BRAZIL Carbon Market Model

Objectives, General Structure and Pending Empirical Issues

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LCR-RNet Second Annual Meeting, Berlin 20-21 September 2010

OUTLINE

Presentation Outline:

- Policy context of the study: regulatory framework and main questions
- Proposed structure and empirical challenges
- Modeling interaction issues

Climate Change Regulatory Framework in Brazil

National Policy on Climate Change (PNMC)

Law 12187, 29th Dec 2009

Regulating adaptation and mitigation actions in Brazil, setting:

- Tax and credit incentives
- Market creation mechanisms
- Governance structure
- Emission goals: deviation of 36.1- 38.9 % from 2020 tendency

Brazil Voluntary Actions

NAMAs	BAU ($MtCO_2e$)	Reductions ($MtCO_2e$)		Reductions (%)	
Land Use (Deforestation Reduction)	**1084**	**669**	**669**	**24,8%**	**24,8%**
Amazonia (80%)		**564**	**564**	**20,9%**	**20,9%**
Cerrado (40%)		**104**	**104**	**3,8%**	**3,8%**
Agriculture	**627**	**133**	**166**	**4,9%**	**6,1%**
Pasture recovery		**83**	**104**	**3,1%**	**3,8%**
Crop & Livestock integration		**18**	**22**	**0,7%**	**0,8%**
Zero tillage		**16**	**20**	**0,6%**	**0,7%**
Biological Nitrogen Fixation		**16**	**20**	**0,6%**	**0,7%**
Energy	**901**	**166**	**207**	**6,1%**	**7,7%**
Energy efficiency		**12**	**15**	**0,4%**	**0,6%**
Biofuels use increase		**48**	**60**	**1,8%**	**2,2%**
Hydropower increase		**79**	**99**	**2,9%**	**3,7%**
Other renewable sources (SHP, bioelectricity, wind power,etc)		**26**	**33**	**1,0%**	**1,2%**
Others	**92**	**8**	**10**	**0,3%**	**0,4%**
Steel – replacement of charcoal from deforestation for sustainable charcoal		**8**	**10**	**0,3%**	**0,4%**
Total	**2703**	**975**	**1052**	**36,1%**	**38,9%**

Brazil NAMAs

Great reliance on deforestation control with 24.7% out of the total target

Monitoring and incentives (environmental services payment = REDD alike)

The rest 15.2% from other sources:

- Energy: 7.7%
- Agriculture : 6.1%
- Others (steel&charcoal): 0.4%

Goals	Energy	Agriculture	Others	Deforestation	Total
2020 with reduction of 38.9% comapred to 2005 levels	100%	-4%	49%	-61%	-15%

Sub-national regulation

Sao Paulo State Policy on Climate Change (PEMC)

- ❑Sets 20% reduction in 2020 from 2005 levels
- ❑ Reliance on emission standards, tax and credit instruments
- ❑ MDL and market creation

- Some major cities, such as, Rio de Janeiro, also proposing mitigation targets.

Policymaking Questions

1. REDD is to 2020 targets the main mitigation option
2. What would be the REDD equilibrium price according to each level of national commitment?

2. And what would be the respective economic and distributive impacts according to each financing mechanism ?

4. And if offsetting is allowed with other carbon market abroad?

Structure

The study will include the interaction of three models, namely:

Carbon market model (CMM): model in joint development by IPEA-Rio and IPEA-BC3 (Basque Center for Climate Change, Spain) that is structured with built-in marginal costs of mitigation industry and optimization mechanisms for closing prices and quantities.

General equilibrium model (GEM): model IMACLIM developed by CIRED (Center International de Recherche sur l'Environnement et le Développement, France), to be shared with IPEA-Rio and Centro Clima/COPPE, that provides detailed and specific identification of the sectors of transport and energy and uses a recursive element update of technical coefficients based on a matrix of clean technologies.

Land-use model (LUM): model in joint development by IPEA-Rio, CIRED and IPEA-BC3 that econometrically estimated a function of demand and supply for land for agricultural purposes based on production functions of agriculture and forests. It sets prices to estimate the opportunity costs of the activity benefiting from REDD schemes.

Interaction

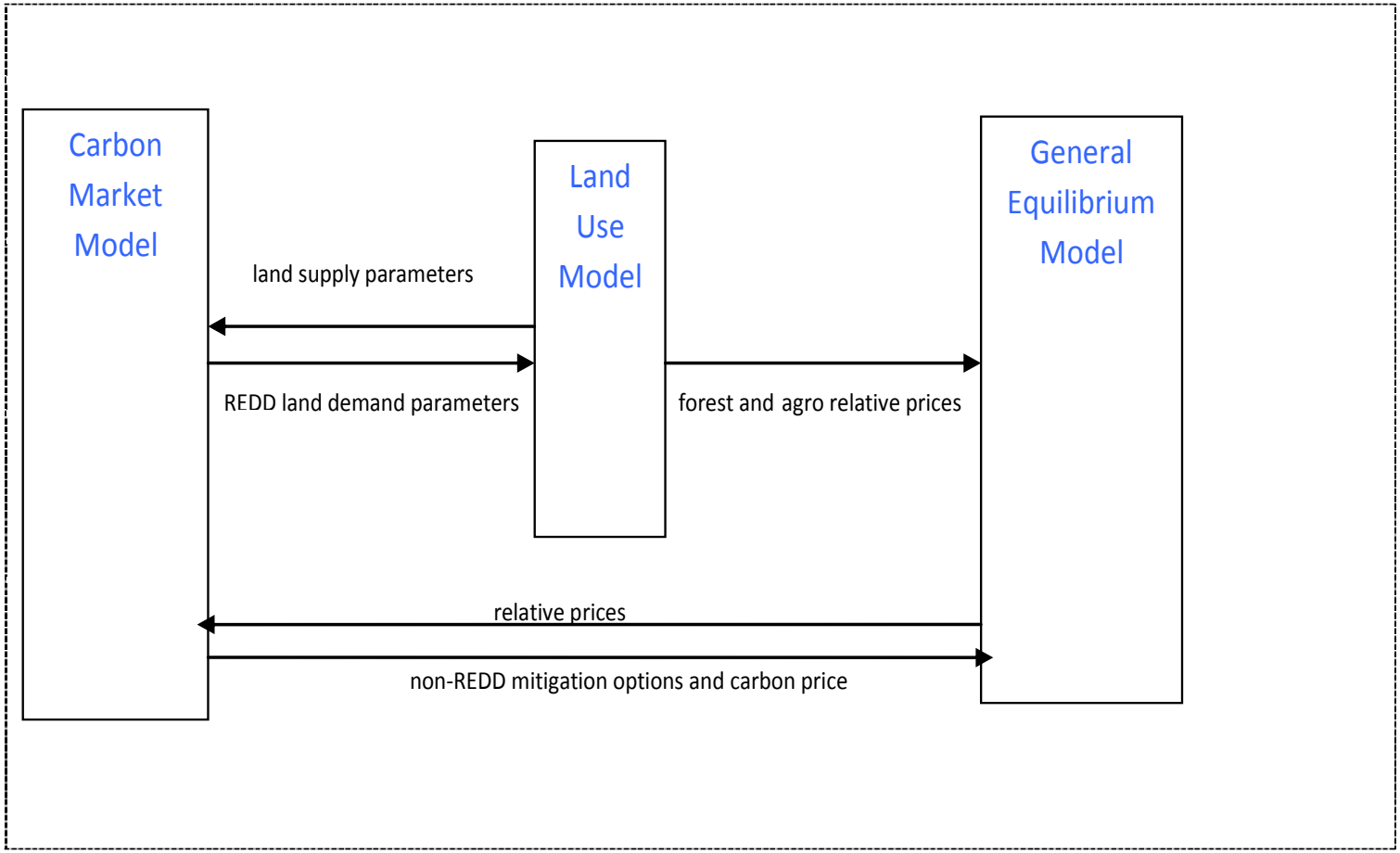
1. Given a national emission target, integration among the models starts with CMM selecting mitigation options, including land requirements for REED, and setting carbon price.

2. New equilibrium parameters revise technical coefficients and marginal costs to LUM and GEM.

3. LUM, in turn, inform GEM on new land requirements setting new output shares and prices for agro activities.

4. Dynamic approach: feedback from GEM to CMM re-estimates prices and quantities for each commitment period.

Full ("IDEAL") Integration of Models



Coupling GE and PE models

- Integrated assessment with bottom-up (partial equilibrium) allocation model generating exogenous input to GEM
- PE as a constrained maximization problem based on GE prices
- Coupling faces compatibility problems on software, baseline, unit of measurement and sector structure.

LUM Issues

- ✓ Forestland supply
- ✓ Expansion via intensification
- ✓ Soil conservation
- ✓ Water availability