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Bilateral CDM Project Flows: Stand-alone, or substitute for FDI and Aid?

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Introduction

Under the Kyoto emission trading scheme industrialized and transitional countries are required to keep emissions, measured in tons of CO₂ equivalents (tCO₂e), below a certain limit. However, the permits to emit a tCO₂e can be traded among countries with emission limits to allow for an efficient distribution of emission abatement. Additionally, countries obligated to lower their emissions can buy permits created by projects under the JI (Joint Implementation; mostly transitional countries) or the CDM (mostly developing countries).

The CDM (and similarly the JI) allows industrialized countries to invest in projects in developing countries. These projects are rewarded with permits that can be used to fulfill an emission target. The amount of permits is equal to the saved emissions in the project. These permits then can be either used by the project owners/investors themselves or sold to third parties.

CDM projects are facilitated by the United Nations Framework Convention on Climate Change (UNFCCC). Although entrepreneurs in developing countries can start CDM projects on their own, this is not the standard scenario. Out of 2065 CDM projects in the data set used here, 1685 were financed with partners in industrialized countries. Partners are often necessary because they have financial means, technological know-how or procedural experience, among other things, which hosts lack. Partners mostly invest because of the Certified Emissions Reductions (CERs) a project generates, but that does not explain how they choose their host country.

Objectives

Since the CDM is relatively new, it is still unclear what determines the partnership between certain host and partner countries for projects. Some argue CDM projects could be compared to any other foreign direct investment (FDI) (e.g. Niederberger & Saner, 2005), while others say that CDM is comparable to development aid (Michaelow & Michaelowa, 2007). Viewing CDM projects as a form

of FDI could imply two things: First, it could mean that CDMs are perceived as a business opportunity like every other, without regard for any intrinsic or environmental value the project might have. Second, even if CDMs are not purely regarded only for their business potential, existing channels for usual FDI or other factors facilitating usual FDI might at least be helpful in attracting projects.

On the other hand, CDM projects might be viewed by financiers as development aid. That would show that CDM projects are appreciated by creditors not only for their financial properties but also for environmental, humanistic or other implications.

This paper analyzes the determinants of CDM projects and the CERs created by them, especially FDI and official development aid (ODA). CERs can be seen as flows from host to partner countries. To gain insights into the effects of the factors FDI and ODA, which could be responsible for the amount of CERs created by projects of a pair of countries, many factors have to be controlled for. Among them are economic sizes, economic and cultural relationships, the need and potential for emission abatement, institutional frameworks and infrastructure. Most of these factors usually explain FDI and ODA flows relatively well (for an overview see Blomström, Globerman, & Kokko (1999)). If held constant, the remaining explanatory power of the FDI and ODA variables might hint towards a deeper relationship between CDM projects and these two factors.

However, not only the willingness of foreign investors and its determinants has to be accounted for, but also the willingness and absorptive capacity of developing countries for CDM investments. Therefore the degree of economic development plays a role and is tested as well.

Moreover, the spatial dispersion suggests that African countries have a particular hard time to attract CDM projects. To test if this relationship is already explained with the variables listed above or if there is a problem beyond those factors, a dummy for African countries is introduced.

Data and Methods

Though being primarily used to analyze trade flows, the gravity model employed in this paper is adapted to the analysis of project certificate flows. It is used on a data set containing 139 developing countries and all of the 23 industrialized countries eligible to use rights granted by CERs. Data for the dependent, CERs created by projects with foreign partners, were retrieved directly from the UNFCCC database (UNFCCC, 2010). Multilateral data was split into bilateral data using equal weights. Bilateral data for FDI and ODA were retrieved from OECD databases (OECD, 2010), other data was taken from appropriate sources and infrastructure is measured as an index constructed from data on transportation, communication and access to electricity.

The start of the CDM in 2005 allows for a panel with 3 periods ranging from 2005 to 2007, which makes it possible to control for period specific effects in a panel analysis.

Results and Conclusion

Table 1 shows the results of four regressions with the number of CERs as dependent and a fifth with a dummy for project collaboration as dependent.

The basic treatment model contains a factor for the wealth with GDP ppp per capita, CO₂e-emissions gauging the potential to abate greenhouse gases for the non-Annex country and the need to have pollution permits of the Annex II country as well as the inflows of FDI and ODA.

This model, in which all variables are significant, shows that the less wealthy an economy is, but the more CO₂e it emits and the less its partner emits, the higher the flow of CERs from that country to the partner will be. The positive relationship between CO₂e-emissions in the host country and the number of CERs is also reflected in the results of Wang & Firestone (2010), whereas the negative relationship between partner emissions and CERs runs contrary to their calculations. As expected, the flows of FDI and ODA have a positive influence, though the influence of ODA seems to be pronouncedly more significant. These results indicate that there is a relationship between usual investments and development aid on the one hand and CDM projects on the other.

To further determine that the influence of FDI and ODA flows is not simply due to underlying factors for FDI and ODA activity, three of the most prominent of those underlying factors are introduced in a second model: The quality of governance, an index for the infrastructure and the literacy rate proxying for the level of human capital. Though quality of governance and literacy rate seem to have a significant influence, neither the significance nor the value of FDI and ODA variables change much. Contrary to expectations, governance and literacy seem to have a negative relation to CER flows. One possible explanation is the altruistic thought that goes with giving aid. If giving aid is motivated by altruistic principles and giving aid is positively related to the flow CERs from CDM projects, it is no large stretch to conclude that CDM projects might originate from the thought to improve the situation wherever the project takes place. One clue for this hypothesis is, that if variables for governance, literacy rate and infrastructure are introduced, the still negative influence of GDP per capita becomes insignificant. It seems as though these three variables specify the reasons for helping others by starting projects in their country better than GDP per capita (as a proxy for development) does.

Since the introduction of supposedly determining factors of FDI and ODA does not take away from the explanatory power of FDI and ODA, it is not straightforward to conclude that FDI and ODA can now be interpreted as catching institutional, soft or unmeasurable factors. This interpretation is still consistent with the data, though. Controlling for subindices of governance, which are more diversified, leads essentially to the same results and are therefore not shown here.

Still, even though we can exclude usual business factors as an explanation for the explanatory power of FDI and ODA flows, we cannot be sure, especially in the case of ODA, that cultural factors might be the underlying linchpin for investment in CDM projects in certain countries. To test for these

factors, the third model includes two proxies for these kinds of relationship: Given the composition of the data set, a dummy for former colonial relationships gauges effects caused by a common history best; similarly, a dummy for common languages should cover effects for contemporary cultural relationships that lower transaction costs of starting common businesses and projects. It turns out that both dummies do not show a significant influence or change the other variables in a meaningful way. A fourth model testing for being an African country as a factor does not change results either. However, the same variable is negatively significant in the selection equation of the Heckman procedure (fifth model). This means that when trying to procure a project at all, being African covers a negative factor, but as long as project relations are established at all, African countries behave like any other.

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 GDP _{pc} _i	-0.55**	-0.2	-0.21	-0.57**	
Log GDP _i					0.34***
Log CO ₂ eEmiss pc _i	0.84***	1.20***	1.19***	0.94***	-0.14***
Log CO ₂ eEmiss 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

Therefore, after testing for effects of usual determinants, cultural ties and being African, we cannot deny that there might be more to FDI and ODA relationships than pure factors for business and development aid. One interpretation would be to see it as an expression of institutional quality: FDI and ODA are usually dependent on the recipient either having good institutions to use the incoming

funds or receiving it in the first place. Those could be formal institutions, like the respective ministries being efficient at attracting these sort of funds, or informal ones, like business ties which help further projects to get along.

This interpretation would be consistent with the African results: Some publications on CDMs claim that the Designated Official Authorities, which mostly are ministries or their subsidiaries, in countries are a bottle neck in establishing projects. Usually those work less efficient in Africa, which would explain Africa's predicament. Once they work well, though, African countries can produce as many CERs as others.

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