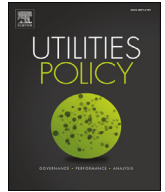




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Water utility efficiency assessment in Italy by accounting for service quality: An empirical investigation

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ABSTRACT

In Italy's water industry, publicly owned utilities (PWCs) coexist with public-private partnerships (PPPWCs), that could contribute expertise for operations, funds, and relationships. This paper examines the effect of ownership structures on efficiency by comparing Veneto (with almost all PWCs) and Tuscany (with almost all PPPWCs). This comparison is highly debated, with possible economic, social, environmental, and political implications. A Data Envelopment Analysis approach, that uses both quantitative and qualitative variables to represent the lack of service quality, was adopted. Results suggest that PWCs perform slightly better when quality issues are excluded, while PPPWCs perform better when considering both variable types.

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1. Introduction

Since the governance of water services has been a major topic throughout the world over the last three decades, empirical studies have frequently investigated differences in efficiency between publicly owned utilities (PWCs) and public-private partnerships (PPPWCs), with conflicting results (Abbott and Cohen, 2009; Berg and Marques, 2011; Hall, 2001; Lobina and Hall, 2007; Marques, 2008; Peda et al., 2013; Pérard, 2009).¹

Regulation might be very important for the protection of the public interest, and different regulatory models might have several consequences for firm performance. The influence of regulation on the performance of water utilities has been analyzed by scholars

throughout the world to understand if and how different regulatory models impact firm performance (see for references Simões and Marques, 2012). The impacts could be expected but could also be perverse if, for example, a regulatory model is implemented in isolation from its influence on the firm's policy and strategies (Simões and Marques, 2012).

In Italy, one of the main aims of the Italian government's important reforms over the last twenty years was to incentivize the outsourcing of water services to independent firms in order to terminate the direct supply of water and wastewater services through public administrations (Carrozza, 2011; Guerrini et al., 2011; Massarutto and Ermano, 2013). However, municipalities or other public bodies that provide one or more water services directly, still constitute around 75% of Italian water industry operators (Romano and Guerrini, 2014). Moreover, public, mixed, and privately owned utilities nowadays coexist, operating on different scales and with different strategic and organizational statuses (mono-vs. multi-utilities, stand-alone firms vs. corporate groups, etc.). Previous studies have assessed the existence of significant differences in technical efficiency between Italian PWCs and PPPWCs (Guerrini and Romano, 2014), economic profitability and financial sustainability (Romano et al., 2013), as well as sensitivity to water sustainability issues (Romano et al., 2014a). However, the

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¹ In this context, it should be noted that a worldwide trend has emerged as more communities insist on returning water and wastewater services to public control in Latin America, Asia, the United States, Africa, and Europe. There are more than 180 successful cases of remunicipalization of urban water services, such as those of Buenos Aires, Atlanta, and Paris (Kishimoto et al., 2014).

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inclusion of quality issues in the measurement of efficiency is neglected, in spite of its relevance for citizens, regulators, and the environment (Picazo-Tadeo et al., 2008). In fact, the total value of water services cannot be adequately assessed in terms of quantitative outputs only, since aspects such as service quality, the physical and chemical quality of the water supplied, and disruptions to supply are important qualitative attributes of the final product (Hernández-Sancho et al., 2012; Saal and Parker, 2001; Woodbury and Dollery, 2004).

Benchmarking is a tool that can be used to inform citizens about infrastructure improvements, and utility performance could better be understood by incorporating service quality into the regulatory activity of water authorities (Lin, 2005). In fact, water regulators are now incentivizing improved service quality by means of awards or penalties when setting prices (Molinos-Senante et al., 2016a,b). Recently, the Italian water regulator has also introduced a new penalty-based tariff method for those companies that do not achieve the assigned target in terms of service quality. However, it is worth mentioning that the quality of service regulation, when implemented in isolation, could have perverse effects on the performance of utilities (see Simões and Marques, 2012).

Following the methodological approach applied by Hernández-Sancho et al. (2012), Molinos-Senante et al. (2015a,b), and Picazo-Tadeo et al. (2008), this paper aims to investigate the performance of Italian water utilities in two regions where utilities with different ownership structures operate, namely Tuscany and Veneto. Tuscany, in the center of Italy, is a pioneer region where the water industry has been opened to private investors in the period 2003–2005, and almost all the water utilities are organized as public-private partnerships (PPPWCs). In contrast, Veneto in the northeastern area, is a region where almost all entities are publicly owned (PWCs). Around 8.7 million inhabitants, or 14% of the Italian population, live in these two regions. A Data Envelopment Analysis approach was applied, and the metafrontier approach—that accounts for possible heterogeneity between units—was adopted for comparison of performance. Since service quality to customers is an aspect that cannot be ignored in the performance assessment of water companies (Molinos-Senante et al., 2016a,b), this study considers quantity-based measurement, as well as quality variables that represent the lack of service quality as undesirable outputs.

The remainder of the paper is organized as follows: section 2 is devoted to a review of the existing literature, while sections 3 and 4 present the dataset and the methodology, respectively. Section 5 presents and discusses the empirical results, while the final section contains a summary and some concluding remarks.

2. A brief overview of the regulation of the Italian water sector with respect to cost and quality

According to the national water authority (called Autorità per l'Energia Elettrica il Gas e il Sistema Idrico—AEEGSI) dataset, there

are around 1750 entities providing water services. Of these, 1384 are municipalities or other public entities (representing 17% of all Italian municipalities) and only 366 are independent firms. Among these 366 firms, only 164 were entrusted with the simultaneous provision of all of the main water services: collection, adduction/transportation, distribution of water for civil use, sewerage, and wastewater treatment. Table 1 provides a brief overview of the 164 Italian water utilities.

Power and responsibilities within the water sector in Italy are charged to national and local authorities, and to water companies that are entrusted with service delivery and implementation of the necessary infrastructure (for more details, see Guerrini and Romano, 2014). According to Law 152/2006, a National Regulatory Authority should define the national framework under which all firms must operate, choosing the tariff method and the service contract type; then, it should periodically monitor the implementation of the rules in every area of the country. A Local Regulator Authority (AATO; now called EGATO) is responsible for controlling the entities that locally manage the services.

In terms of tariff method, AEEGSI introduced the MTT (transitory method) for 2012 and 2013, which was replaced by MTI 2014–2015 and then by MTI 2016–2019. The former normalized method, in force until 2011, requires a progressive reduction of operating expenditure (OPEX) in order to achieve a modeled cost curve. This curve was calculated through a parametric function, in accordance with a benchmarking procedure. The MTT and then the MTI mitigated the incentives for efficiency improvements for both OPEX and capital expenditure (CAPEX), avoiding any kind of comparison among utilities. The OPEX that is charged in tariffs every year is based on the 2011 recorded tariffs that are updated with inflation; CAPEX includes depreciation on net assets book-kept two years before, cost of capital, and fiscal costs. The last two components of CAPEX are estimated by multiplying the specific rates provided by AEEGSI by the value of the net assets. According to this method, the tariff changes every year.

The quality of service was self-regulated since 1999, when the chart of services was introduced: with this document, every water utility defines for itself the targets that should be achieved by only limited negotiation with the local water authority. The service charts published by water utilities to date show a very similar summary, even if some might provide less detail than others in the narrative sections.

From 2016 onwards, the new MTI introduces incentives and penalties for the achieved standards of quality, allowing tariff variation linked to this index. Furthermore, provision 655/15 of AEEGSI provides the compulsory standards for quality of services for all water companies; with this law, the self-regulation of water service quality was delayed (Fig. 1). Since July 2016, AEEGSI set targets for utility firms in terms of time to deliver specific types of services (e.g., days required to realize a new connection, hours required to repair a breakdown, minutes of waiting at the front

Table 1
The main features of Italian water utilities.

Data collected for all 164 Italian water utilities	Weight of total population of 164 firms	Population density	% of businesses that are Multi – mono-utilities
Ownership structure			
PWCs	65%	169 (inhab/km)	27%–73%
PPWCs and PrWCs	35%	169 (inhab/km)	32%–68%
Size			
Small (<10 M € of revenue)	33%	143 (inhab/km)	20%–80%
Medium (10 < revenue < 50 M €)	44%	177 (inhab/km)	27%–73%
Large (>50 MIL of revenue)	23%	191 (inhab/km)	43%–57%

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