Comments on: "Efficient Forestation in the Brazilian Amazon: Evidence from a Dynamic Model"

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Summary of paper

Theoretical framework:

- Efficient deforestation: benefits $\geq$ (private + **social**) costs
- Social costs are not internalized by decision makers $\rightarrow$ inefficient deforestation.

Research questions:

- What is the extent of inefficient deforestation?
- How can we get closer to the first best using (tax) policies?

Methodology:

- Estimate parameters of decision to switch land use in a **dynamic discrete choice model**.
- Compute steady-state carbon emissions under different sets of parameter values.

Contributions

Methodology:

- Dynamic discrete choice model (closest paper is Souza-Rodrigues, 2018)
- Three land use categories: pasture, cropland, and forest (literature: forest vs. deforestation)
- Model allows for regeneration (literature: deforestation as irreversible phenomenon)

Data:

- Disentangle economic benefits and externality (most studies assume linear externality)
- Level of analysis (land use shares of 30m cells aggregated at 1km cell) (literature: municipality-level data)
- State-of-the-art computation of transportation costs (similar to Souza-Rodrigues, 2018)

MODEL

Forward looking agents:

- Choose to convert each plot of land into forest, pasture or crop.
- Conversion costs except if *no conversion* or *conversion back to forest*.
- Careful specification of payoff of each land use:
  1. *Forest:* mean value of forest is proportional to carbon stock
  2. *Crop:* value as a function of transportation costs and prices
  3. *Pasture:* value as a function of road proximity and pasture suitability

Steady state emissions and counterfactuals:

- Using estimated parameters, authors compute value functions in steady-state.
- Based on value functions, compute the land use pixel.
- Authors do counterfactual policy exercises changing parameter values.

RESULTS

Main results:

- Cheaper to convert forest to pasture than to crops.
- Implicit valuation of carbon stock or USD 7.26/tCO_2.
- BAU: only 48% of carbon preservation
- Counterfactual: full internalization of SCC preserves 99.5% of carbon

Counterfactuals

- *Spatial targeting of policy:* which areas are at risk of "inefficient" deforestation. Useful for targeting of policies (e.g. enforcement).
- *Carbon taxes or cattle taxes:* small tax levels would achieve most of the benefits of the first-best (USD 50 tax).

Comments and questions

Model:

- **Dynamics**: is it the case that in the absence of transition costs the model would be static? What happens is $\rho = 0$ (myopic agents)?
- Why only pasture has **time-varying coefficients**? It could be interesting to see how the coefficient of forest evolved over time.

Results and counterfactuals:

- Is it the case that full internalization will increase forest cover relative to today?
- Definition of long-run/steady-state: is it possible to have an idea of how long is the long-run?
- Spatial targeting: Enforcement costs are probably heterogeneous across space.

General comments

- Comprehensive study of how second-best policies can protect the Amazon forest.
- Authors measure *how much* and *where* deforestation is economically inefficient.
- Hopeful message about how we can approximate first-best results with relatively modest policies.

Congratulations!