I S S U E S I N G L O B A L
E C O N O M I C S

ESSAY

Why the CDM, while promising, is a long way from being a 'first-best' market mechanism, and reform is clearly needed

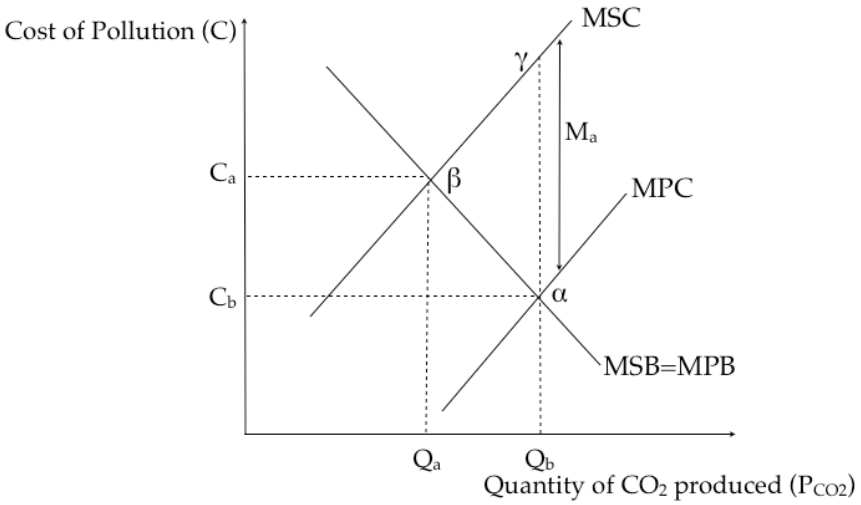
Edinburgh, 18.11.10

Georg Schauer

Word Count: 1995/2000

This essay will attempt to briefly outline the concept of the Clean Development Mechanism (CDM) and some few problems associated with it. It shall start by explaining why such a system is needed by examining pollution as negative externality. It shall then continue by elaborating on the function of the CDM to then consider Hepburn's problem of CER markets as well as additionality. This essay will give a supplementary alternative to the CDM towards its end and will conclusively state that Hepburn's claim that the CDM is no first-best market mechanism is justified.

Figure 1: Negative Externality in Production

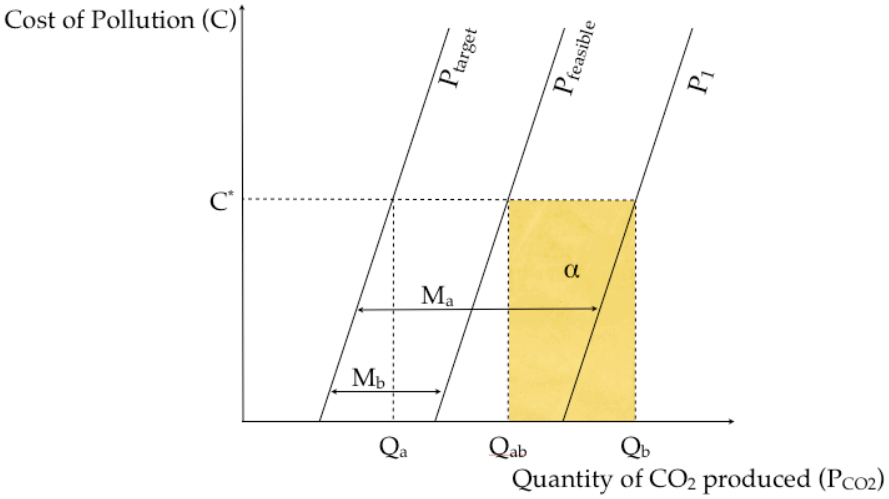


Polluting the atmosphere with CO_2 is an example of a negative externality in production. The marginal cost that society has to bear (MSC) is lower than that of an individual polluting firm (MPC). In figure 1 this is represented by the vertical distance between MPC and MSC or M_a. Because of this difference the market equilibrium forms at α which means that Q_b of CO_2 is produced with is higher than the socially optimal level Q_a at equilibrium point β. The simplest intervention to move along the marginal benefit curve would be a tax. However, on a global level, the availability of asymmetric information and motivations of governments makes that option impossible. Agreements like the Kyoto Protocol created several other mechanisms to deal with this issue. One of them is the CDM.

The CDM is a market based approach to reducing CO_2 emissions. It allows industrialised countries[1] to trade CO_2 reductions in order to meet their own target reductions. Those reductions are represented by the term CER which represents one ton of CO_2 forgone. If a country has a CO_2 reduction target that it is unable to meet, the CDM now allows that country or firms in that country to finance reductions abroad and then buy the emerging CERs. With the CERs they are able to create domestically plus the ones they created abroad that country may now be able to fulfil its own target level. The CDM may also be used as an offset mechanism meaning that a country that wishes to produce more CO_2 may reduce its production elsewhere through the CDM to legitimate that increase.

[1] Industrialised Country shall mean one under Annex I of the Kyoto Protocol

Figure 2: Function of the CDM



Let me illustrate: In figure 2, suppose the supply function of CO_2 for the industrialised country A is represented by P_1. Costs of production shall be at C^* and hence Q_b will be emitted. Suppose now that country has the target to shift that production curve inward by M_a so that only Q_a is produced. They are only able to move to Q_{ab} in the SR though because of their own limitations through sunk costs and legislation, thus are only able to move to $P_{feasable}$, saving box α. If now a group of companies from country A went to the less economically developed country (LEDC) B and managed to bring about M_b CERs, country A may buy those at a certain world market price and in their statistics will have moved from P_1 to P_{target}.

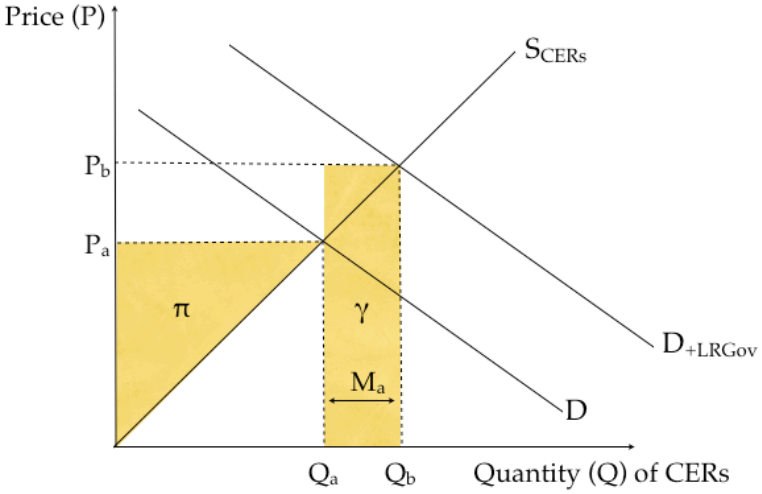
In April 2009, 4200 CDM projects where registered[2], representing a total of 2.9 billion tons of CO_2 reductions by 2012. This makes the CDM the largest approach to climate change. Since the price for CERs is determined by a market it varies but is usually within £5-8. This is comparably cheap when looking at similar schemes within the EU with prices up to €13. The majority of projects are based in China and over two thirds in east asian areas. This is because marginal costs are relatively low there making those regions more attractive to investors. Also, countries like China which have a great deal of experience dealing with the CDM are better capable to accommodate new projects.[3]

According to Hepburn there are a number of significant challenges associated with the CDM which he elaborates in his essay. They include questions on how reasonable some projects and policies by individual countries are, on which scale they occur and the CER market.

[2] Not necessarily approved, Pew Centre 2009

[3] Pew Centre 2009

Figure 3: Capturing Firm Profit (π) to increase Q of CERs



Hepburn argues that the current market for CERs is inefficient.[4] At equilibrium, let it be at Q_a in figure 3, producers capture a surplus π. Since individual governments are unable to provide means to capture that surplus through price discrimination, the box remains profit for project developers and investors. Hepburn proposes finding a way for governments to seize that surplus in order to buy even more emission reductions from it. This can be illustrated in figure 3 by an outward shift of the demand curve. If governments use additional funds to obtain CERs, demand will increase and so will Q up to Q_b under ceteris paribus which entails that the box γ representing additional government spending must be equal to π.

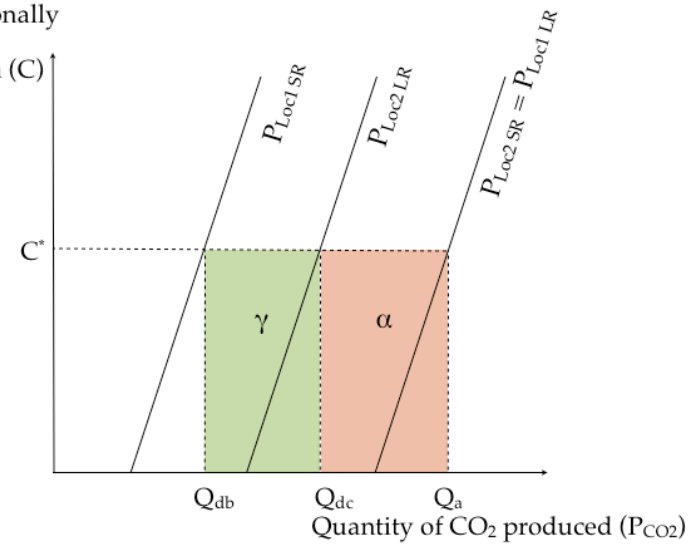
As already mentioned such a shift is not realisable. It would also not necessarily have a positive net effect on the Q of CERs. This is because the producer surplus serves as incentive for project developers. As Hepburn states, markets allocate profits and there is nothing wrong with that. Granted, this way of providing motivations for investors is effective, but succumbs to changes in the world price of CERs or exchange rates.

The Wall Street Journal for instance pointed out that decreases in the P for CERs may not be a bad thing, this is because they lower opportunity costs for firms in industrialised nations that wish to buy CERs. However, lower prices in figure 3 would mean a leftward movement along the supply curve and hence a decrease in producer surplus. As mentioned earlier in this essay, prices for CERs are within £5-8 while it could potentially be at 13€. The Wall Street Journal interprets these numbers as an 60% collapse in P from summer 2008.[5] What this means is that incentives for new projects are lower, while trading with existing projects has become for affordable for the first world. Hence I would dismiss Hepburn's argument for now since effective price discrimination in conjunction with low Ps would further lessen incentives for investors.

[4] Hepburn 2008

[5] Johnson 2009

Figure 4: Additionally



From the standpoint of many critics of the CDM the problem of additionality is at the heart of the CDM's shortfalls. Additionality describes situations where a project developer tags an undertaking to produce CERs while in fact that project would have occurred also without that developer or worse no CERs occur at all. In figure 4 suppose $P_{loc1\ SR}$ represents the production of CO_2 of a particular firm A in an industrialised nation. Suppose now that $P_{loc2\ SR}$ represents the production of CO_2 in a LEDC firm B. Ideally a CDM project would cause a reduction in emissions from B perchance from Q_a to Q_{db}. This would result in a net decrease of emissions and the sale of CERs would generate $\alpha + \gamma$.

If B however suffers from the problem of additionality more CERs may be sold than were generated. This is particularly problematic in cases where a CDM project is an offset to an increase in CO_2 emissions elsewhere. If at C* A wishes to increase production from Q_{db} to Q_a, than an offset mechanism would require a reduction in B from Q_a to Q_{db} to result in no net increase in CO_2 emissions.[6] If the additionality problem occurs then B's reduction in emissions will be smaller than the increase of A. So in figure 4, B may only reduce to Q_{dc} while A increases P_{CO2} to Q_a. This implies a net increase of emissions by Q_a-Q_{dc} while at the same time the project immorally claims to do good for the environment.

If the majority of projects under the CDM display such behaviour than the CDM may be regarded as failure since it achieves the exact opposite of what it attempts to. The question economists should hence be asking is not how to contain CER price fluctuations but rather what proportion of projects suffer from this phenomenon and how to effectively address additionality.

In the opinion of some scholars such assessment is impossible. Müller at Oxford writes that in fact any assessment is purely hypothetical as it is econometrically undoable to predict the outcome of projects without the CDM. He then suggests not to test at all to reduce bureaucracy and make the system more transparent.[7] I find this idea very problematic as I believe transparency is derived from analysis and information rather than a lack of effort to obtain such.

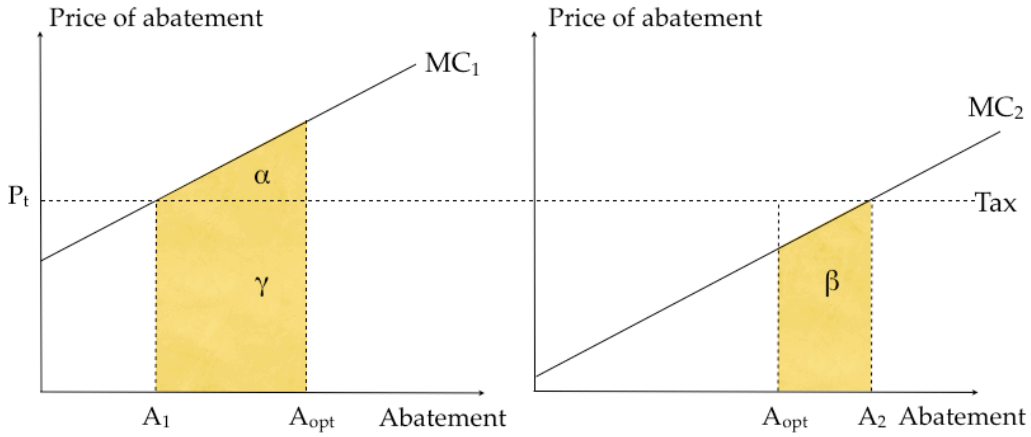
[6] under ceteris paribus and proportionality between CO_2 production of firm A and B.

[7] Müller 2009

The Öko-Institut in Germany evaluated 93 CDM projects between 2007 and 2009 and found that roughly a third failed to hand in crucial information on investment strategies, only giving figures without calculations. Apart from that the most commonly used assessments are barrier analyses intended to judge whether there was a burden the project had to overcome to show that it would not have occurred on its own. Most popular outcomes in the study were "risk of exchange rate fluctuation" or "project bankruptcy without CER sale" while sometimes blatantly ignoring other revenues. The Öko-Institut concluded that 43% of projects cannot provide evidence for the existence of any barriers.[8]

One other problem with such faulty calculations is that they may be profitable for project developers. The Energy Generating Authority of Thailand calculated that for a project to build wind farms the CO_2 emissions arising from transport, construction and deforestation are 0 tons of CO_2 which is obviously false, but attracted investment.[9] Carbon Trade Watch also pointed out that such massive projects affect the life of local communities that often cannot protest. For instance it is now a legal offence to use traditional grazing ground occupied by wind farms in certain countries[10], like in Singida, Tanzania, which is on the other hand supposed to generate 70,000 CERs.[11] One must note that there is a trade-off between CER production and a negative effect on local communities.

Figure 5: Tradable Emission Permits



One alternative to the CDM worth mentioning is the concept of tradable emission permits. Hepburn touches this when talking about a CER tax system that he abandons saying that asymmetric information on marginal abatement costs (MACs) would not allow governments to estimate a rate of tax appropriate to individual firms and that price discrimination is undoable as mentioned earlier in this essay.

Instead one may propose not to tax the production of CERs but rather current emissions in projects in industrialised countries that wold like to create CERs in order to offset an increase in emissions. A system of tradable emission permits would be able to capture these increases with a tax. The advantage of this concept

[8] Schneider 2009

[9] EGAT 2010

[10] Smith 2008

[11] DNA Tanzania, 2008

is that most industrialised nations have legislation in place that allows for such measures while in LEDCs such taxes are often unenforceable.

This system would reward producers with low MACs without forcing them to disclose those. Governments set an optimal level of abatement and pollution and give permits to firms to pollute to that level. In figure 5, a low cost producer would abate beyond the optimal level A_{opt} for instance by β and sell the corresponding right to pollute to a high cost producer who will pollute up to A_1 and then buy that right to pollute beyond that to A_{opt} if it costs less than the fine charged by the government represented by γ. The advantage of this model is that abatement is left with low cost producers. One problem with this approach to polluters though is that the setting of A_{opt} and its enforcement is difficult. Alternatively governments could auction permits instead of giving them away.

Conclusively it seems evident that Hepburn's statement that the CDM is no first best market mechanism is justified. As he points out there are some flaws with it for instance in the CER market or with additionality. The latter may go well beyond what Hepburn discussed in his essay. Solutions to these problems are opaque at best. The many variables and asymmetric information involved make it difficult to address these issues and it shall require continued research beyond this essay to identify what this first best emission market mechanism may be.

Bibliography

DNA Tanzania: *Investors guide to Tanzania - Clean Development Mechanism*, DNA Tanzania Publications 2008, URL:[http://www.cd4cdm.org/sub-Saharan%20Africa/Tanzania/TanzaniaCDMinvestorsGuide.pdf] accessed 08.11.2010

Electricity Generating Authority of Thailand: *EGAT CDM Wind and Solar Project Development Experience*, Lecture held at CEPSI, 2010, Lecture Notes at URL: [http://www.aesieap0910.org/upload/File/20101026/TS3904-EGAT%20Clean%20Development%20Mechanism%20(CDM)%20rev02.pdf] accessed: 08.11.2010

Gardner, Prof Dr Peter: *UWCiM Blue Book*, UWCiM, 2008

Hepburn, Dr Cameron: *International Carbon Finance and the CDM*, published in *The Economics and Politics of Climate Change*, Oxford, 2009

Johnson, Keith: *Cheap Carbon: Permit Prices Tank, Threatening Clean-Energy Projects*, Wall Street Journal Blogs 2009; URL: [http://blogs.wsj.com/environmentalcapital/2009/01/21/cheap-carbon-permit-prices-tank-threatening-clean-energy-projects/], accessed 07.11.2010

Müller, Benito: *Additionality in the CDM*, Oxford Institute for Energy Studies Publication EV44, 2009

Pew Centre on Global Climate Change: *CDM April 2009 Status Report*, Pew Centre Online Publications, URL: [http://www.pewclimate.org/docUploads/CDM-Backgrounder-April09.pdf], accessed 08.11.2010

Sari, Agus P: *CDM - Perspectives from Developing Countries*, International Energy Studies Online Publications 1999, URL: [http://ies.lbl.gov/iespubs/43418.pdf], accessed 09.11.2010

Schneider, Lambert: *Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement*, Öko-Institut e.V Internet Publikationen 2007, URL: [http://www.oeko.de/oekodoc/622/2007-162-en.pdf], accessed 08.11.2010

Smith, Kevin: The CDM, interviewed by WhatProductionsUK, URL: [http://www.youtube.com/user/WhatProductionsUK#p/a/u/0/_xG8Hpnagg0], accessed 05.11.2010

Sutter, Christoph; Parreño, Juan Carlos: *Does the current CDM deliver its sustainable development claim? An analysis of officially registered CDM projects*; Clean Air Initiative for Asian Cities Online Publications 2007, URL: [http://www.cleanairnet.org/caiasia/1412/articles-72508_resource_1.pdf] accessed 10.11.2010

United Nations Framework Convention on Climate Change: *Kyoto Protocol*, United Nations Framework Convention on Climate Change Online Publications 1998, URL: [http://unfccc.int/resource/docs/convkp/kpeng.pdf], accessed 05.11.2010

Willis, Monique; Wilder, Martijn; Curnow, Paul; Baker & McKenzie: *The CDM and Special Considerations for Renewable Energy Projects*, Renewable Energy and International Law Project Online Publications 2006, URL: [http://www.reilproject.org/Publications/REIL_CDM_Paper.pdf], accessed 08.11.2010

World Wind Energy Association: *The Clean Development Mechanism and Wind Energy - How to Come to an Effective Support Scheme for Renewable Energy within a Post-Kyoto Agreement*, World Wind Energy Association Online Publications 2009, URL: [http://www.wwindea.org/home/images/stories/cdm-reform_final.pdf] accessed 10.11.2010