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# Water Reforms, Decentralization and Child Mortality in Colombia, 1990–2005

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**Summary.** — This paper attempts to determine the municipal level impact of the 1994 Law 142 water and sewerage services reforms on child mortality and service coverage. The objective of these reforms was to transfer service provision from the municipalities to specialized companies. These reforms were undertaken within the 1990s decentralization process which established that the provision of water and sewerage services was the responsibility of local governments. The results obtained indicate that municipalities that reformed exhibit a slower reduction of child mortality rates and lower increases in water coverage than the ones that did not reform.  
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*Key words* — child mortality, water reforms, decentralization

## 1. INTRODUCTION

High quality provision of water and sewerage services is fundamental to overcome poverty and to improve quality of life. In particular, access to potable water and basic sanitation facilities is strongly related to the prevention of gastrointestinal diseases in children and adults<sup>1</sup> (Esrey, Potash, Roberts, & Shiff, 1991). The World Health Organization estimates that 1.8 million people die every year from diseases related to an inadequate provision of water and sanitation; 90% of them are children under five (OMS, 2004). As part of the Millennium Goals, Colombia committed to reduce mortality in children under five from 37 to 17 deaths per 1,000 live births. Achieving such an objective inherently entails improved provision of water and sanitation services.

By the late 1980s, Colombia had already begun to reform water and sanitation service provision through two strategies. First, the central government sought to enhance service provision by gradually transferring it to the local governments. Second, the government also transformed the regulation of the service provision sector in order to allow for the participation of specialized private or mixed firms. The final stage of the latter strategy was the enactment of Law 142 of 1994 which established a new institutional framework for the provision the services. One key aspect of the Law was to authorize the participation of private capital in the provision of those services. In this regard, the Law facilitated the creation of companies specialized in the provision of water and sewerage services as a way to stimulate coverage expansion and quality improvement. The entrance of specialized companies would lead eventually to the gradual elimination of local governments as direct providers of those services. To date, however, local governments remain the principal providers, as specialized companies mainly operate in municipalities with more than 20,000 subscribers (Roda, 2004). The reform was implemented more than 15 years ago, yet as of now its impact is not completely known.

The objective of this paper is to empirically evaluate the impact of the reforms on water and sewerage service provision, as well as on child mortality from 1990 to 2004. We find that the municipalities that chose to reform by incorporating specialized providers experience less progress in their indicators of child mortality and water coverage than municipalities in which local governments continued providing services. Thus,

the incentives that a private maximizing specialized firm experiences do not lead by themselves to more coverage or better quality of water and hence to lower child mortality. It may be, in fact, that the incentives that a local politician has—accountability, reelection, etc.—may bring about better water and sewerage services, which in turn may lead to better indicators of child mortality.

Almost at the same time that Law 142 was enacted, Law 60 of 1993 determined the complete decentralization of the provision of water and sewerage services. More specifically, Law 60 established that municipalities were obligated to assure service provision either as direct providers or in association with other public, private, or communal entities. Thus, when specialized public, private, or mixed firms began to operate, it was within a decentralized environment. As a consequence, local governments have had full autonomy to choose either to contract the specialized providers or to remain service providers themselves.

The paper consists of eight sections, including the introduction. Section 2 presents a short review of the literature on international water and sanitation sector reforms. Section 3 describes the water sector reform process prompted by Law 142 in relation to public utilities provision by private parties. Section 4 presents descriptive statistics on water and sewerage coverage and child mortality. Sections 5 and 6 present the methodology of estimation and the econometric results for child mortality. Section 7 analyzes the effect of the reform on service coverage, and its relation to child mortality. Finally, Section 8 summarizes results and presents concluding considerations.

## 2. LITERATURE ON THE IMPACT OF WATER AND SANITATION REFORMS: INCONCLUSIVE EVIDENCE

The relationship between the availability of potable water and sewerage and a population's quality of life is well

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established in the literature (Abou-Ali, 2002; Esrey *et al.*, 1991; Fajardo, 2004; Jalan & Ravallion, 2003; Lavy, Strauss, Thomas, & Vreyer, 1996). Specifically, a lack of potable water and sewerage systems is strongly related to an increased incidence of infectious and transmissible diseases, including diarrhea and cholera. While children are especially vulnerable to such diseases, previous research suggests other factors, including parental education level, hygienic practices, and proper medical care, may also contribute to the prevalence of these diseases in children (Payment & Hunter, 2001). Most studies show that the availability of potable water and sewerage services reduces the child mortality rate by 5–27%, reduces overall disease incidence by about 20% (Galdo & Briceño, 2005<sup>1</sup>), and reduces disease duration by 29% (Jalan & Ravallion, 2003). The provision of water and sewerage services is undertaken within different institutional setups—public, private, and mixed providers—each of which may affect differently the coverage and the quality of the service according to the set of incentives the providers experience. This paper attempts to explain those issues in the case of Colombia.

Since the late 1980s, a process of reforms on the provision of public utility services including water and sanitation, electricity and telecommunications began in many developing countries. One of the cornerstones of the reforms was the involvement of private providers using diverse participation models. As described below, evaluations employing diverse methodologies and approaches have been carried out in the 20 years since the reforms began. In the cases of electricity and telecommunications, evidence concurs that private participation yields positive effect on service efficiency and coverage. However, in the case of water and sanitation the impact of private sector involvement remains controversial as evaluation of the reforms have not shown conclusive results as shown below.

Arguments in favor of private sector provision of water and sewerage services can be summarized by stating that the most important incentive to increase efficiency is the possibility of financial profits (De Alessi, 1980). Public provision of services lacks this incentive and hence exhibits low levels of efficiency and quality. On the other hand, opponents of reforms that increase private provision claim that water and sanitation services should be public goods because they generate environmental and health externalities. Under this premise it is not possible to reach a socially optimal level of private sector service provision because of the difficulty in efficiently internalizing and regulating those externalities (Noll, Shirley, & Cowan, 2002). Moreover, researchers have identified several limiting factors related to the private provision of water and sewerage services, including its characteristic of natural monopoly, the low elasticity of demand and the high risk of nonfee payment among lower-income sectors (for discussion see Galiani, Gertler, & Schargrodsky, 2005). The reforms implemented in Colombia fall between these two extremes for and against private service provision. These reforms recognize the government's responsibility—particularly the local governments' responsibility—to ensure the universal provision of quality services. At the same time, however, they promote private involvement in the water and sewerage sector while still demanding good performance and positive outcomes no matter the type of service provider.

Regardless of the discussion on its potential benefits, private involvement in the provision of water and sanitation services took place in 140 countries from 1990 to 2003 (Prasad, 2006). These reforms considered different models for the participation of private capital such as sales of equity of state-owned companies, concession contracts, and Build, Operate, Manage, Transfer contracts (BOMT). According to Prasad

(2006), the literature on the implementation of water and sanitation reforms has focused on the performance of provider companies from a microeconomic point of view, analyzing efficiency and productivity indicators although the results are not conclusive in the case of private capital involvement. Moreover, the impact of those indicators on the population quality of life and on the decrease of poverty levels has not been studied in-depth.

De Alessi's (1980) hypothesis that the maximization of profits drives increased efficiency of private water provision firms has been empirically tested in studies across multiple countries. Bhattacharya, Elliot, and Raffie (1994) show that public companies in the US exhibit higher efficiency in the use of production materials and have better technical capacity, though the dispersion of results for public companies is higher than for private companies. Estache and Rossi (2002) analyze the performance of 50 Asian water companies to demonstrate that private companies are not more efficient than public ones. Coelho, Da Silva, and Moreira (2005) find that private water companies in Brazil are only marginally more efficient than public companies. The African case presented by Kirkpatrick, Parker, and Zhang (2006) finds no evidence of superior performance of private companies over public companies. Clarke, Menard, and Zuluaga (2000) use household surveys from Brazil, Argentina, and Bolivia to show that there is no correlation between private participation and the coverage achieved by water and sewerage systems. Clarke *et al.* (2000) and Shirley, Xu, and Zuluaga (2000) examine the private provision of water and sanitation in Conakry and Santiago de Chile and find that reforms benefited consumers, local governments, and private investors. In sum, these studies indicate that there is no clear evidence of greater efficiency or coverage in regions or countries with private sector participation. When outcomes are widened to consider quality of life, Galiani *et al.* (2005) find that in Argentina, private participation is associated with a 9% decrease in child mortality, with stronger effects on municipalities with higher poverty levels.

In the Colombian case, Silva and Andia (2006) analyze the relationship between resources transferred to municipalities and water and sewerage service coverage during 1998–2002, as well as the link between the latter and under five child mortality. The authors find that the relationship between the allocated resources and the change in coverage is weak, which indicates the existence of sharp spending inefficiencies. There is a similarly weak relationship between the latter and under five child mortality.<sup>2</sup> Barrera and Olivera (2007) find private participation on coverage has a positive effect on service quality, particularly in urban areas,<sup>3</sup> yet the authors find only inconclusive evidence on the link between private participation and the incidence of diarrhea in children. Giraldo and Rosales (2004) analyze the effect of access to electricity and potable water on the productivity of households in Colombia; they find that the productivity differential explained by the access to these services is equivalent to 10.5% of the monthly minimum legal wage. Arevalo and Schippener (2002) explore the experience of private sector participation in the administration and operation of water and sanitation services in the department of Antioquia. Specifically, the authors analyze the evolution and performance of 11 small and medium-sized providers serving 38 municipalities, and evaluate users' satisfaction. Their results indicate that the highest satisfaction is found under mixed management strategies, as they combine the joint interests and efforts of both the public and private sectors (Arevalo & Schippener, 2002). Finally, Krause (2007) finds that quality of governance such as strong civil society, control of corruption, and low activity of illegal armed groups favor

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