Economic and environmental impacts of shifts in regional diets: a global MRIO scenario analysis

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This paper examines the impacts of future regional changes in population and diets, as constrained by the availability of land and water, on the international division of labor in agricultural products and on their relative prices. The study applies an input-output model of the world economy with an explicit representation of both resource requirements and the constraints imposed by resource endowments. The database includes three categories of land (non-irrigated cropland, irrigated cropland, and pastureland), two of water (rainwater and irrigation water), as well as phosphate rock ore for fertilizer production. A baseline scenario, and a projected baseline for 2050, are compared against two experimental scenarios for 2050 incorporating assumptions about diet change. The first scenario increases meat consumption and caloric intake in developing regions to levels at which the FAO estimates that undernourishment is eliminated. The second scenario decreases meat consumption and caloric intake in developed regions to the levels assumed for developing regions in the previous scenario. Developing regions are defined as regions in which daily caloric intake is below 3000 cal person-1. Comparisons among the baseline and the two experimental scenarios provide estimates of the extent to which more moderate diets in the developed regions can offset the increased demand originating in developing countries. These estimates can give policymakers and indication of the degree to which these changing dietary patterns can reduce stresses on resource inputs to agriculture. Resulting changes under alternative scenarios in the international agricultural division of labor and in agricultural prices, based on minimizing costs subject to resource constraints and resulting scarcity rents, highlight the regions of the world where agriculture will be most affected by global population growth and changing dietary patterns.