Global Land Use Changes and Consequent CO$_2$ Emissions due to US Cellulosic Biofuel Program: A Preliminary Analysis

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1. Introduction
The land use consequences of US biofuel programs and their contributions to GHG emissions have been the focal point of many debates and research studies in recent years. However, most of these studies focused on land use emissions due to the first generation of biofuels such as corn ethanol, sugarcane ethanol, and biodiesel. However, only a few and incomplete attempts have been made to estimate these emissions for second generation technologies which convert cellulosic materials into liquid fuels.

The land use impacts of producing biofuels from cellulosic materials could be more complicated than corn ethanol. Currently, technologies for producing biofuels from cellulosic materials are not commercially available, so there is no market data on which to base the analysis, and there is little farmer experience in producing the needed feedstocks. For these reasons it is important to provide a comprehensive analytical framework to assess a wide range of alternative possible cases which may come about in the future.

2. Objectives
This research develops a numerical general equilibrium model to investigate GHG emissions due to land use changes induced by producing biofuels from cellulosic materials.

3. Existing Estimates for Corn Ethanol

4. Land Use Estimates Made by EPA for Corn Ethanol and Switchgrass

5. Numerical General Equilibrium Model

6. An Overview of GTAP Model

7. Modifications in GTAP Database

8. Cost Structures (shares) of Feedstock Industries

9. Cost Structures (shares) of Advanced Biofuels

10. Modifications in GTAP-BIO Model

11. Simulation Scenarios

12. Preliminary Results

13. References

14. Acknowledgment
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