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A Gravity Model of Virtual Water Flows: The Case of Turkey

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Abstract

Due to its empirical success gravity model of trade has long been the pillar of empirical research. According to conventional gravity model of bilateral trade, trade is determined by indicators of country size (GDP, population and land area) and of the distance between the pair of countries in question (physical distance as well as dummy variables indicating common borders, linguistic links and cultural similarities). Lately the gravity model of bilateral trade is transformed to include the virtual water concept. Virtual water is defined as the volume of water embedded in the production of an item. This concept and its empirical applications are mostly related to the production of agricultural commodities as water is mainly used by agricultural activities It is argued that water-rich countries should produce and export water-intensive commodities to water-scarce countries. The virtual water trade flows are determined by a number of factors like production technologies, domestic and international prices, trade barriers and quantity of available land; besides water endowments. In line with the existing literature we form a gravity model of virtual water trade flows for Turkey where the dependent variable is the total amount of water embedded in the agricultural products exchanged between Turkey and her major trade partners. The study will cover 2002-2012 period, 326 agricultural products and 196 countries. Water content of the trade flows of Turkish economy is computed by using country specific average water footprint of agricultural commodities provided by Mekonnen, M.M. and Hoekstra, A.Y. (2010) and agricultural trade data extracted from FAOSTAT database. Among the independent variables we include the conventional variables of gravity models like population, GDP per capita, geographical distance between Turkey and her trade partners; and some other variables which try to explain water availability and water pressure.

Keywords: Gravity model, trade, agriculture, virtual water.

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