



A Stock-Flow Mechanism to Reduce Emissions from Deforestation

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Overview



- **REDD - Policy and institutional challenges**
- **Main question addressed here: How to distribute REDD funds across countries?**
- **A REDD policy mechanism needs to be:**
 - transparent
 - perceived as fair
 - lend itself to negotiation
- **Present stock-flow mechanism & compare**
- **Implications for market-based REDD**

Challenges

For REDD to be effective the incentives on the ground must change

- Both direct and indirect causes of deforestation need to be addressed
 - Understanding role markets play
- Institutions need to be put in place
- Monitoring and enforcement





Question

How to distribute REDD funds between countries?

- Different typologies of countries:

- High forest stock – High deforestation rate
- High forest stock – Low deforestation rate
- Low forest stock – High deforestation rate
- Low forest stock – Low deforestation rate

• Equity – It matters how the stock of forest and deforestation rate are taken into account





Previous Mechanism Proposals



“Compensated Reduction” Approach

- National level mechanism
- Compensates a country based on reduction relative to past emissions
- The price per tCO₂ can be linked to carbon markets or set independently

Example:

If the price paid is US\$ 5/ t CO₂, a 1 GtCO₂ reduction in a country will bring US\$ 5 billion

Problems of this approach:

- Penalizes countries with historically low emission rates – “unfair”
- Is prone to create international “leakage”



Previous Mechanism Proposals



“Expected Emissions” Approaches



- Incorporate global deforestation rate as a baseline ($\sim 0,5\%$ p.a.)
- Indirect way of factoring in stocks

Example:

If price paid is US\$ 5/tCO₂, a country with a stock of 1000 GtCO₂, emitting 4 GtCO₂ (1 GtCO₂ below “expected”) will receive US\$ 5 bill.

• Approaches

- Strassburg et al. (2007)
- JRC-EC (2007)
 - “High deforesting countries” use compensated reduction approach, “Low deforesting countries” follow expected emissions approach
- Strassburg et al. (2008)

Strassburg et al. (2008)



Previous Mechanism Proposals

Operates at global level

- Total incentive paid is a function of global Reduction in Emissions from Deforestation

Each country is offered 2 kinds of incentive:

- I1: incentive to reduce relative to past emissions
- I2: incentive relative to global baseline rate

The combined incentive (CI) is the weighted sum of these two components:

$$CI = \alpha \cdot I1 + (1 - \alpha) \cdot I2 \quad 0 \leq \alpha \leq 1$$



Previous Mechanism Proposals

Problems of the “Expected Emissions” Approaches

- These approaches are ad-hoc – weak economic rationale
- Stock is incorporated in an indirect way
- Parameters to be negotiated are not transparent



Stock-Flow Mechanism



Stock-Flow Mechanism for REDD



Based on an analogy between forest carbon and financial stock

A multi-national enterprise, which:

- compensates countries who avoid depreciation of its capital stock (by avoiding deforestation), and**
- pays dividends to its stockholders**

Stream of revenues comes from the value on the carbon market of the reduction in emissions relative to the global historical baseline

$$AER_{i,t} = PAE_t \cdot (HE_{i,t} - E_{i,t})$$



Stock-Flow Mechanism



Payment for avoided emissions

$$AER_{i,t} = PAE_t \cdot (HE_{i,t} - E_{i,t})$$

Where: $AER_{i,t}$ = Avoided emissions revenue
 PAE_t = Payment per avoided ton of CO_2
 $HE_{i,t}$ = Historical emissions
 $E_{i,t}$ = Emissions



Payment of dividends for carbon stock

$$DIV_t = \frac{\text{Global funds} - \text{sum of } AER_{i,t}}{\text{Global carbon stock}}$$

Total Payment for country i

$$CI_{i,t} = AER_{i,t} + DIV_t \cdot C_{i,t}$$

$$AER_{i,t} = PAE_t \cdot (HE_{i,t} - E_{i,t})$$



Comparing Approaches



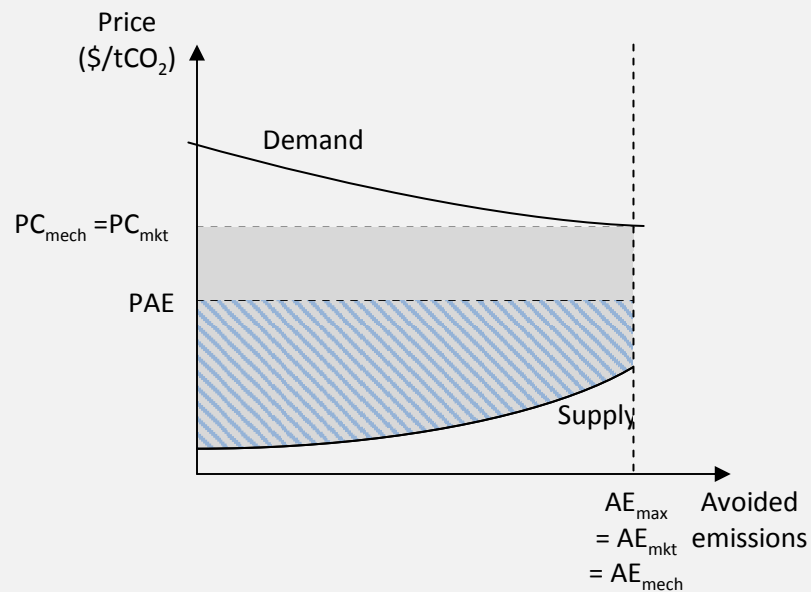
Characteristics of the approach

$$CI_{i,t} = PAE_t \cdot (HE_{i,t} - E_{i,t}) + DIV_t \cdot C_{i,t}$$

- Conceptually simple
- Equitable – dividends act as a stabilization fund
- PAE_t is the only value to be negotiated
- Dynamic incentives
- Dividend paid for a ton of carbon is same for all countries - Compatible with full carbon accounting

Comparing Approaches

How does the stock-flow approach function in a market?



If REDD were to cause a decrease in prices PAE could act as a lower limit to the price of carbon credits

$$AER_{i,t} = PAE_i \cdot (HE_{i,t} - E_{i,t})$$



Summing up

- Three approaches to how to distribute funds:
 - Compensated reductions
 - Expected Emissions
 - Stock-flow
- The numbers show considerable difference between compensated reduction and the other two approaches in terms of participation
- The stock flow approach performs similarly to Strassburg et al. but is more intuitive

$$AER_{i,t} = PAE_i \cdot (HE_{i,t} - E_{i,t})$$



Final Message

**Markets can be tailored to
society's needs but we need to
think about their design**

Thank you!

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