Bilateral CDM-flows: Stand-alone, or substitute for FDI and aid?

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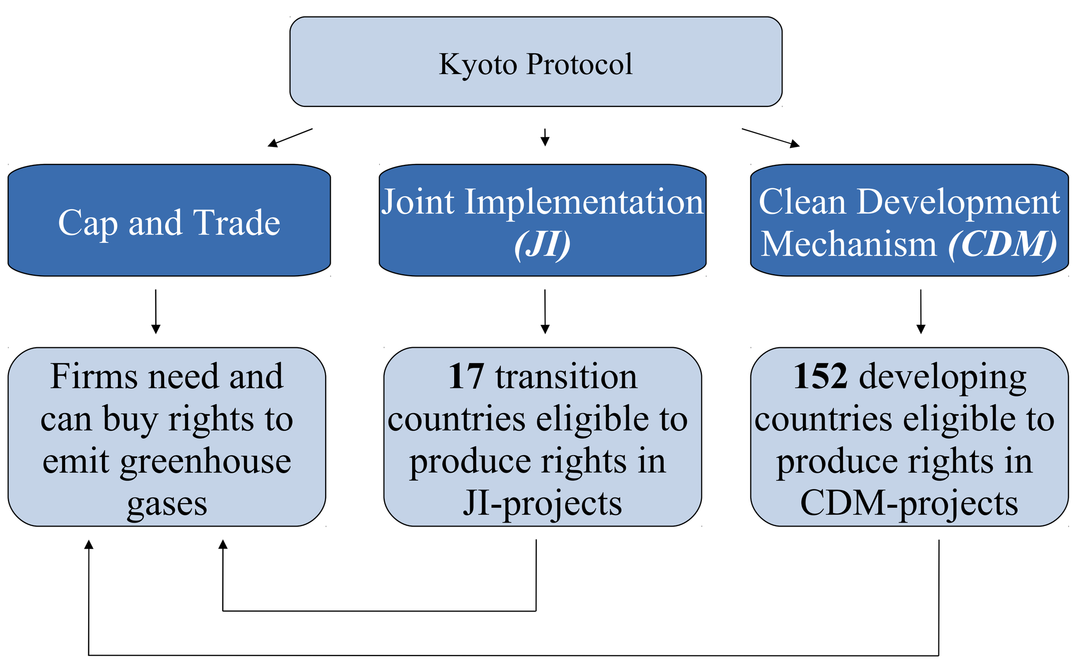
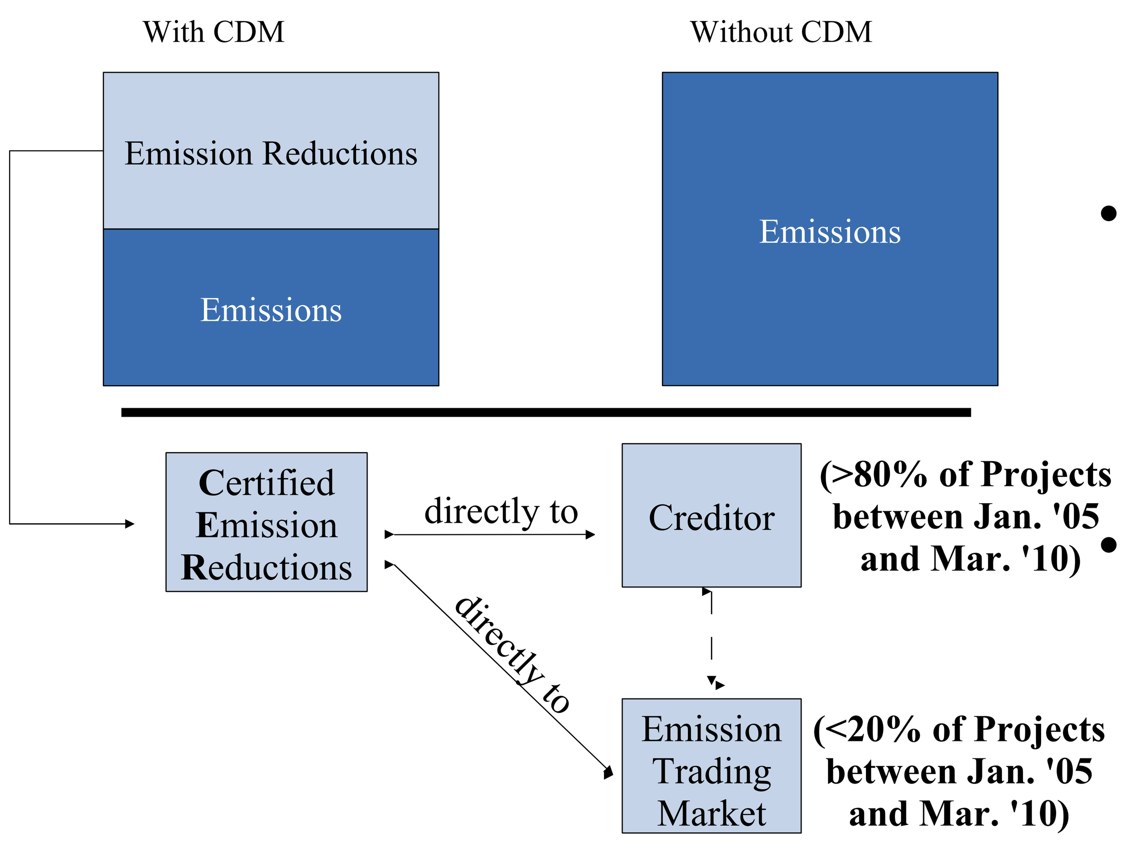
Motivation and Objective



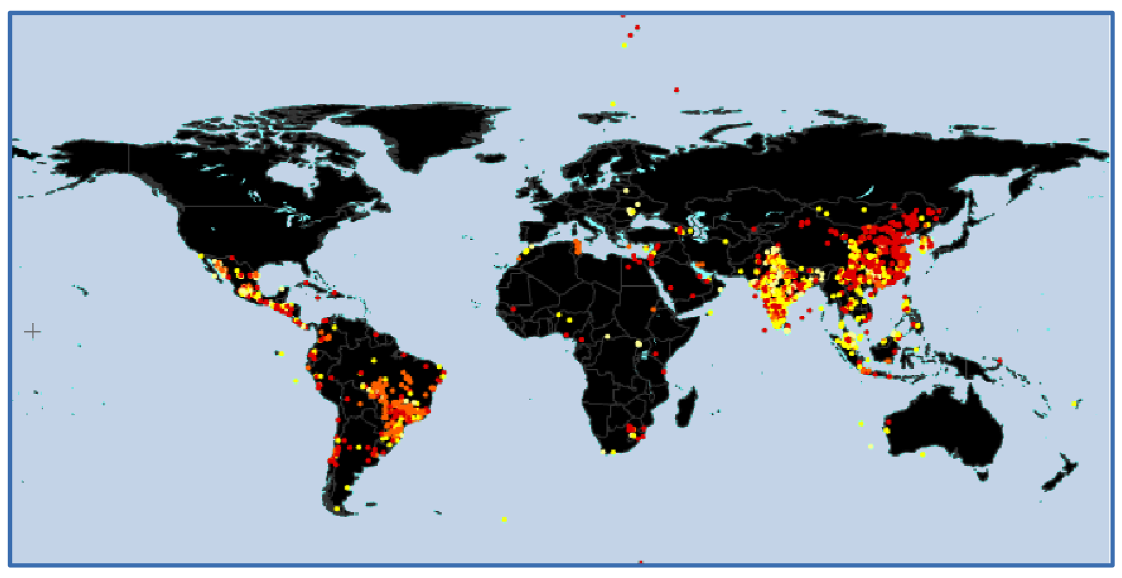
Three Legs of the Kyoto Protocol

- Clean Development Mechanism (CDM) projects offer an opportunity to attract investment in developing countries.
- They also offer an opportunity for firms in industrialized countries to abate pollution.



The Clean Development Mechanism

- Certified Emission Reductions (CERs) gained are either going to the creditor or directly to the market.
- Since only foreign involvement is of interest here, project without creditors are left out.



Source: UNFCCC (2010)

African CDM Projects

- Among the eligible regions, Africa has by far the least projects.
- Note: Red and orange dots represent large scale projects and yellow dots small scale projects.

Research Questions:

- To what extent do CDM investments hinge on the same factors as FDI and aid?
- Why does Africa have so little CER flows?

Gravity Model and Data Stucture

$$Flow_{ij} = A \cdot GDP_i \cdot GDP_j \cdot Distance_{ij}^{-1}$$

$$\ln Flow_{ij} = \alpha + \beta_1 \cdot \ln GDP_i + \beta_2 \cdot \ln GDP_j + \beta_3 \cdot \ln Distance_{ij} + u_{ij}$$

- *Dependent*: **CER** flow between **2005-2007.**
- *Observations*: 121 hosts and 23 partners leading to **8326** potential trading pairs and 351 **actually trading pairs** in 3 periods.
- *Adjustment for zero-inflation*: **Two-Stage-correction** treating the inflation as selection bias and correcting for it via **Inverse Mill's Ratio** (IMR) following Heckman (1979).
- *To avoid high multicollinearity of the IMR*: Capturing the size of countries with different variables in the two stages.

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Results

Table 1: CER Flow Gravity Models

Variables	Basic Treatment Model	+ FDI and Aid Determinants	+ Determinants and Cultural Effects	Basic Treatment +Africa	Selection Equation +Africa
Dependent Variable	Log Number of CERs	Log Number of CERs	Log Number of CERs	Log Number of CERs	Dummy CER>0
Intercept	17.44***	17.33***	17.47***	17.36***	-9.47***
Log $GDPpc_i$	-0.55**	-0.2	-0.21	-0.57**	
Log GDP_i					0.34***
Log $CO_2eEmiss\ pc_i$	0.84***	1.20***	1.19***	0.94***	-0.14***
Log $CO_2eEmiss\ pc_j$	-0.79**	-0.82**	-0.84**	-0.76**	-0.34***
FDI $flow_{ij}$+FDI $flow_{ji}$	0.0001964*	0.0002083*	0.0002107*	0.0001948*	
(FDI $flow_{ij}$+FDI $flow_{ji}$)/ FDI_i					-14.52
Aid $flow_{ij}$	0.0038186***	0.0037757***	0.0037467***	0.0038692***	
(Aid $flow_{ij}$)/Aid_i					0.94***
$Governance_i$		-0.70*	-0.69*		
$Infrastructure_i$		0.02	-0.12		
$Literacy_i$		-0.04***	-0.04***		
Common $Language_{ij}$			-0.37		
$Colony_{ij}$			0.14		
Africa-Dummy				0.72	-0.76***
Inverse Mill's $Ratio_{ij}$	1.32***	1.05***	1.07***	1.40***	
Adjusted/Pseudo R^2	30.12%	30.43%	30.30%	30.36%	27.88%
AIC	1527	1528	1531	1528	
N	N=351	N=351	N=351	N=351	N=8326

- *Basic Treatment Model*: **FDI and aid are positively related** to CER flows, as expected. Pairs containing hosts with small economic power as well as pairs containing hosts with high emissions have a higher flow. Low emissions on the side of the partners coincides with a higher flow of CERs.
- *+ FDI and aid determinants*: The **determinants do not change the explanatory power** of FDI and aid. Literacy and Governance unexpectedly exhibit a negative relationship.
- *+ Cultural Effects*: Cultural Variables exhibit **no significant relationship** and do not change the effect of FDI and aid.
- *Basic Model + Africa Dummy*: The Dummy itself **does not have a significant coefficient** and does not change the other coefficients either.
- *Selection Equation with Africa Dummy:* As far as having a partnership (as opposed to having a larger flow) is concerned, **being an African country has a negative effect**. That effect does not vanish with more explanatory variables.
- The *IMR* stays significant throughout all models. This indicates that the selection bias - introduced by an overabundance of zeros in the set - has been **successfully countered**.

Conclusion and Outlook

- Usual determinants for FDI and aid do not decrease the explanatory power of those two factors. This suggests that there are some untested and possibly unmeasurable factors responsible for CERs as well as FDI/aid flows, like former business relationships and institutional influence.
- Further, results for Africa show that the problem is rather getting CDM projects at all (or establishing a relationship out of which they come) rather than bolstering the amount of CERs or the number of projects.

Future Research

- Since unquantified and possibly unmeasurable factors are at work, a study of those factors and formal as well as informal institutions surrounding them might provide new insights.
- With respect to Africa, an inquiry into the mechanics of project and contact establishment would be especially interesting.

References

Heckman, J. J. (1979). Sample selection bias as a specification error. Econometrica: Journal of the econometric society, 153-161.
UNFCCC (2010). Retrieved March 15th 2010 from http://cdm.unfccc.int/Projects/MapApp/index.html.