Brazil's economic strategy has shifted during the last several decades from one of producer protection to trade competitiveness. Despite macroeconomic instability, Brazil has emerged as an economic and agricultural powerhouse:

- 3.6 percent real annual economic growth between 2000 and 2008 (World Bank, 2010)
- A global top-five producer of 31 farm commodities in 2000 and 36 commodities by 2008 (FAO, 2011)
- A global top-five producer of 31 farm commodities in 2008 (FAO, 2011)

How Brazil's farm policy affects productivity is central to evaluating the role of policy in the country's economic development process.

### Background and Objective

#### Methodology

- **Analyze data from a sequence of decennial agricultural censuses (1985, 1995, 2006):** to understand the growth of Brazil's agricultural sector and its national economy.
- **Decompose total factor productivity (TFP) growth into frontier technology change (TC) and efficiency change (TEC):**
- **Assess factors affecting Brazil's production efficiency, including agricultural research expenditures, rural credit, road densities, and education infrastructure.**
- **Estimate a three-input, two-output distance frontier using Battese and Coelli's (1992) time-effect parameterization:**
- **Solve for mean TFP, productivity, and technical efficiency:**

### Data

2 quantity output indexes (crops and livestock), covering 20 commodities — Inputs:

- Quality-adjusted, annual cropland-equivalent quantity index
- 2 male-equivalent labor quantity indexes (hired and family)
- Capital and materials service expenditure index (tractors and live-stock capital, and feed, seed, fertilizer, pesticide, animal vaccine, and electricity expenditures)

### Results

**TFP Decomposition**

- **Northern**
  - Crop TC = 7.2%
  - Livestock TC = 6.9%
  - Total TC = 4.5%
  - NC = -2.8%
- **Southern**
  - Crop TC = 3.6%
  - Livestock TC = 3.4%
  - Total TC = 2.6%
  - NC = -1.9%
- **National**
  - Crop TC = 3.4%
  - Livestock TC = 3.3%
  - Total TC = 4.5%
  - National = -2.1%

<table>
<thead>
<tr>
<th>Efficiency Determinants</th>
<th>Northern</th>
<th>Southern</th>
<th>National</th>
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<tbody>
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<td>School = 0.10%</td>
<td>-0.07%</td>
<td>0.00%</td>
<td>-0.10%</td>
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<tr>
<td>Road = 0.07%</td>
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