

## Domestic Water Demand in Saudi Arabia

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**Abstract :** The main objective of this paper is twofold. First, we aim to identify the main determinants of domestic water demand in Saudi Arabia. To achieve this, we estimate two sets of water demand models for the period 1994 to 2021. In the first model, we estimate water demand as a function of water price, income, and population. In the second model, we include water use efficiency (WUE) as an additional variable to examine its role in future domestic water demand. Second, we project Saudi Arabia's domestic water demand by 2050 using the estimates from models 1 and 2. The estimation results for models 1 and 2 show that all coefficients are significant and align with theoretical expectations. The estimated price elasticities of demand are -0.11 and -0.22 for models 1 and 2, respectively. The income and population elasticities are similar for both models, ranging from 0.63 to 0.68 for income and 1.50 to 1.77 for population. The price elasticity of water demand is low, whereas the population elasticity is high. The estimated elasticity of WUE is -0.20. Projections based on model 1 indicate that total domestic water demand will increase from 3.7 billion m<sup>3</sup>/year in 2023 to approximately 7.4 billion m<sup>3</sup>/year in 2050. In the WUE-based model, domestic water demand is projected to rise from 3.7 billion m<sup>3</sup>/year in 2023 to 6.2 billion m<sup>3</sup>/year in 2050. In a scenario where the price of water is increased by 20%, the projected water demand in 2050 is approximately 7.2 billion m<sup>3</sup>/year for model 1 and 5.9 billion m<sup>3</sup>/year for model 2. Additionally, the results suggest that domestic water demand in Saudi Arabia could be reduced by 17% through WUE improvements and by 5.4% through water price reform. These findings highlight the effectiveness of WUE improvements for domestic water management in Saudi Arabia.

**Keywords :** water, price, income, ARDL, Saudi Arabia

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