



**MONETARY AND
CAPITAL MARKETS**

Discussion of “Carbon prices and tropical reforestation in tropical forests” by Jose Scheinkman

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Motivation and Policy

- **Amazon deforestation generates significant global ecological risk**
- **The Amazon forest**
 - ▶ Holds >10 percent of Earth's terrestrial biodiversity
 - ▶ Stores carbon equivalent of 15–20 years of global CO₂ emissions
 - ▶ Has a net cooling effect from evapotranspiration which helps to stabilize the Earth's climate
 - ▶ Contributes up to 50 percent of rainfall in the region
 - ▶ Allows biomes & economic activities to thrive in regions that would otherwise be more arid, via moisture supply
- **The Amazon forest system could soon reach tipping point, inducing large-scale collapse**
 - ▶ This would also imply an irreversible loss of biodiversity
 - ▶ Destruction of the Amazon rainforest may well have first order adverse implications for earth's ecological system
- **Policy implication #1:** Conserving the carbon stock of forests is an important global public good
- **Policy implication #2:** Aim should be to increase forest cover without harming biodiversity
 - ▶ This clearly means reducing agricultural land

Methodology and Results

Methodology

- Spatial dynamic model quantifies the trade-off between cattle production and carbon capture
- Analysis exploits cross-sectional variability in cattle farming productivity and carbon absorption
- Estimated shadow price of CO₂ emissions used to value forest services provided by preserved areas

Results

- **Deforestation of Amazon is an ecological and economic disaster**
 - Carbon sequestration offers opportunities
 - Optimal management of the Brazilian Amazon could improve outcomes substantially
- **Significantly lower cost than previous estimates**
 - Transfers of US\$25 per ton of CO₂ captured would yield optimal land use with substantial reforestation
 - Target areas are currently used for low-productivity cattle ranching
 - Authors estimate such a policy to yield CO₂ capture of 15 Gt over 30 years

Comment 1: Additional Factors

1. Restoration versus reforestation via monocultures

- Biodiversity and disease risks from reforestation
- Restoration usually far superior to reforestation (the latter oftentimes consists of plantations)

2. Industrial fertilizers and pesticides from land conversion into cattle ranches degrade soils and water

- Pollution spillover that is not accounted for
- Estimated adverse impact of agricultural land conversion may be underestimated

3. Legal framework is key driver deforestation in Brazil

- Legal inconsistencies between
 - civil law (supports title held by landowners)
 - constitutional law (supports squatters' claim to land not in "beneficial use")
 - The "beneficial use" criteria is vague

4. Land tenure implications

- Particularly rights of Indigenous and Local Communities
 - Emphasized in the Kunming-Montreal Global Biodiversity Framework
- Tenure security of indigenous lands is critical for success

Coment 2: Effectiveness of Policies may be Overstated

1) Authors do not allow for carbon sink reversal:

- ▶ Tree mortality reduces carbon storage: **southeast Amazon forest is already emitting more than absorbing**

2) Estimates of CO₂ absorption by tropical forests imprecise (-1.7 GtCO₂ ± 8.0 Gt)

- ▶ Quantitative results unlikely to be robust

3) Additionality issues aren't addressed:

- The extent to which natural cycles complement or substitute for policy measures aren't discussed sufficiently

4) Non-permanence issues:

- ▶ CO₂ residence times in atmosphere are multiple (from a few months to over 1000 years)
- ▶ Residence time increases with accumulation of CO₂ in atmosphere and gradual saturation (or even reversal) of sinks

5) Asymmetry between CO₂ emissions and absorption:

- ▶ Despite gradual saturation of sinks, CO₂ remains a key fertilizing element for plants/forests
- ▶ Hence removing CO₂ from atmosphere reduces the global forest carbon sink
- ▶ We thus need to remove much more CO₂ than we emit to keep same level of atmospheric CO₂ concentration
 - **Key insight: emissions & removals are not equivalent**

Implication: estimates appear optimistic

Comment 3: Policies Require Refinements

- **Science-based considerations suggest need for more ambitious, multilayered policies**
- **„Payment for performance” should be based on three guiding principles:**
 - 1. The coherence of public policies is critical (such as land tenure considerations)**
 - 2. Specific implementation challenges of reforms and regulations are case specific**
 - 3. Evaluation of the "carbon and biodiversity" effects need to take change theory into account**
- **Political acceptability may be country specific**

Thank you