

Can Water Use Be Reduced through Policies that Promote Individual Metering of Water Consumption?



Using administrative data from the Empresa Pública de Agua y Saneamiento (EPMAPS) of Quito, Ecuador, it is found that water consumption decreases by approximately 8 percentage points (pp) after the introduction of individual meters.



To obtain an equivalent drop of 8 pp in water consumption, but without individual meters, water consumption prices would have to be doubled.



Individual water meters could be a useful tool for reducing water consumption in both developing and developed countries.

CONTEXT

Water shortages affect people in both developed and developing countries, and access to safe drinking water is still limited for much of the world's population—a situation likely to be aggravated by climate change. Reducing excess consumption can make the provision of water more efficient, but payment arrangements can undermine this goal. When consumption measured collectively for all members of a building or community, and payment is divided equally among households regardless of individual consumption, consumption is higher than optimal (“the tragedy of the commons”). Changes in billing and payment arrangements that tie individual payments to individual consumption may help to alleviate this problem.

PROJECT

Using administrative data from Quito's EPMAPS, we evaluate whether installing private water meters in residential neighborhoods and/or buildings that previously had collective meters affects the rate of water consumption. The 2014-2016 data include information on just over 400,000 residential customers that include i) monthly water consumption, ii) customers' geographic locations, iii) customers' basic demographic characteristics, and iv) a list of all “main” accounts before and after the installation of the individual “supplemental” water meters. In addition, the price elasticity of water is evaluated to see how much prices should increase to achieve a similar effect as installing individual meters.

RESULTS

The empirical evidence using a regression discontinuity design is clear: once the individual meters are installed and consumers are directly responsible for how much water they use, average water consumption decreases significantly. It is estimated that water consumption drops by approximately 8 pp (on average 19.4 m³). Using differences-in-differences (DD) generates similar effects. To create a valid control group, a synthetic control based on the more than the 360,000 accounts that did not change to the individual metering system is used. For DD, after the installation of water meters, monthly water consumption decreased by about 21.6 m³ per month (approximately 8%) relative to the control group. As can be observed in the figure, the synthetic control group and the treatment group behave exactly the same before the installation of the meters, but they diverge afterwards. In addition, the price elasticity of water consumption in Quito ranges between -0.07 and -0.10, suggesting that the installation of individual meters has the same effect on water consumption as a price increase of more than 100 percent.

Key Concept



WATER METER

Instrument to continuously measure, record, and display the volume of water passing through the measurement transducer under the conditions to be measured.

Key Concept



PRICE ELASTICITY OF CONSUMPTION OR DEMAND

A measurement of the change in consumption of a product in relation to a change in its price.

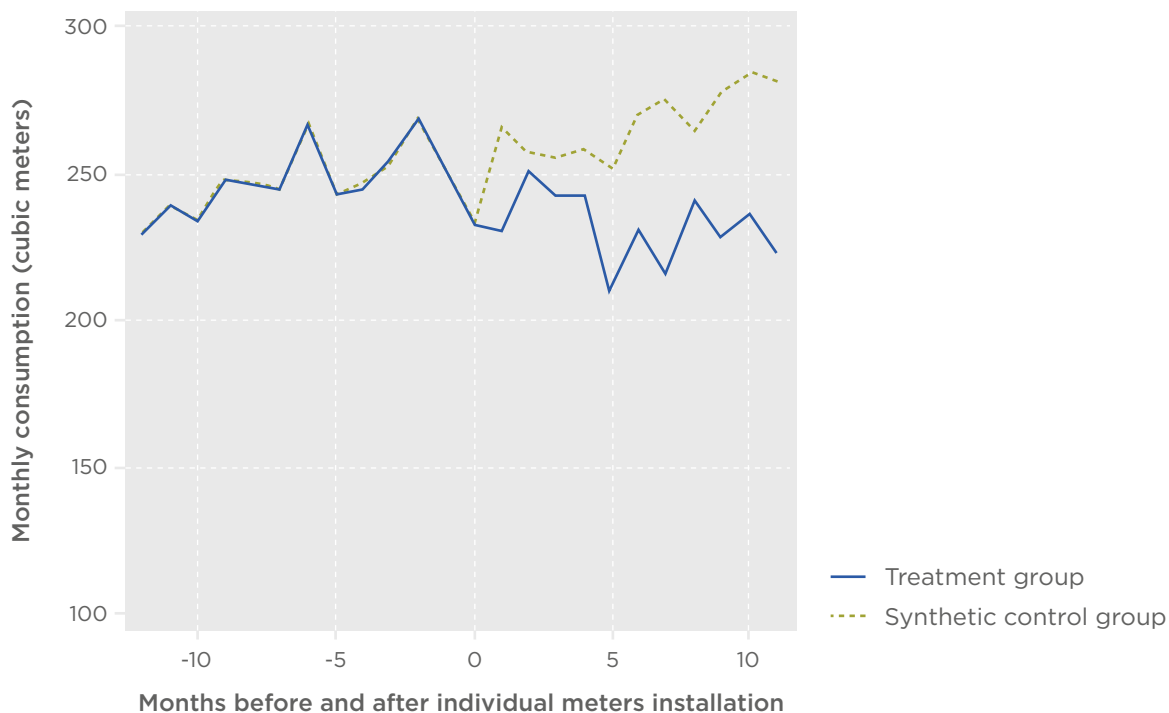
POLICY IMPLICATIONS

The demand for residential drinking water is quite inelastic, which may prevent addressing any potential water shortages through prices. Likewise, when meters are collective, there is a tragedy of the commons effect that further complicates the situation. The literature has explored different options, including nudges and similar approaches. The installation of private meters provides an institutional solution to the problem of the commons that could help reduce consumption. In order to encourage water conservation, water supply companies should pursue installation of individual meters in both new and existing buildings. In addition, using individual meters would make water consumption more efficient by making users more sensitive to price changes and to other regulations that may be enacted to reduce water consumption. Nudges and behavioral interventions could be more effective as well. Having information at the individual household level could provide the ability to conduct social norms and other campaigns that have shown effective in reducing consumption.

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Figure 1. Average Water Consumption by Group



Key Concept

TRAGEDY OF THE COMMONS

Individuals can use more than what is socially optimal when the cost of collective consumption is shared among the group independent of individual consumption.



FULL STUDY

[Carrillo, Paul, Ivette Contreras, and Carlos Scartascini. 2021. "Turn Off the Faucet: Solving Excess Water Consumption with Individual Meters." IDB Working Paper No. 1152. Washington, DC: Inter-American Development Bank.](#)

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Authors: Paul Carrillo, Ivette Contreras, and Carlos Scartascini.

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