

A Comparison of CGE and IO models in analysis of Water Scarcity and Climate Change

Topic: CGE and Econometric Input-Output Modeling

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This paper compares the results of CGE (Computable General Equilibrium) and IO (Input Output) models in analyzing the impacts of water scarcity. We measure the impacts of water shortage on sectoral production using both IO and CGE models. To control for different assumptions in models, different closure rules are applied and different scenarios of water scarcity are considered.

We employ an IO model with water accounts using standard physical IO assumptions. The WGE model, a computable General Equilibrium model for Water, is developed using the same database. The main closures in WGE model are imperfect factor mobility versus immobile factors, Leontief technology in production versus CES (constant elasticity of substitution), Leontief function in household expenditure versus CES function, and Armington assumption in trade versus no substitution between imported and domestic commodities. These closure rules will help to specify which assumptions in CGE models are more important in disagreement with IO models.

Physical water IO for Iran is the main database used in both models. This multi-region database consists of information about sectoral water use (in various sub-sectors of agriculture, manufacturing, and services sectors, as well as households), water sources (mainly raining, underground water, and surface water), and regional ecological zones (arid, dry, sub-humid, and humid).

CGE models capture both substitution and scale effects while IO models concentrate on scale effects. Preliminary findings suggest that those results from CGE models with lower substitution parameters will be slightly different from IO results. In other words, more substitutability in CGE models generates results which are much different from IO results. Our findings indicate that the size of production loss in CGE model is lower than in IO model. This difference is occurred mainly due to changes in production technology and reallocation of resources in the economy which are not captured by IO model.