

# **The role of environmental variables on the efficiency of water and sewerage companies: a case study of Chile**

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## **Abstract**

This paper evaluates the efficiency of water and sewerage companies (WaSCs) by introducing the lack of service quality as undesirable outputs. It also investigates whether the production frontier of WaSCs is overall constant returns to scale (CRS) or variable returns to scale (VRS) by using two different data envelopment analysis models. In a second-stage analysis, we study the influence of exogenous and endogenous variables on WaSC performance by applying non-parametric hypothesis tests. In a pioneering approach, the analysis covers 18 WaSCs from Chile, representing about 90 % of the Chilean urban population. The results evidence that the technology of the sample studied is characterized overall by CRS. Peak water demand, the percentage of external workers, and the percentage of unbilled water are the factors affecting the efficiency of WaSCs. From a policy perspective, the integration of undesirable outputs into the assessment of WaSC performance is crucial not to penalize companies that provide high service quality to customers.