

Brazilian Land Use Model

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The MIT Joint Program IGSM: Land Use and Carbon Implications of a Global Biofuels Industry

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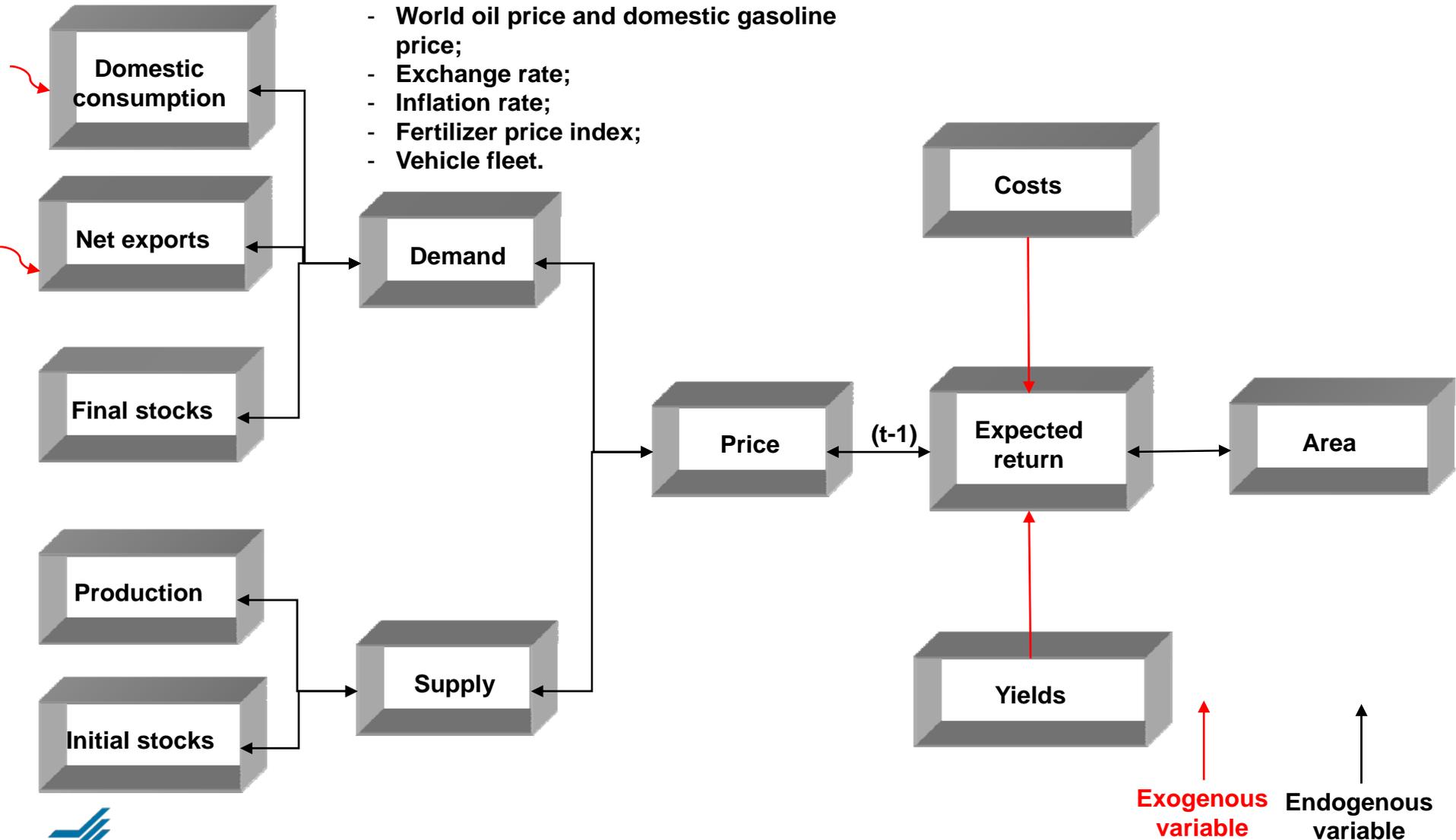
General structure of the Brazilian land use model

- Same structure of the FAPRI Models, but adapted to Brazilian agricultural sector.
- The model comprises supply and demand and land allocation in each one of the 6 regions.
- Land allocation integrated to the supply side. Area calculated at regional level (function of expected market profitability). The allocation of land determines production and supply.
- The model can be integrated to world models to simulate impacts of world prices and demand shocks on Brazilian agriculture. (project to combine CGE modeling type with the Brazilian model).
- Land for pastures is a function of the estimated cattle herd and the planted area for crops (projecting pastures is a challenge in Brazil: no data available and no studies).
- Spatial data from 1996 to 2008 to run the regressions and get parameters (elasticities and coefficients).
- Deforestation happens as agriculture, pastures and planted forest area increase over time.
- Land availability estimated using satellite images and GIS analysis. It include land suitable for agriculture as well as legal restrictions.
- Two components for the land allocation part:
 - Expansion Effect: total agricultural land as a function of total land available for agriculture and pasture, aggregate profitability for crops and pasture and costs of deforestation (include transaction costs).
 - Competition Effect: share of each crop as a function of all crops and pasture profitabilities based on area elasticities with respect to profitabilities (restrictions on elasticities : homogeneity, adding up and symmetry).

Figure 3. General Structure of the Land Use Model

Exogenous macroeconomic data

- Population;
- World and national GDP;
- World oil price and domestic gasoline price;
- Exchange rate;
- Inflation rate;
- Fertilizer price index;
- Vehicle fleet.



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