state company to a private operator, as will be detailed later in this section. The second type comprises public providers controlled by municipalities or by a consortium with neighboring municipalities.

The third mode of organization is the private provision at the local level, by means of concession contracts between municipalities and a private company. They have to comply with the concession contracts, but otherwise have full discretion and responsibility for their operations. There is some variability in the way a municipality implements the concession to a private company. The vast majority of the cases are

regular full concessions that follow a standard concession contract. However few cases that require substantial greenfield investments undertaken by private parties may adopt different property rights models, such as build-own-transfer (in which the property is transferred to the public authority at the end of the concession contract) or build-transfer-operate (in which the property is transferred after completion and is subsequently rented by the private operator till the end of the concession). According to the Brazilian Ministry of Cities (Ministério Das Cidades, 2009), though, the local private mode is still fairly homogeneous, as all municipalities have to comply with the Federal Concession Law No. 8,987, and contracts share the same basic governance features, which allows us to treat them as a group.

Finally, the fourth type is a provider controlled by a private party but in which the state holds some rights. This fourth type originated from the privatization of the state sanitation company in Tocantins, a state in the North region of Brazil, with per capita income close to the median of the Brazilian states and with a low population density (5.49 inhabitants/km<sup>2</sup>), nearly one-fourth of the Brazilian. As for water services, 78% of households have water connections, what puts Tocantins exactly at the median of Brazilian states.

The privatization of the Tocantins's SSC was the only case in Brazil in which the state became a minority shareholder (Freitas et al., 2017). The Tocantins state remained the owner of golden shares that give rights to appoint the Director of Planning, one member of the Board of Directors and veto rights related to changes in the statute of the company, such as location, and reduction of planned targets. The vast majority of municipalities in Tocantins, in different years, opted to delegate sanitation services to this private provider with state rights. There were still in Tocantins some cases of local public providers and a single case of a municipality that opted for a local private provider.

This fourth mode of organization may be named partial privatization since only part of the decision rights are allocated to the private party. It also may be characterized as a hybrid form, although this concept is mainly applied to private ordering organization arrangements. They are something in between full privatization and public provision, with an allocation of “decision rights that keep partners independent, although shared rights restrict their autonomy” (Ménard, 2012: 52). The allocation of veto powers to the state government presumably restrains the discretion of the private party, with dubious effects on its performance. Also, the right to appoint the Director of Planning preserves some leeway for the state government to hire employees for the sanitation company as an instrument of patronage. On one hand, this type of allocation of rights between the government and the private party may reduce operational efficiency. On the other hand, with lower discretion, the private party would be less prone to engage in activities that could harm the quality of water and sewage services.

From 1994 to 2008, Brazil experienced a wave of privatization of water and sewage services. As shown in Table 1, most privatizations occurred simultaneously in water and sewage, with only a few cases of concession in just one of the services. Except for one case, the concession of sanitation services to private operators occurred after the enactment of the Concessions Law (Federal Law No. 8987) in 1995. In the same year, public services were included in the National Privatization Program, initiating a phase of large privatizations under the presidency of Fernando Henrique Cardoso. In addition to directly privatizing state-owned enterprises, the Federal Government encouraged other levels of government to follow the same steps. For this reason, as shown in Table 1, most privatizations in sanitation occurred during the Cardoso term in office (1995–2002).

Data from Table 1 also raises a concern that has to be addressed in our empirical strategy. Although privatization of sanitation services in Brazil allows for a difference-in-differences approach, from which we explore longitudinal and horizontal variation in the data, one can observe a regional concentration in Tocantins State (where the type “private with state rights” is found). For this reason, we control for state fixed effects in the difference-in-differences regressions. Moreover, as

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