Issues for Financing Transformation Investments

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What is Climate Finance?

• Assumes a decision to make investments and bear costs.
  – Whether with caps, carbon taxes, subsidies, regulatory interventions, whatever… in short, some shadow prices.

• How to design the channels that enable the investment flows to go where they are needed at lowest cost?
  – In many cases, if you set a price that makes the activity profitable, they will come.
  – But not always!
Example: Sequestration

- Sequestration can potentially help reduce atmospheric concentrations.
  - Biosequestration, geologic sequestration, ocean sequestration.

- A Question of Permanence.
  - Is the sequestration long-lived? If not permanent, is it long enough lived to be useful?
    - How long is enough?
    - Depends on the projected time path of the social cost of carbon: Herzog, Caldeira and Reilly (2003)
    - This is a big issue.
  - How do we structure financing to properly incentivize investment and management of sequestration projects?
    - This is another big issue.
Environmental Bonding

- A classic financial structure.
  - Mill (1972) and Solow (1971).

- Used in the U.S for various mining and drilling activities, and for nuclear decommissioning:

- Discussed for carbon sequestration.
Operation

• Credit for avoided emissions at the time of injection, equal to the quantity sequestered times the social cost of carbon.
• At the same time, establish an escrow account to fund any potential liability from future release of carbon.
  – Any releases require debits equal to the quantity released times the then current social cost of carbon.
• Through time…
  – Account earns income. Potentially available for payout.
  – Must maintain the escrow account through time at a sufficient level. With a rising social cost of carbon, the potential liability for already sequestered carbon rises, requiring an increasing balance in the account.
• Net cash flow depends on the income earned versus the additions required.
Toy Model & Heroic Assumptions

- **Project:**
  - @ t=0, discrete injection of Q tons, at cost $K/t CO2e.
  - Costless management.
  - @ t=H, discrete release of all Q tons.

- **Risk-free rate of interest**
  - Constant at R%.
  - Rate earned on the escrow account.

- **Social Cost of Carbon (SCC)**
  - @ t=0, social cost of carbon (SCC) = $C/t CO2e.
  - Through t=B, SCC grows at a constant R% per year.
  - @ t=B, SCC is constant.
Implications for Bonding

- **No cash payouts until** \( t=B \).
  - There is no realized value from sequestration unless the carbon remains sequestered past \( t=B \).
    - This is NOT what many proposals for REDD+ type projects imagine.

- **Sequestration is a long duration investment.**
  - A problem?
  - We have many other long duration investments, especially in real estate and infrastructure. Investors are typically insurance companies or similar.
  - Cash flows **BETWEEN** entities on the value chain are OK, but not net external cash flows.
Institutional Challenges

- Bonding has had mixed results.
  - U.S. mining liabilities have often been underfunded.
  - U.S. nuclear decommission have generally worked, so far.
- Similar long-horizon funding problems have had mixed results.
  - Pension funding, medical insurance liabilities.
  - Complicated questions about the different rates: growth rate for the social cost of carbon vs. rate earned on escrow.
- Risk is a big issue.
  - A challenge for bonding, since CONTRIBUTIONS to the escrow account may be required.
My Inventory of Climate Finance Issues

1. Financing R&D.
   - Classic public goods problem. Unique issues for climate finance?

2. Financing adaptation.
   - Classic public goods problem. Unique issues for climate finance?

3. Inefficient institutions.
   - Old frictions under new stress: energy efficiency investments.
   - New challenge: sequestration

4. Immature capital markets in many developing countries.
   - Role of government funding channels and how to optimize.
Gripes

• The Health of the Overall Financial System.
  – The vast majority of climate investments will be readily funded through the standard financial system. Not an problem.

• A Low Price for Carbon is the Main Problem.
  – But it is not a finance problem per se.

• IPCC AR5
  – Agenda shaped by politics, not science.
  – Omits many of the main climate finance issues.
  – Traffics in fallacies.
  * Tying sources and uses - High Level Advisory Group on Climate Change Financing (AWG)
  * Social value of transferring private risk to governments.
  * Substitution of headline numbers for hard facts.
The End