



IFAMA's 25th Annual World Symposium
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Market-driven land use change in the Brazilian Legal Amazon

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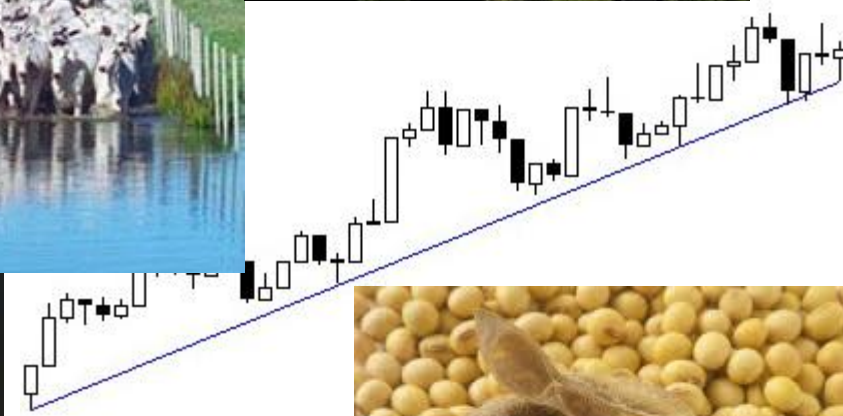
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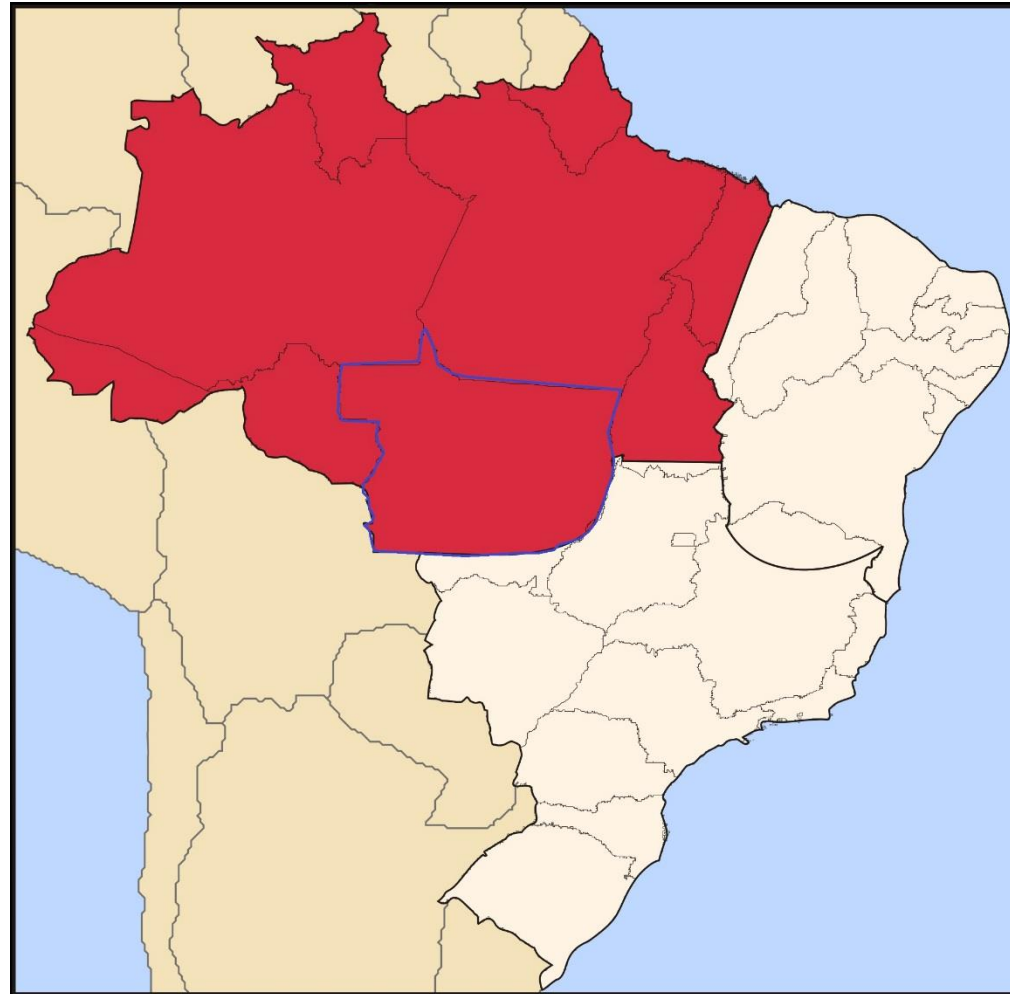


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WHY THE AMAZON HAS BEEN DEFORESTED?



WHERE* THE AMAZON HAS BEEN DEFORESTED?



MATO GROSSO

- More data available
- 34% of original vegetation cover
- 88% of soy field
- 33% of cattle herd

*Cerrado or Amazon biome



Methodology

▶ Data from 1989 to 2011

- ▶ Deforest in Mato Grosso (PRODES) (explained)
- ▶ Soybean prices (CBOT) - **World**
- ▶ Effective Soybean consumption (USDA) - **World**
- ▶ Soybean production in Mato Grosso (IBGE)
- ▶ Live cattle prices in Mato Grosso (ESALQ-USP)
- ▶ Cattle herd in Mato Grosso (IBGE)
- ▶ Land rent expected in Mato Grosso (CONAB)
- ▶ Meat flour banning – (2000) – *dummy variable*
- ▶ Public policies to deforest control (Project Prodes – 2004) – *dummy variable*

White's heteroscedasticity-consistent estimator



Methodology

- ▶ Land Use Land Cover in 2002 and 2008 from Brazilian Ministry of Environment and PRODES Project (INPE)
- ▶ Vegetation cover of Brazilian biomes 2002-2003 (MMA)
- ▶ Areas converted to agriculture in 2008 (BrMinEnv)
- ▶ Deforestation **overlook** (PRODES)
- ▶ Vegetation map of Brazil (IBGE – Brazilian Institute of Geography and Statistics)

GIS was used to identify areas converted to agriculture in 2002 and 2008 and to compare with the map of primary vegetation cover.



Results

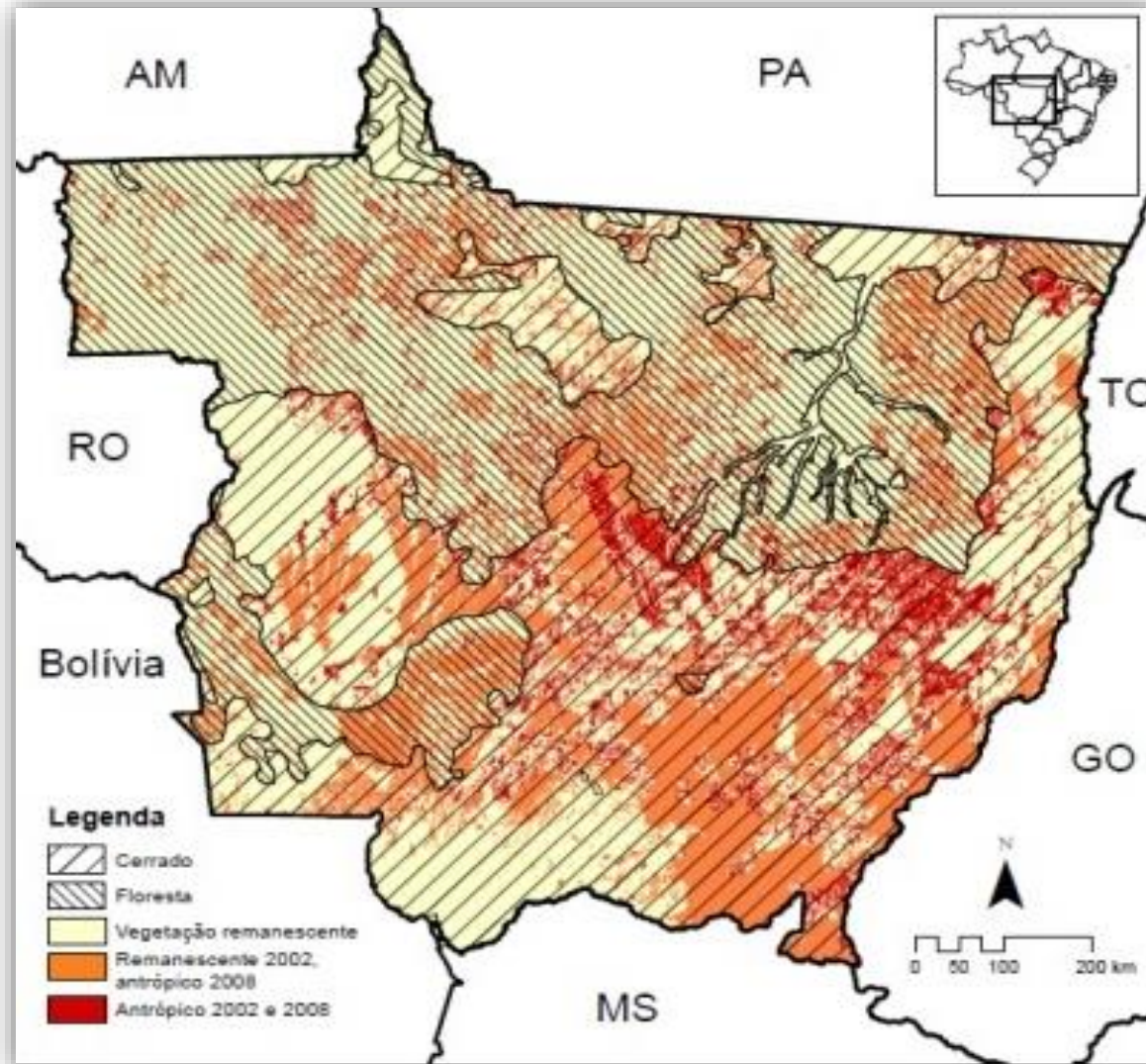
| Variables | Lag (year) | Coefficient | S.E. | t-ratio | p-value |
|--------------------------|-------------------|--------------------|-------------|----------------|----------------|
| Constant | | 1.9426 | 0.5301 | 3.664 | 0.0018 |
| Public Policies | 2 | -0.7512 | 0.3443 | -2.182 | 0.0426 |
| Soybean production in MT | 1 | 0.5010 | 0.1423 | 3.519 | 0.0025 |



Results

Areas and percentages of areas occupied by tropical savannah and forest vegetation in the Mato Grosso State according to different types of regionalization.

| | MT (% area) | Original (km ²) | Anthropic 2002 (km ²) | Anthropic 2008 (km ²) | Variation 02-08 (km ²) | Anthropic 2002 (%) | Anthropic 2008 (%) | Variation 02-08 (km ²) |
|--------------------|----------------|--------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|-----------------------|-----------------------|---------------------------------------|
| Legal Amazon | 100 | 851.857 | 100.843 | 281.523 | 180.680 | 11.8 | 33 | 21.2 |
| Biome type | | | | | | | | |
| Amazon | 53.6 | 456.261 | 29.411 | 485.672 | 77.482 | 6.4 | 23.4 | 17 |
| Cerrado (savannah) | 44.6 | 338.187 | 69.915 | 408.102 | 93.695 | 20.7 | 48.4 | 27.7 |
| Pantanal (wetland) | 6.7 | 57.409 | 1.502 | 58.911 | 9.436 | 2.6 | 19.1 | 16.4 |
| Vegetation type | | | | | | | | |
| Cerrado (savannah) | 55.1 | 469.659 | 75.489 | 545.148 | 109.790 | 16.1 | 39.4 | 23.4 |
| Forest | 44.6 | 380.221 | 25.325 | 405.546 | 70.670 | 6.7 | 25.2 | 18.6 |
| Water bodies | 0.2 | 1.977 | 0 | 1.977 | 153 | 0 | 7.7 | 7.7 |



Map of the original vegetation coverage and of the predominantly agricultural areas in 2002 as well as of their expansion in 2008. Map constructed based on data from the IBGE, MMA and PRODES.



Conclusions

- ▶ Only soy production in Mato Grosso State and public policies has been influenced the Amazon deforestation;
- ▶ Proportion of areas converted to Anthropic uses in Cerrado Biome of Mato Grosso State may be associated to a less restrictive environmental legislation to this Biome when compared to the Amazon and Pantanal Biome in the same State;
- ▶ From the vegetation point of view, rates of agriculture expansion on Cerrado vegetation are higher than the Forest;
- ▶ It seems that the decision to converse areas are more associated with the legal issue than with the type of vegetation.



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Thanks for your attention!

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