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Agricultural water consumption and crop prices

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Most human activities depend on water. Agriculture alone consumes 70% of all freshwater withdrawals worldwide. In cases when such withdrawal overcome sustainability levels, water scarcity represents a growing threat to food security. In this framework, there has been an enduring debate on the opportunity of assigning an economic value to water. Some studies argue that water resources would be more efficiently allocated if they had a price that reflects their scarcity and that a pricing policy would also provide incentives for more sustainable consumption. Building on these considerations, in this work we investigate whether the water consumption in agricultural production is reflected in crop prices.

In this research, we focus specifically on the production of agricultural primary goods to understand whether water consumption is taken into consideration in the prices associated with these products on the global market. We consider the water component also in terms of water availability per capita at the country level (Falkenmark Water Stress Indicator). Aware of the fact that water and land are usually regarded as a single entity, we analyze if the water, isolated from this relation, still has an impact.

We select twelve representative crops analyzing their farm gate prices from 1991 to 2016, collecting data regarding 162 countries in total. We identify two different behaviors: staple crops (e.g. wheat, maize, soybeans, and potatoes) tend to incorporate in their prices the amount of water employed during the cultivation process. Differently, cash crops (e.g. coffee, cocoa beans, tea, vanilla), which are not crucial in human diets and mainly produced for exportation purposes, show a weaker relationship between water footprint and prices on the global market. These variations may be ascribable to specific market dynamics related to the two product groups. While there could be different elements influencing the behavior of these two macro-categories of crops, it is important to understand how water is related to crop prices to pursue more efficient practices in water allocation and governance management, improving environmental sustainability in this field.