Economic Analysis of the Role of Forest Biomass in Bioenergy Production in Southern US

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Research Motivation
Is biomass boom a threat or opportunity for US South, which is a world leading producer of timber and wood products and owns about 100 million acres agricultural land?

With a drop in demand for pulp and paper products and increase in demand for wood pellet, wood pulp is expected to play a larger role in bioenergy production.

Studies differ in their projections of the role of forest-based bioenergy Vs. agricultural bioenergy likely to be produced in US south.

Estimation of the economic viability of bioenergy feedstocks needs to take into account joint forest and agriculture sector.

Research Objectives
Develop an integrated dynamic optimization model of the agricultural, forestry and bioenergy sectors in the US south to:

• Estimate spatially explicit optimal mix of various agricultural and forest feedstocks and its implications for land use to meet the increasing bioenergy demand over the 2007-2035 period

• Analyze the implications of demand for bioenergy for southern timber and food market and social welfare

Methods
Integrated Ag-Forest Model for US South

Model Key Features
a) Integrated dynamic model of forestry and agricultural sectors in US south with timber, crops, co-products, livestock, and biomass markets
b) Spatial heterogeneity in returns to agriculture and timber for 295 crop reporting districts
c) A broad source of second-generation biofuel source: crop residues, miscanthus, switchgrass, sugarcane, energycane
d) Model can solve annually how many bioenergy to be produced from which feedstocks at which price and corresponding land use change

Results
Mix of Bioenergy Feedstocks in 2035

Conclusions
• Differences in parametric assumptions significantly change the mix of bioenergy feedstocks
• High yielding energy crops such as miscanthus plays a leading role in fulfilling the biomass demands
• With the absence of energy crops, pulpwood and logging residues contribute more than 80% of total biomass
• Woody biomass as a major feedstock for bioenergy would cause more forestland pasture to be converted to forest land and significantly increase pulpwood price

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