

Water Demand and Financing in Rwanda: An Empirical Analysis

av

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AKADEMISK AVHANDLING

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Abstracts

Paper 1: Water demand by unconnected households in urban districts of Rwanda

In this paper, we analyse water demand by households in urban districts in Rwanda who currently lack a piped connection into their home. The analysis uses data from a cross-sectional survey. The demand function has been estimated in a two-step procedure for correcting selection bias (Heckman 1979). The results showed that public taps are the most widely used water source and that the demand from this source is more inelastic compared with that for other water sources. Although it happens that households combine different sources of water, the majority in the sample uses only one source. We use the full household income, and obtain results which indicate income elasticities higher than those obtained with monetary income. The full cost associated with alternative water sources is shown to be important for determining the choice of source – something which has been overlooked in most previous studies. Poor (unconnected) households cannot expect to be connected to the piped network in the short run; and improving the current non-tap distribution systems could be considered an alternative solution.

Paper 2: Individual status quo modelling for a rural water service in Rwanda: Application of a choice experiment

In Rwanda, rural water supply is not uniformly distributed. Thus, for domestic water, rural areas are characterised by differences in the distance to the nearest water point and in water quality; for irrigation water, by watering frequency and water availability; and by the price for both. This means that a household's perception of further improvements in water supply will depend crucially on the current situation faced by that particular household. We used a choice experiment method to model how the individual status quo (SQ) affects preferences. We found that accounting for individual SQ information improves significance of the model relative to simply using the generic SQ parameter in the model, and that the willingness to pay increases. Not using this information leads to a downward bias – and, in some cases, statistical insignificance – in the estimates of households' valuation of health improvements linked to improved domestic water availability, as well as of increased watering frequency linked to the improved availability of irrigation water.

Paper 3: Social cohesion in Rwanda: Results from a public good experiment

In this paper we describe a public good experiment carried out in 20 rural villages in Rwanda. We find that contributions in different parts of the country are affected by the local intensity of the 1994 genocide, with more generous contributions being made in areas where violence was greater. This supports earlier research indicating that conflict experience leads to greater prosociality. However, we also find that people who have not been targets of violence themselves give lower contributions than people who have been. The considerable group-related and regional differences in social behaviour may have implications for the country's ongoing decentralisation policies and for the country's social cohesion in general.

Paper 4: The value of access to water: Livestock farming in the Nyagatare District, Rwanda

In Rwanda, access to water is seen as a significant constraint to development in both urban and rural areas. The government and foreign donors give priority to improving access to water for agricultural use. In this paper we study whether and, if so, to what extent the revenue generated by livestock farming in the Nyagatare District is affected by the distance that cattle need to go in order to reach the nearest water point. Our findings suggest that this distance does not affect the revenue from livestock farming much, indicating that improved access to water is not a major constraint to livestock farming at present. Therefore, other water needs can be given greater weight.

Paper 5: Water management and pricing in the urban areas of Rwanda: The case of Kigali city

In this paper, we study the current water pricing system practiced in Kigali in Rwanda and evaluate the potential for efficiency gains by moving to other alternatives. Notably, our numerical examples indicate that a change in the system for connection fees could make it easier for households to gain access to the piped water network, which should be beneficial both for household welfare and for health. It also appears to be the case that a slight change in the tariff block structure could lead to more efficient water use and improved funding for maintenance of the water network.

Keywords: coping sources of water, full income, unconnected households, unselected sources, water demand elasticity, urban districts, Rwanda, choice experiment, domestic water, irrigation water, households, districts, common property management, conflict experience, public good experiment, livestock farming, revenue function, water economics, water pricing, income distribution, water demand, social welfare, Kigali.

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