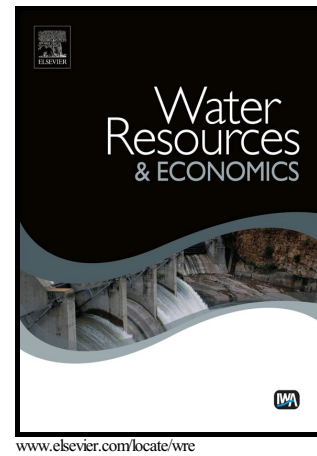


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Water Losses and Optimal Network Investments:
Price Regulation Effects with Municipalization and
Privatization

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1. Introduction

Rehabilitation investments to reduce water leaks in the distribution network is one of the most important issues currently affecting the water industry worldwide.¹ Up to now, and with few exceptions, this issue has not attracted the attention of the economic literature. As water losses can be compensated by increasing resort to available water resources, sustainability issues may arise just for areas characterized by resource scarcity (Noll et al., 2002). However, the increasing attention to the effects of climate change on water resource management (Bates et al., 2008) is making water leaks a salient issue in more and more local areas, as drought phenomena are extending to more regions. Investments to reduce leaks in water networks may increasingly represent an adaptation strategy with respect to the effects of global warming (see for example Charlton and Arnell, 2011).

The engineering literature and environmental sciences have devoted some more attention to network leaks and the related investment activities. These contributions highlight that water management can compensate leaks in the short run, by increasing pressure and/or the amount of water input, but an increase of variable costs may ensue.² Social damages may be due to 1) unsustainable resort to scarce water resources; 2) carbon emissions from increasing electricity consumption to inject more water into the network; 3) risk of contamination if pollutants can infiltrate through pipe-breaks (Xu et al., 2014). Service quality is also affected and in the worst cases lower network pressure resulting from leaks may lead to service interruptions (Garcia and Thomas, 2003). The different state of network infrastructures at a local level may affect both the variable cost of leaks management and the amount of investment needed for a structural reduction of leaks.

Rehabilitation and substitution investments, including the adoption of new technologies for leaks detection, imply significant long run costs, but can induce a decrease of both variable costs (as far as energy consumption is concerned) and social damages. However, pushing infrastructure investment too much may not be wise from the economic point of view: investments that maximize the net social benefits may not be such to lead to zero leaks (Venkatesh, 2012).³ Accordingly, an issue of optimal investment arises from the economic point of view. In practice, as water supply is

¹According to Garcia and Thomas (2003), in France actual losses amount to 25% on average and, in certain regions, reach a peak of 50% of distributed volumes. Egenhofer et al. (2012) provide some data concerning water leaks in Europe, showing a significant variability across and within countries. Water losses range from 50% in Bulgaria to 5% in Germany. See Fig. 3.2 in Egenhofer et al. (2012).

²The increase of water injection in the network implies greater pumping efforts, giving rise to an increase of energy costs. Additional chemicals for water treatment also contribute to increase variable costs.

³Actually considering European countries only Germany is characterized by a negligible amount of network leaks (see footnote 1).

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