

## **Some Domestic Environmental Effects of US Agricultural Adjustments under Liberalized Trade: A Preliminary Analysis**

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This paper evaluates some of the environmental impacts on the US of a total trade liberalization scenario, in which all agricultural policy distortions—such as agricultural subsidies and tariffs—that were in place in the year 2000 in all trading countries are eliminated (but with no changes in environmental policies relative to 2000). Of course, trade liberalization never occurs all at once in all countries so this presents a scenario of a possible outcome were the hypothesis of total liberalization to occur. This simulation of total trade liberalization can be useful in understanding the possible market effects of partial trade liberalization, which is viewed as a more probable option.

In particular, the simulation suggests a 2.4 percent increase in corn production, with increases in all US regions; however, most regional changes are minimal. The simulation also shows an increase in US corn prices of 17 percent. The potential changes in wheat production are fairly homogeneous across regions within plus or minus two percentage points, while soybean production is likely to fall marginally. The simulation also suggests larger regional impacts with attrition of production in some regions and augmentation in others, and thus further concentration of production.

Changes in the livestock and feed sectors are also predicted to be limited throughout the US, with some variation at the regional levels. For example, while dairy production falls nationally, many regions exhibit increases in production. Swine production remains relatively unchanged, whereas changes in the beef sector vary by region. Within the parameters of the scenario, poultry production shows slight increases in most regions.

A preliminary analysis of this scenario might suggest that the potential environmental impacts at the national level would be marginal, due to limited variations in national commodity production. However, since national fluctuations in both production and environmental impacts depend on regional changes (which can be positive or negative) changes at the national level may not always be representative of changes at regional levels. For example, areas with the largest cropping increases are likely to have the largest potential increases in pesticide loading to ground and surface waters.

In order to assess the true costs and benefits of agri-environmental policies, it is necessary to assign monetary values to these production and environmental changes. However, since researchers are still in the preliminary stages of assessing the environmental impacts of agricultural activities beyond the boundaries of the field, monetary values could only be assigned to three parameters for this study: damages from nitrogen loss to water, as well as from on- and off-site soil erosion impacts. Since the variations in the physical quantities of these environmental impacts are minimal, the monetary value of the damages attributed to these changes in production, while increasing the aggregate, is also relatively small (less than one per cent over the pre-trade liberalization baseline). The value of the increase in aggregate damages to the environment from the three parameters modeled is approximately one percent of the expected net

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change in gross producer receipts and gross consumer expenditures for agricultural products. There is some regional variation in the change in the monetized environmental impacts. For instance, damages from soil erosion are predicted to increase in the Northeast and decrease in the Southeast.

Even in an extreme case scenario, the estimated changes in US agricultural production are within the bounds of normal seasonal variation in US agricultural commodity production as observed over the last thirty-five years. The results of the analysis also suggest that, for the US as a whole, environmental impacts stemming from the hypothesized trade shocks will most likely fall within average seasonal variation and vary by region (local impacts could not be modeled), at US\$16 million for the three damage effects modeled (greenhouse gas emissions, pesticide losses, manure nutrients, and bacterial discharges, biodiversity damages are not included). This represents 1 percent of the expected net change in gross producer receipts and gross consumer expenditures for agricultural products from trade liberalization. Note that this is not meant to imply that there will be no increase in environmental effects, but simply that these estimated increases are likely to be small. In particular, the estimated changes in commodity production and the environmental impacts are not uniform across the US, with some regions seeing an increase in agricultural production and environmental impacts, and others exhibiting a decrease.

Although this analysis uses the most comprehensive agricultural sector model currently capable of analyzing the costs and benefits of US agri-environmental impacts, there are some limitations to this tool. For example, it may not allow for the identification of variations in localized impacts at scales smaller than the regional aggregations used in the analysis. As well, changes in on-farm fuel use and transport of commodities were not included in the analysis; sugar, fruits and vegetables (all highly input-intensive crops) are not in the model; and the environmental impacts of changes in their production were thereby not modeled. In addition, while agricultural activity can also produce positive (depending on the previous use) environmental byproducts, such as open space and scenic views, an empirical assessment of such goods with respect to trade liberalization is currently not feasible. Finally, the analysis and interpretation of the modeled results do not take into consideration the effectiveness of regulatory and voluntary programs in mitigating the environmental consequences of increasing production.