How to Make the Clean Development Mechanism Sustainable - The Potential of Rent Extraction

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Abstract: The Clean Development Mechanism (CDM) should foster sustainable development and greenhouse gas emissions reductions. The design of the CDM and first experience suggest that it may not achieve these goals. Developing countries hosting CDM projects may loose cheap emissions reduction possibilities for their own future use, and sustainable development and technology transfer may not take place. On the other hand, the CDM has the potential to generate considerable rents if permit prices are high or costs low. A deliberate decision on how to distribute these rents should be taken and the potential failure of the CDM in meeting its goals calls for further regulation. I suggest to combine these two issues and to extract the rents by a profit tax. The tax revenues could contribute to national sustainable development strategies, to offset external costs imposed by CDM projects and to extract part of the resource rent they may generate. The international character of the CDM offers a frame for internationally coordinated tax design. This would hedge against a potential race to the bottom.

Keywords: Clean Development Mechanism, economic rent, rent extraction, profit tax, sustainable development
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1 Introduction

The Kyoto Protocol (KP) sets binding greenhouse gas (GHG) emissions reduction targets for developed countries and for transition economies. It offers considerable economic flexibility how to achieve those. Domestic reductions can be complemented by emissions permits bought on the international carbon market or by investing in reduction activities creating so-called "certified emissions reductions" (CER) abroad in the context of the Clean Development Mechanism (CDM) or Joint Implementation (JI) (UNFCCC 1997). The emissions cap in combination with emissions trade, CDM and JI makes the resource "atmospheric greenhouse gas absorption capacity" a valuable good that can be produced, traded and used as a valuable input to any process emitting GHGs.

A global market offers the possibility to match supply and demand of emissions permits on a correspondingly global level. Theoretically, this increases efficiency and lowers costs to achieve the aggregate reduction goal with respect to the situation where only domestic reductions are possible. However, this is only true under specific assumptions, and permit trade can well be harming due to other free trade effects (Copeland and Taylor 2000) or weak property rights (Chichilnisky 1994), for example.

Besides reservations towards emissions trade in general, for developing countries, two issues related to the CDM are most important:

- the potential sell-out of cheap emissions reduction possibilities, and

- the likely absence of induced sustainable development.

First, carbon trade and non-domestic reductions abroad make emissions reductions cheaper only if the actors involved do not change. However, developing countries are likely to be subjected to targets in the future as well. Without caps for developing countries, reductions are cheaper as not all countries face a cap and the countries with a cap can exploit cheap reduction potential in the others. If all countries were to face a cap, this global reduction potential would be the same but the number of countries exploiting it would be bigger. The relatively cheaper reductions in developing countries would then account for their own reductions and not anymore for the reductions of developed countries. If developing countries have to comply with own caps only in the future, these cheaper possibilities might not be available anymore, as they would already have been realized by the countries facing caps now (see Rose et al. (1999) for a formal discussion).

Thus, unless the stock of reduction options changes, the switch in the market structure from partial to global participation may make developing

countries loose (Rose et al. 1999, Ott and Sachs 2002). To avoid this, cheap reduction options utilized in early commitment periods have to be replaced by equally cheap or cheaper ones - i.e. some learning-by-doing, research and development or technology transfer have to take place. To never impose a cap on developing countries would clearly also solve the problem but this is no option for stringent climate policy.

Second, the CDM has two goals according to the KP. It should assist developing countries in achieving sustainable development and in contributing to combat climate change, and it should assist developed countries in achieving compliance with their quantified emissions reduction commitments (UNFCCC 1997, Art. 12). It is the prerogative of each host country to decide whether a project assists in achieving the sustainable development goal (UNFCCC 2001, Decision 17, p20). But within the KP the sustainability goal remains too general and no guidelines or rules how to achieve it are provided. To correct for this, there are several sustainability standards promoted by NGOs and governmental institutions such as the Gold Standard (Goldstandard 2005) and the CCB Standards (CCB 2005). But they are only voluntary and have a short-term and local focus. The Community Development Carbon Fund of the World Bank has some direct project-wise community development requirements (CDCF 2005).

The CDM not only poses problems, though, it may also generate considerable profits. This is the case especially when CER prices are high or costs are low, as in many projects with few additional sustainability benefits. These profits are the economic rents generated by the various business activities related to the CDM. The goal of this paper is to discuss the potential of rent extraction by a profit tax with revenue hypothecation as a policy instrument to address the two problems identified above.

Cosbey et al. (2005) present other suggestions to improve the CDM, mainly relying on additional standards or labelling. High CER prices due to increased demand from Annex-I countries and the unilateral CDM also have potential to improve the CDM. None of these suggestions builds explicitly on the presence of resource rents, though. A more fundamental restructuring provides the sectoral CDM that focuses on whole sectors rather than single projects (see e.g. Sterk and Wittneben, 2005). It might reduce the currently high transaction costs and could help countries to engage in broader development strategies than project-wise CDM allows for. Rent extraction could be complementary to the sectoral approach as this faces the problem to distribute benefits and costs between the different actors, what most transparently is done by employing the rent concept. At the COP11/MOP1 in Montreal, December 2005, several improvements for the CDM have been decided. Some types of sectoral projects will be possible and the CDM Ex-

ecutive Board has been granted increased funding to overcome bottlenecks in processing project proposals (Wittneben et al. 2006).

The main objection against the proposed tax is that it potentially deters investment. The CDM in general bears the danger of a race to the bottom, forcing countries to accept CDM projects without further benefits and without rent extraction (as observed in South Africa, for example, according to Steve Thorne in UNFCCC (2005a)). The international character of the CDM offers the possibility to implement such a tax in an internationally coordinated manner thus regulating against the race to the bottom.

The next section presents the CDM. Section 3 addresses different policy instruments to regulate the CDM and discusses the rent concept and rent extraction. Section 4 concludes.

2 The Clean Development Mechanism

The CDM allows countries with binding emissions reduction targets (so-called Annex-I countries, basically the industrialized countries and economies in transition) to use emissions reductions or GHG removal realized in countries not facing reduction targets (Non-Annex-I countries, i.e. basically the developing countries) for their own compliance. It thus allows developing countries to benefit from such emissions reduction or GHG removal activities as the CERs thus produced are valuable for Annex-I countries. In prinicpel, these countries themselves or private and public entities act as investors in CDM activities (UNFCCC 1997, 2001), but as current experience shows, they rather act as buyers of credits from CDM activities by some CER purchase agreements while the investment risk is often borne by a host country institution. Since February 2005, unilateral projects are eligible as well (UNFCCC 2005b). These are promoted and financed by a project-proponent in a Non-Annex-I country, without involvement of another party. The CERs are then sold on the market.

Although changes might be fast, I give a short overview on the situation of the CDM as of mid-January 2006 (Fenhann 2006). Currently, there are 71 CDM projects registered and 518 are in the process of validation or in another status of the CDM registration process. Regarding CER production, 51% are Hydrofluorocarbons (HFC) destruction (40%) or N2O capture/destruction (11%) projects that are likely to not deliver any additional sustainability benefits (Cosbey et al. 2005). These percentages have been rather stable, although the number of projects and accumulated CER production has almost doubled since October 2005. Landfill gas (Methane reduction) projects account for 12% of accumulated CER production. Combined with power gen-

eration or other energy use, they are likely to deliver sustainability benefits, but there are some large projects that only flare the gas, thus foregoing these additional avails. The volume of CERs from the projects is about 820 mill CERs by 2012. The countries hosting CDM are still few and the distribution of projects is skewed, with India (40%) and Brazil (20%) accounting for 60% of the CER generation projected, followed by China, Mexico, the Philippines and Chile, each accounting for 5 to 3%. The least developed countries still attract virtually no projects. The biggest buyers currently are the UK, Japan and The Netherlands with 50, 37 and 34 projects, respectively, whereas for 402 projects this information seems not available (i.e. it is likely that a CER purchase agreement has not yet been reached).

Attracting investment to developing countries is seen as a major goal of the CDM by many of its supporters. As any investment, CDM investments are related to the general business and institutional climate in a country. The CDM is naturally sensitive to the uncertainties on the future of the CDM and the KP. It shows some not yet fully understood patterns different from ordinary investment, though (Niederberger and Saner 2005). The high transaction costs of the CDM approval process, especially the issue of defining additionality seems to deter investment (Cosbey et al. 2005, references in Sterk and Wittneben 2005). The current official view is inclined to accept additionality only for CERs from projects that would not have been realized in a business-as-usual (BAU) scenario, i.e. without the impact of the CDM; in particular, "environmental additionality" alone, referring to reductions that would not have occurred without the project activity, while the project itself may well be implemented without the CDM, seems not to be sufficient (UNFCCC 2004).

There are positive correlations between the level of CDM and foreign direct investment (FDI), although India is an exception having not so much FDI but quite a view CDM projects while it is the opposite in China (Cosbey et al. 2005, Niederberger and Saner 2005). However, as activities under the CDM are only beginning, it is too early to draw final conclusions. Regarding investment in developing countries, the division between ordinary FDI and CDM is sometimes difficult to make. The same applies to ordinary financial development aid to which CDM should be additional and not substitutive - an additionality not simpler to establish than the additionality regarding emissions reductions, resp. the baseline referred to.

2.1 CDM and Sustainability

The mixture of general sustainability with emissions reductions as the two goals of the CDM is problematic. The latter goal refers to economic indicators

like efficiency and cost-effectiveness, while the former refers to sustainability in its whole range, including social and ecological issues.

Within the KP and subsequent documents, sustainability remains a term void of binding criteria. It has a weaker position than the more straightforward criterion to reduce emissions. The latter faces uncertainty only regarding the additionality criterion. Crucial thereby is to define the baseline set by the BAU. This is no simple task at all, but if it is established, the criterion is well-defined. The experience with lip-services to sustainable development without a binding framework and correspondingly few actions taken led to initiatives to define voluntary sustainability criteria for CDM projects (Sutter 2003, CCB 2005, Goldstandard 2005). Due to the multi-dimensionality and trade-offs linked to sustainability, considerable leeway remains on how to actually interpret, weight and implement those. The two goals have thus very different standings when it comes to realisation. This is still the case also after the improvements of the CDM reached at the COP11/MOP1 in December 2005, as those do not address the potential problems related to achievement of the sustainability goal (Wittneben et al. 2006).

Today, sustainability incorporated in the CDM in practice tends to be of a short-term and local character if it is a topic at all (Cosbey et al. 2005, the Goldstandard Manual for Project Developers (Goldstandard 2005), CCB 2005). As there are many short-term pressing problems in developing countries, the actors may tend to focus on a rather short-term horizon, trying to get fast improvements for local communities. Such improvements are definitively necessary. But in such a context the CDM may operate rather as an additional source of conventional financial development aid than as an instrument promoting sustainable development and reducing GHG emissions.

The local and short-term traits are also a problem, as the long-term and potential large-scale effects of the CDM are not known. By promoting bioenergy, for example, the CDM might increase competition on land and water between food and bio-fuel production (Berndes 2002, Azar 2004) and the pressure from conventional unsustainable farming practices.

The imparity between sustainability and emissions reduction is also mirrored in corresponding unequal certainties regarding transfers and benefits. The donor party gets a well defined amount of CERs from a CDM project given the baseline is established and the project is registered. But what it has to supply regarding potential investment in additional sustainability aspects besides investment in the project per se is a matter of project-wise negotiations. Furthermore, once approved and implemented, a CDM project generates CERs that are subject to clear private property rights. This is not the case for many sustainability benefits and they tend to be undersupplied due to their public good character.

Finally, the different time-frames for the two goals are a particular challenge to sustainability. A CDM project generates CERs for a specific period of time, which, according to the current rules lasts for seven (with the opportunity of renewal for at most twice additional seven years) or ten years (without the option of renewal) (Decision 17/Cp.7, 15, UNFCCC 2001). Of the 589 projects referred to above, 46% have chosen 7 and 54% 10 years (Fenhann 2006). Afforestation and reforestation (A/R) CDM projects have longer periods of 20 (twice renewable) or 30 (without renewal) years. They generate temporal CERs that have to be periodically replaced with permanent ones during the project life-time and the amount of A/R CERs used to comply with the reduction goal must not exceed 1 & of base year emissions (UNFCCC 2001). Currently, no such CDM project is in the pipeline, though.

The still remaining uncertainty regarding post-2012 regimes additionally favors short-term investments. The host country, however, is interested in "development" - be it poverty reduction, institution building or technology transfer. These issues clearly have local traits. But they are related to some national policy agenda as well and ultimately have to be seen in the time-frame of generations. Again, the economic goal to generate CERs has a well-defined position in contrast to sustainable development.

2.2 Rents in the CDM

These reservations regarding sustainability in the CDM and the potential sell-out of cheap reduction possibilities discussed in the introduction point out that CDM projects are likely to impose social costs on developing countries. At the same time, the permit prices have considerably increased in the first months of the European Union Emissions Trading System (EU-ETS) and in case they further increase significantly, the CDM may generate considerable profits. February 2006 prices for permits in the EU-ETS are around 26 €/t CO_2. They have risen from below 10 €/t CO_2 and reached close to 30 €/t CO_2 in July 2005, and then stayed around 22 €/t CO_2 till mid-January 2006 (Point Carbon 2005a, Climatecorp 2006). Emissions allowance units traded in the EU-ETS currently realize substantially higher prices than CDM CERs. This is due to the uncertainties related to CERs and to the only partial link between EU-ETS and the Kyoto mechanisms (Lecocq and Capoor 2005). For the long-run and when clear rules are established, I assume similar prices and refrain from discerning separate markets in the following.

High profits may be realised in particular for the low-cost projects without additional sustainability benefits such as some landfill gas and N_2O capture and HFC destruction projects. The latter have an estimated cost of 0.5 €/CER (Cosbey et al., 2005).

It is common to use the term "economic rents" for these profits. An economic rent is a surplus value, i.e. the difference between the market price of a good and its production costs. The situation of differing market prices and costs arises due to different marginal costs of different producers defining the supply curve while the market price is given by the marginal producer. In the CDM, rents are generated through resource use or the presence of external costs.

The resource rent can be subdivided into quality and scarcity rent. The first accrues to high quality resources that allow for lower production costs (e.g. an ideal site for wind power as opposed to a less favorable one). The second accrues to the scarcity of a resource, e.g. of sites suitable for hydropower generation as opposed to other, more expensive electricity generation technologies. The rent discussion is of particular relevance for the CDM as some types of CER generation employ hitherto value-less or new resources. Examples are barren land for solar power plants, marginal land not suited for agricultural production that might qualify for afforestation or the use of waste gases from dumps.

The presence of externalities generates rents as it leads to lower costs with respect to other production processes or locations where externalities are internalized or absent. For the CDM, the most important externality is the potential exploitation of cheap reduction possibilities without technology transfer or learning-by-doing and other sustainability benefits necessarily being realised. Thus, it can also be framed as undersupply of a public good. The externality may even be seen as pecuniary and thus not resulting in efficiency losses. However, the fact that the developing countries will demand GHG emission reductions certificates only when they face targets themselves, the purely pecuniary character of the externality can be questioned in this situation where the set of market participants and thus actors receptive for price signals changes over time.

A further type of rent is the "quasi-rent", which accrues to extraordinarily wise investment in business activities (be it in technology, human capital, management, etc.) and is not attributable to any natural resource use or externality. The quasi rent is a topic for the CDM when new technologies with fast progress and few experience are implemented.

The presence of rents from resource use or externalities raise the question to whom they belong. It is common practice for classical resources that the owner, which is often the government and different from the resource user at least partly extracts the rent. Regarding external costs, their internalization is a necessity on grounds of economic efficiency and this leads to some redistribution as well. For new resources exploited in climate change mitigation activities or new externalities caused by those, however, the rent distribution

is not systematically discussed. Regarding the quasi-rent, however, it is generally agreed on that it belongs to the firm. In a competitive market, it is expected that competitors will take up such particularly profitable business strategies and that the quasi-rent will thus vanish.

Currently, a tax of 2% is levied on the revenues from CERs (Decision 17/Cp.7, 15, UNFCCC 2001). The revenues are earmarked to support countries particularly vulnerable to the adverse effects of climate change. CDM investment in least developed countries is exempted from the tax. This is in the spirit of rent extraction as described in section 3.2. Being a revenue tax it is not optimal, though, as it neither reflects or correlates directly with the size of the rent nor with the height of external costs. Due to the special earmarking of its revenues it also only partly addresses the problems of the CDM and defers the revenues from the sovereignty of the individual host countries. Some governments/institutions undertook steps in direction of rent extraction from the CDM. The Karnataka State Power Utility (India) decided to extract the total rent (Babu and Michaelowa 2003, p.15), but this paragraph in the power purchase agreement has seemingly been dropped later on (Sutter 2005), and China explicitly states that a share of the CER revenues shall belong to the country (CDM China 2005, Article 24; Point Carbon 2005b: e.g. 65% of CER revenues for HFC projects, 30% for N2O).

3 Further Regulation of the CDM

The preceding section has shown that the CDM and sustainability are a pair plagued by trade-offs that emerge along and between the key-concepts sustainability and emissions reductions. A crucial aspect thereof is the different level of definiteness the various actions and goals related to the CDM have: to generate certified emissions reductions is by far easier to capture in an institutional and legal framework than sustainability and development. Furthermore, the CDM potentially causes considerable external costs for the host countries but has also the potential to generate large profits for the investors.

This motivates additional regulation of the CDM. A straightforward approach is to combine these issues and to further regulate the CDM by rent extraction in combination with revenue hypothecation to offset some of the external costs. Other reasons to employ rent extraction are that a deliberate decision on who will capture these rents should be taken, and that rent extraction can also compensate for resource use.

Regulating the CDM has some peculiar traits. According to several simulations, the CDM is expected to be one of the main "production sectors"

for the GHG market providing 40 to 70% of the emissions reductions (Vrolijk 2000) or 5 to 65% according to other, newer estimates reported in IEA (2004). This market is thoroughly shaped and designed by politics. Demand is generated on political base alone - there is no physical necessity and most actors incur no increased utility from consuming or buying CERs. The good, CERs resp. the guidelines defining it, is also designed by the authorities and its properties are not shaped by demand and supply. It does not correspond to anything physical necessary for the actors' (productive) operations. Therefore no quality attribute of CERs - however defined - is important for the consumer mainly interested in cheap CERs. One intrinsic and self-enforcing control mechanisms of goods markets is thus missing (Repetto 2001).

GHG markets are thus artificial markets with prescribed goods and a partly prescribed demand. Market participants can partly influence demand as they are free to reduce emissions and thus to reduce demand. Supply then emerges independently according to the boundaries set, which are astonishingly few as compared with financial markets, for example (Nolles 2004). The necessity for further regulation identified above is tied to just this aspect that supply is largely unregulated in a market with few boundary conditions trading a good that nobody wants but that is demanded, nevertheless, due to political decisions and corresponding legal requirements. This sets no incentives to work towards increased sustainability.

Although many assumptions and uncertainties influence the CDM supply estimates from above, it is just now, still in the building process of this market, that regulation of this potentially large part of the supply side can best be addressed. It has to be kept in mind, however, that the importance of the CDM in the carbon market could drop dramatically in case it looses attraction for potential investors due to the regulation or other political developments.

3.1 Policy Instruments for CDM Regulation

The literature offers a wide range of policy instruments that could in principle suit the regulation of the CDM. Three broad types of policy instruments can be discerned - command-and-control (CAC) regulation like standards, market based instruments (taxation, subsidies, two-tiered instruments like deposit-refund schemes, or permit trade), and information disclosure like labeling. Institution building for allocation of rights can be added as a fourth one of particular importance in developing countries with weak institutions and property rights (Sterner 2003). The adequacy of these instruments depends on their positive properties and on how they fit the situation to be regulated on the one side and on the actions and actors to be regulated and which

forces shape the concrete implementation, i.e. the political economy aspects, on the other.

Regarding the economic criteria allocative and cost efficiency, flexibility and cost-effectiveness, market-based instruments perform best. For regulation of the CDM, some sort of taxation is adequate given the potential presence of rents or external costs. Permit trade is no option as its design does not suit the problem. Subsidies could work in principle, but would be expensive for society and even increase the potential profits from the CDM. They have also perverse output effects and contradict the spirit of the KP which is the polluter pays principle (although in a weakened form as initial allocation of permits is mainly done by grandfathering). Two-tiered mechanisms such as deposit-refund schemes are more popular in the regulated sectors than a tax, as they are cheaper for the industry. In the CDM, their design would however further accentuate the project-based focus and fail to collect any revenues. The same reservation applies to CAC measures and information disclosure.

To assure achievement of long-term and national sustainability goals that lay beyond the project level, only a measure that generates the necessary revenues to implement such policies comes into question and that thus extracts some of the rent generated. This is thus basically some type of taxation.

Institution building clearly has to play its role in the CDM, but more as a preliminary measure to assure successful implementation of further regulation than as a supplement for it. A tax builds on the presence of institutions that may not be present or reliable in all developing countries (Somanathan and Sterner, in press). Such and related institutions are also a prerequisite for development and FDI and should thus be promoted independently of any CDM policy. The potential revenues from CDM are an additional incentive to do so.

Market-based instruments are not that commonly used as regulatory instruments in environmental policy as could be expected from their theoretical advantageous properties. This is mainly traced back to the interests of the groups affected (Dijkstra 1999). Such political economy issues have clearly to be taken into account for any concrete implementation of taxation in the CDM.

3.2 Rent Extraction in the CDM

Any type of taxation of the CDM will extract part of the rent. Rent extraction can take place in basically four different forms. These are the ex-ante extraction by an auction or ex-post extraction by a profit tax, revenue tax or fixed fees (Luchsinger 2005). An auction has promising properties in an

ideal world but suffers from the informational problems related to uncertain future developments and from the fact that all payments have to be done at once and in advance. A profit tax is tied most directly to the true value of the rent. To minimize distortions, the tax should be levied as a proportion of profits after accounting for all costs, including capital costs and depreciation. Theoretically, rent extraction by a profit tax then does not alter investment decisions. No projects would become unprofitable as it might be the case under a fixed fee or revenue taxation. Set as a percentage of profit, the profit tax is most flexible regarding costs and revenues. It takes price changes of CERs into account and does not drive projects out of the market that become marginal with falling prices (Amundsen et al. 1992, Luchsinger 2005). In practice, however, also rent taxation will likely have negative effects on investment, by changing the rate of return relative to other investment options and thus making CDM projects relatively less attractive.

Given the two motivations for rent extraction, this need not be a disadvantage, though. Taxation can have a distributive goal - as in the case of resource rent extraction, or a corrective on the margin, as for internalisation of external costs. In the latter case, an effect of the volume is intended, and the tax rate should ideally reflect the external costs (Pigouvian tax) rather than to be tied to a percentage of the rents, what would be optimal for rent extraction. Given the situation in the CDM, it makes sense to focus on rent extraction on at least two grounds. First, quantification of the external costs may pose major problems. And second, not to deter investment may be a goal higher ranked than full internalisation.

The main advantage of the fixed fee is the certainty about the costs it imposes and the revenues it generates. It thus acts as a risk hedging mechanism. If players are decidedly risk-averse, a combination of a tax with a fixed fee is a promising option. Revenue taxation, finally, has no theoretical advantages but is attractive on practical grounds as no information on the costs is necessary - information notoriously difficult to collect. In any case, these informational and implementation issues are the same as in natural resource extracting industries traditionally subjected to different mechanisms of rent extraction and drawing on this experience will be fruitful in case the CDM should be subjected to such a tax (cf. e.g. Amundsen et al. 1992, Banfi et al. 2005, Luchsinger 2005).

To support projects with true sustainability benefits, a profit tax could also be differentiated and include tax reductions or exemptions for projects in accordance with certain sustainability criteria. China follows such an approach by applying different tax rates to different projects according to their perceived lack of benefits for the country (Point Carbon 2005b). Much of the necessary information for such discrimination is available due to the ordinary

CDM approval procedure. Criteria for a tax exemption and reduction scheme could build on the existing labels such as the Gold Standard. As pointed out earlier, these would have to be adapted to truly account for the long-term and non-local issues, though. Due attention should also be paid to the potential presence of quasi-rents and extraction of those should be avoided to keep intact incentives for innovative and efficient investment in new fast-developing technologies. Econometric cost-comparisons among similar projects as applied in the regulation of natural monopolies such as electricity distribution (see e.g. Jamasb and Pollitt 2001) could help to determine the presence and size of quasi-rents.

Given the long-term perspective of emissions reduction policies and the expectations on CER-prices it is worth implementing such a tax and establishing the corresponding institutions also if it does not yield any revenues at the beginning. The tax rate could be designed progressively such as to not deter investment in this early phase but to generate significant revenues as soon as profits are higher and the CDM is well established as an instrument in climate policy.

3.3 Revenue Hypothecation

The suggestion to earmark the revenues from rent extraction is motivated by the potential lack of truly sustainable development in the context of the CDM and the fact that the revenues could be used for national strategies in sustainable development, poverty reduction and technological and institutional development. Hypothecation could hedge against losses from the sell-out of cheap reduction possibilities. The host countries would not only bear potential costs imposed by the CDM but also keep some profits. This works as well in case single CDM projects my perform poor regarding sustainable development. In any case, how the potential rents from the CDM will be used or if they should be added to the gross tax revenues of a country should be agreed on in advance.

Earmarking of tax revenues can be inefficient from an economics point of view. Ideally, tax revenues should be used where a society sees greatest welfare gains. Some flexibility for changes of targets may thus be necessary. Revenue use has also political economics aspects and it can be expected that several interest groups will try to influence the revenue distribution, especially in case the national and long-term sustainability goals are weakly defined.

Tax-base erosion is also a potential problem. As the goal is not to generate general revenues this is however less the case here. If the tax base is low because most projects are truly sustainable, less additional action is

necessary. If the tax base is low because of a low number of CDM projects, the problems caused by CDM will be fewer as well, thus again requiring less action to tackle those.

3.4 Race to the Bottom?

The "race to the bottom" refers to the popular view that competition between geographical units such as nations leads to lower regulatory, e.g. environmental standards for all - as lower standards are more favorable for investment. Copeland and Taylor (2004) suggest to discern the pollution haven (PH) hypothesis and the PH effect. The former hypothesises that liberalization in trade policies leads to relocation of polluting industries to locations with lower environmental regulation. The latter states that new business projects tend to be implemented in locations with less strict environmental regulation. In their encompassing review, Copeland and Taylor (2004) conclude that there is neither theoretical nor empirical support for the PH hypothesis, while there is for the PH effect.

As the CDM is designed and if we assume the aforementioned results to apply to general sustainability regulation as well, the PH effect and the race to the bottom is a real threat. This makes the host countries' theoretical freedom to set the rules and to choose only truly sustainable projects hypothetical unless they are prepared to loose attractiveness for CDM investment. The low number of CDM projects in China may be one example of this effect, given the legal possibility for rent extraction in this country (cf. section 2.2).

The CDM being organized under a transnational body, it would in principle be possible to implement any additional regulation on an international level and binding for all nations hosting CDM projects. On the other side, if developing countries face own targets in the future, it could be better for aggregate welfare to have had no CDM investment than only such harvesting cheap options without considerable technology transfer or other sustainability benefits. Thus, the "race to the bottom" not necessarily poses big problems for a country not taking part in it - given it can afford putting off the part of foreign investment that would have come with CDM at this early stage. This argument builds on many uncertainties and countries may feel to be better off with any kind of CDM investment. It should thus not be taken as an argument against internationally coordinated regulation.

4 Conclusion

The danger that the CDM misses its goals and causes social costs in combination with the potential that it generates profits suggests to further regulate the CDM and to chose some type of profit taxation for this. A profit tax can also be seen as one way to extract the resource rent generated in CDM projects that employ natural resources or to internalize potential external costs imposed by CDM activities.

Theoretically, a profit tax does not distort business decisions and it avoids driving marginal firms out of the market, due to its sensitivity to cost and price changes. In practice, by reducing the rate of return, rent taxation will nevertheless make CDM projects relatively less attractive. The revenues could be used to support national strategies of sustainable development or national measures to assure technological transfer avoiding the sell-out of cheap reduction possibilities without replacement. In this case, due account has to be given to potential problems of revenue hypothecation. Due to the ordinary CDM validation process, most information to administer such a tax should be available. The international character of the CDM provides a frame for internationally binding and homogenous rules what would hedge against a race to the bottom. It has however to be noted that the transaction costs in the CDM are currently very high and that they are widely seen as one main hindrance to engage in such projects. In this light, simpler but economically sub-optimal rent extraction schemes such as fixed fees or revenue taxation might be valuable alternatives to the profit tax.

Clearly, there will be opposition against taxing the CDM. Any further regulation will be blamed to deter investment. Organizing such internationally at least helps to establish a level playing field for all host countries regarding attractiveness for CDM investment.

Currently, there are some voluntary initiatives towards further regulation, such as the establishment of sustainability labels for the CDM (e.g. the Gold Standard and the CCB Standards), but they mainly focus on local project related issues and have too short time horizons to truly act against the problems identified above. Nevertheless, they could work towards improvements on this local and short-term level. There are also suggestions such as the sectoral approach to restructure the CDM, but non of these takes up the potential presence of large rents and ties the redesign of the CDM to those.

Any additional regulation of the CDM should be discussed and implemented now, when the CDM and climate policy in general still are in flux. The profit tax could define a mechanism that fosters more equity in a robust way in an uncertain environment and assures that developing countries not only bear the costs of CDM activities but also collect some of its profits.

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