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POUR LE DÉBAT

N° 20/2008 | CLIMATE CHANGE | [IN ENGLISH](#)

The fight against deforestation (REDD): Economic implications of market-based funding

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With a view towards the upcoming 14th conference of the Parties, to be held in Poznan in December 2008, this text discusses the mechanism currently under negotiation within the United Nations Framework Convention on Climate Change (UNFCCC), for the financing of the reduction of carbon emissions linked to deforestation in

developing and emerging countries. The role of the market is a key element of these negotiations, and the author sets out to clarify the terms of the debate. To aid understanding of the issues surrounding future decisions, the author provides an analysis of the implications that result from giving the market a central role within this

mechanism. In putting this document online, IDDRI's aim is to disseminate works that it believes to be of interest to inform the debate. For any questions, please contact the author: romain.pirard@iddri.org

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Abstract

A mechanism is currently being negotiated in the framework of the UNFCCC to finance the reduction of carbon emissions linked to deforestation in developing and emerging countries. The role of the market is a central element of these discussions. The focus is on options that aim to distribute incentives to rainforest nations in the form of tradable carbon credits, with the participation of the private sector as investors. A reliance on the market has several important implications that must be explained in order to better understand the stakes of the negotiations. The objective of this paper is therefore to analyze these implications, so that the terms of the debate are defined as clearly as possible.

Firstly, it is necessary to precisely quantify emission reductions in comparison to a reference scenario in order to grant corresponding amounts of carbon credits. This raises the question of our ability to take into account the unpredictability of the rate of deforestation, in order to optimize the allocation of the scarce financial resources at our disposal for the fight against climate change, with consequences on the economic efficiency of the mechanism.

Secondly, the analysis of the domestic redistribution of benefits arising from the sale of carbon credits shows that the role of property rights on forest resources is key. While these property rights are mainly owned by the public sector in the principle countries of concern, or have not yet been formerly clarified, there is a real risk that a market-based mechanism¹ could lead to inequitable redistribution. Indeed, it is possible that the efficiency of the market to obtain reductions at the lowest price will not sufficiently take into account the opportunity costs.

Thirdly, the implementation of a market-based mechanism favours the notion of reward rather than compensation. Therefore, governments are encouraged to maximise the profits of deforestation reduction. This could lead to a preference for domestic policies that favour a reduction in agricultural rents and, in consequence, a reduction of local revenues. In other words, abandoning the principle of compensation for the costs of deforestation reduction may not be sufficient to encourage governments to apply policies to increase forest rents, which are likely to be the only policies capable of increasing local revenues and tackling poverty.

Negotiators must take all of these economic implications into account to identify methods that will minimize potentially undesirable impacts, in terms of long-term effectiveness and domestic revenue redistribution between the diverse categories of economic stakeholders.

Introduction

Deforestation contributes to around one fifth of global greenhouse gas emissions, and therefore represents an important factor in the fight against climate change (IPCC 2007). The vast majority of these emissions result from tropical deforestation in countries that have no emission reduction commitments within the framework of the Kyoto protocol (not including Annex B). A new international mechanism is therefore under discussion (REDD, Reducing Emissions from Deforestation and Degradation), which aims to organize the transfer of financial resources to developing countries in order to fight against tropical deforestation. Within the debate on the functioning of this mechanism there tends to be two opposing options: on one side the creation of a publicly financed international fund that supports public

¹ A 'market-based mechanism' differs from a 'market-linked mechanism' because it refers to a mechanism that is not only financed by taxes on international carbon credit markets, but one that becomes part of these markets.

policies; and the other side favouring the development of a market-based mechanism responsible for organising the distribution of tradable carbon credits on international carbon markets (Rubio Alvarado et Wertz-Kanounnikoff 2007, Pirard 2008a).

The currently favoured option seems to be a market-based mechanism applied to the fight against deforestation. Its supporters cite several arguments: public funds for development aid have had limited effect; as very high levels of investment are required, this favours the option of private finance linked with emission reduction commitments of industrialised countries; existing carbon markets offer an available framework for application; and the market would function alongside positive incentives for tropical forest countries to conserve their forests (Eliasch 2008).

The aim of this paper is not to review the advantages and drawback of various options for REDD, which have already been largely presented and discussed since the launch of this debate at the initiative of Papua New Guinea and Costa Rica in 2005.

However, and without prejudging the conclusions of future negotiations, we wish to examine the potential economic implications of the implementation of a market-based mechanism for REDD, to provide negotiators and stakeholders with the fundamental elements for making informed decisions and, if necessary, to optimize outcomes in terms of effectiveness and the redistribution of benefits among the diverse categories of agents concerned.

The term 'market-based mechanism' can encompass different realities. In the area of the fight against deforestation, its most accomplished form, which is also the way in which its supporters conceive it, is as follows: rainforest countries outside Annex B would receive carbon credits proportional to their emission reductions from deforestation, these could be freely traded on international markets. This type of mechanism corresponds to the proposals defended by a certain number of countries gathered within the Coalition for Rainforest Nations, following the precursor model of 'compensated reductions' (Santilli *et al* 2005).

On this basis, numerous variations are possible. For example, the mechanism could be applied at a project scale, rather than the scale of a whole country. But supporters of a market-based mechanism insist that two characteristics must be respected in order to maintain some coherence and efficiency: that initial financing would largely come from private initiatives motivated by profit perspectives; and that financial resources would be transferred through the market in the form of tradable carbon credit distribution, linked with the emission reduction commitments of Annex B countries.

This market approach merits analysis at several levels. Indeed, it has several strong economic implications regarding the functioning of the REDD mechanism. We will cite three of them:

- Firstly, the question of the precise quantification of the results obtained by participating countries is important. Indeed, emission reductions should determine the quantity of distributed carbon credits. The more precise and reliable this quantification of results becomes, the more justification exists for the transfer of financial resources to participating countries. Economic efficiency therefore depends heavily on our capacity to estimate results obtained in terms of emission reduction.
- Secondly, the question of property rights can be asked in relation to the redistribution of carbon credits. For reasons of sovereignty, it is generally accepted that the participating countries will be free to implement their own redistribution systems for the benefits obtained by the sale of carbon credits. However, it is useful to consider the implications of often incomplete clarification of property rights in numerous developing countries. In particular it is necessary to focus on the negotiation capacity within the redistribution process for the different categories of deforestation agents, as most of the emission reduction costs are constituted by opportunity costs.

- Thirdly, the market system will translate in practice as encouragement for governments to maximise the profits arising from deforestation reduction, through the granting and then the trading of carbon credits. Theoretical models converge towards an interpretation of the determinants of deforestation in terms of relative agricultural and forest rents. It is therefore useful to think about how the pursuit of maximum profits will impact upon a government's choice of domestic policies. Will the priority be given to policies that aim to reduce agricultural rents and associated revenues, or to efforts to increase forest rents?

These three implications are studied in more detail in the following sections.

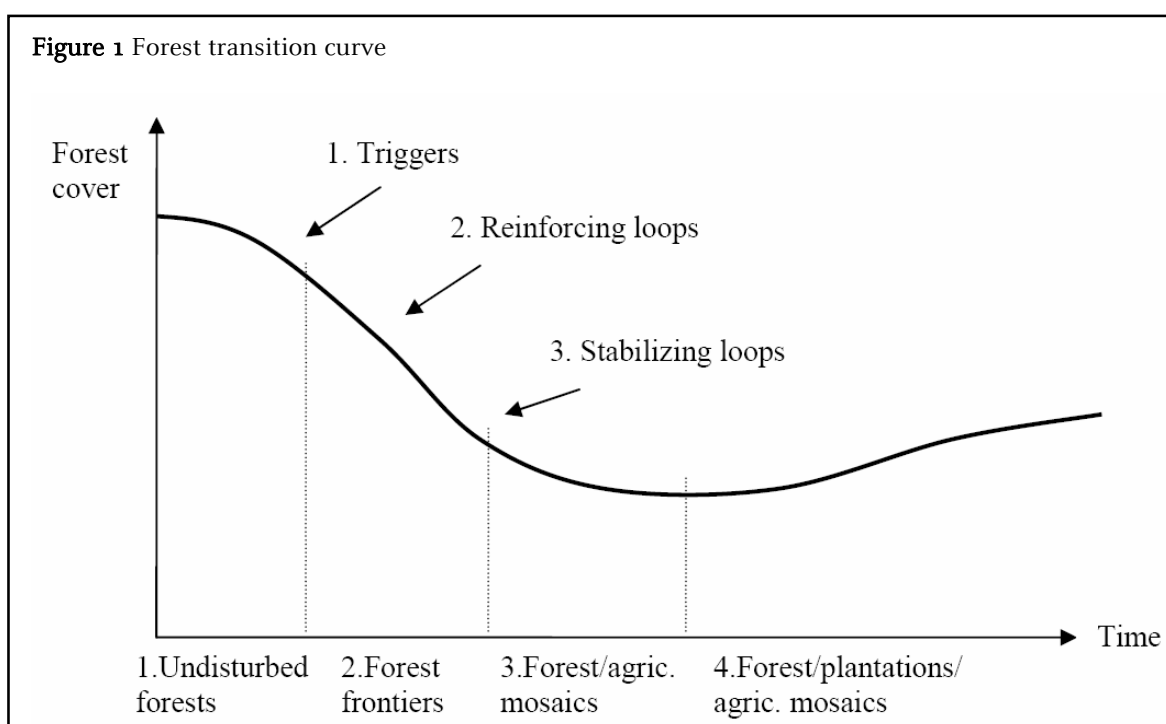
Economic efficiency is proportional to the capacity to define reference scenarios

According to a market-based approach, the trade commodities are carbon credits, the production of which results from a reduction of emissions from deforestation. By 'reduction', we mean that the observed emissions would be inferior to the emissions from a reference scenario. This reduction must therefore be additional, i.e. activities which are part of the fight against deforestation that would not have been undertaken without the prospect of remunerations through the REDD mechanism and the distribution of tradable carbon credits.

Additionality is an important notion, which is familiar to economic evaluation and remains pertinent to evaluate the sustained policies of any sector. We analyse additionality by defining what could have happened without government intervention (de Laat *et al*, 2001). In economic evaluation, we talk more about *net effects*, defined as '*the effects resulting from the comparison between an economy without the project and an economy with the project*' (Garra  , 1994: 23). In terms of incentive measures, the difference between the observed changes and the net effects is called windfall profits, which is the profit '*which could have happened even without any intervention*' (European Commission, 1999). In the context of competition for limited financial resources, particularly in the fight against climate change or tropical deforestation, this is an essential principle for the effective use of these resources, whether they are public or private.

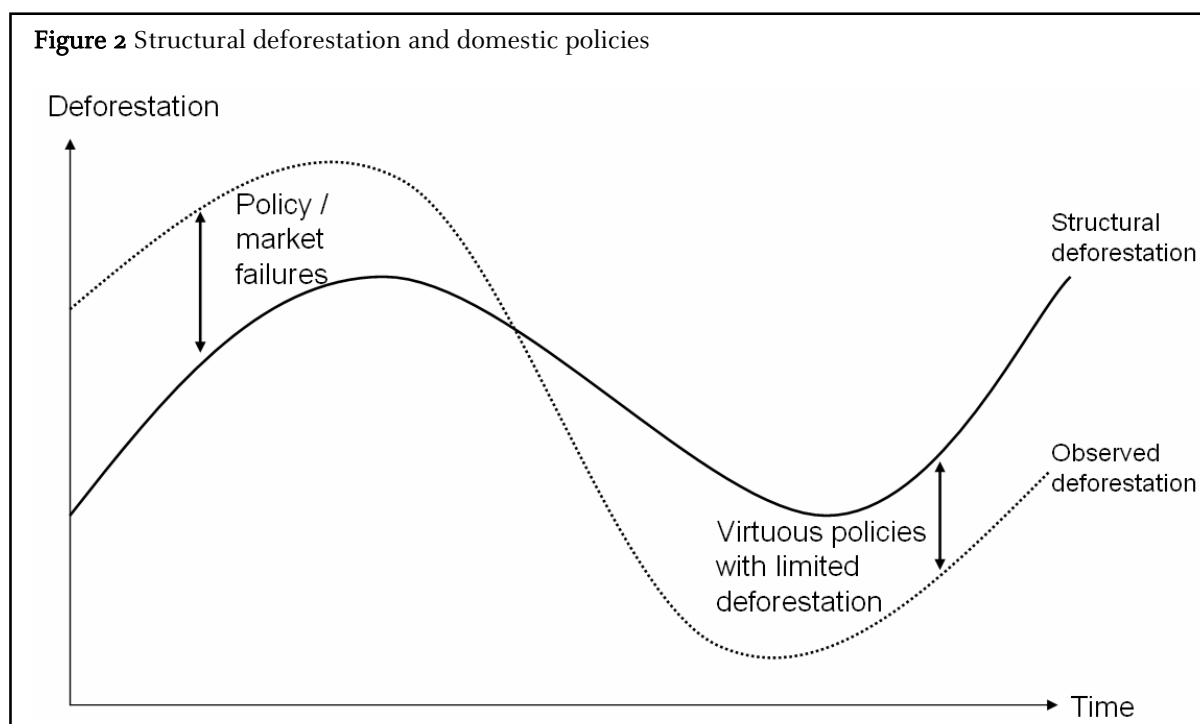
Several proposals have been made in order to design reference scenarios. These can be classified into two main categories: (i) those designed on a historical basis, by considering past trends, with or without adjustment factors according to national contexts; (ii) those based on modelled predictions, aiming to take into account a certain number of variables that are considered as determinants of the rate of deforestation.

These two categories pose considerable problems (Karsenty and Pirard 2007). With regard to scenarios with a historical basis, it is not credible to extrapolate average deforestation rates from the past and to project them into the future. This method does not take into account 'forest transition' phenomena (see figure 1), which modify deforestation rates from one period to another according to the level of economic development and resource scarcity, among other factors. Furthermore this method gives a 'premium' to countries that have already started a massive deforestation (which is the case in southeast Asia and Brazil). Conversely, if major development occurs in central Africa, it is very likely that deforestation rates will accelerate, in particular because regions will be connected through the building or regeneration of a road transport infrastructure.



Concerning predictive scenarios, it is very likely that the rate of deforestation will not only be influenced by relatively predictable factors (demography, programmes of road building, annual economic growth rate...) but also - and perhaps mainly - by 'uncertain' phenomena such as the price of various agricultural commodities (speculative and therefore highly volatile markets), massive migration events, etc. In an important study published by the World Bank in 2006, it is suggested that there are significant correlations between the deforestation rate in the Brazilian Amazon, the income of beef producers and ... the rainfall during the period between 2001 and 2003 (Chomitz *et al*, 2006). The reliability of 'predictive' scenarios therefore appears limited and many countries are very reluctant to use them.

An alternative approach proposed by Combes Motel *et al* (2008) attempts to draw lessons from these radical obstacles that prevent the precise determination of reference scenarios. Their idea is to distinguish between deforestation of a structural type, and deforestation that is caused by domestic policies that have positive or negative impacts on the maintenance of forest cover (see figure 2). Indeed, there are major factors that cause deforestation, over which governments have very little direct influence (so called 'structural' factors): demography, economic growth, international price of agricultural commodities, forest cover at the beginning of the period, climatic events, etc. Besides which, some policies implemented by governments amplify, or reduce, the impact of these factors on deforestation: the fight against corruption, sustainable land use planning, distribution of agricultural subsidies, etc. It is therefore theoretically possible, if reasoning in relative terms (between countries), to determine *ex post* whether a given country has reached a deforestation rate inferior to the structural rate; in which case we can assume that this country has 'avoided' deforestation and should be rewarded. However, this approach does not allow the precise quantification of the range of avoided deforestation, and therefore cannot be used to quantify emission reductions over a given period. In contrast, it could be used as an indicator to modify the supply of financial aid for the implementation of policies and measures in a given country.



The fundamental role of property rights in the calculation of emission reduction costs

In theory as well as in practice, the market usually justifies itself by its capacity to increase efficiency by reaching a given objective at a lower cost. In terms of the fight against deforestation, this means that emission reductions are achieved by less expensive activities. However, the market is not concerned with redistribution and economic equity.

With regard to the REDD mechanism, this raises the central question of property rights in countries where they are poorly defined. In large rainforest countries, a majority of land is officially public. According to the report 'Who owns the world's forests' (White and Martin 2002), 77% of the world's forests were controlled by governments in 2002. A recent update of this report (Sunderlin *et al* 2008) shows that there is a clear tendency to grant more property rights to local populations, communities and individuals, but that such evolution will take a considerable length of time before the inversion of this public/private ratio has been achieved.

In this context, it is useful to consider the implications of a market-based mechanism on the redistribution of wealth within a given country, according to the way in which it is used to modify the behaviour of deforestation agents. This is also pertinent in terms of effectiveness, as it is not realistic to think that impoverishment of the forest population, resulting from inequitable distribution, could lead to the sustainable maintenance of forest cover.

Agents of deforestation can be of several types: shifting cultivators, small farmers, soya or oil palm growers, livestock farmers, land speculators, spontaneous or government-induced migrants, etc. For reasons linked to the availability of capital, the legality of activities and the ability to access agricultural markets (to give just some examples), these categories of deforestation agents are more or less sensitive to different types of financial incentives, regulations and coercion. Let us take two opposite examples: the oil palm growers in Indonesia and the shifting cultivators in central Africa. The former are, for the vast majority, private companies that benefit from licenses on public land granted by the Ministry of Forests. In this case it is the responsibility of the authorities to stop the allocation of licences. Whereas shifting cultivators often act illegally because their property rights are poorly recognised, their access to markets is very limited, and they practice subsistence agriculture. The government then has limited room for manoeuvre, unless they increase controls or provide alternative sources of revenue.

Therefore, it appears that a market-based mechanism at a national scale, that would distribute carbon credits to governments in return for a reduction in deforestation, could have important consequences in terms of redistribution. Agents whose property rights are not officially recognised by public bodies may undergo coercive measures to stop their activities. However, these agents are all the more vulnerable as they usually practice subsistence agriculture. On the other hand, companies to which the government grants licenses for forest production and conversion would be able to negotiate the financing of compensation in return for ceasing their activities, on the basis of opportunity costs. Therefore, aspects of redistribution are at the heart of the market-based mechanism concept, the successful application of which seems closely dependent on property rights that remain insufficiently defined in rainforest countries².

The issue of property rights is also very pertinent in terms of the hypothesis that the market will enable the identification of the least expensive activities. One must notice that the economic costs (or total costs) are mainly constituted by opportunity costs, i.e. the revenues

² A recent article has shown that conflicts have emerged in Papua New Guinea where the government seems to have discouraged the negotiation of contracts between foreign investors and landowners, in order to centralise all contracts and financial transactions ('Carbon trading tension mounts in PNG', ABC News, 13 November 2008, www.abc.net.au).

suppressed due to the absence of forest conversion. The implementation costs (or visible costs) only represent a fraction of the total costs, varying in proportion from one case to another. Notwithstanding strong methodological controversies regarding the calculation of opportunity costs (see Pirard 2008b), it must be appreciated that deforestation can be slowed without the opportunity costs being fully compensated. For example, when a protected area is designated in a region where property rights are poorly recognised, it cannot be guaranteed that the agents affected will be able to benefit from financial compensations equivalent to their opportunity costs. It is therefore probable that implementation costs for emission reductions, i.e. the costs incurred by those who will benefit from payments through the allocation of carbon credits for deforestation reduction - and who will arbitrate over cost/benefits (e.g. the delimitation of a protected area and its control) - will be lower than the economic costs (or total costs) of these reductions. The absence of recognised property rights in the case of a market-based mechanism that encourages the maximization of profits, then leads to an important risk of inequitable redistribution of wealth through a clear disassociation between the implementation costs and the opportunity costs of deforestation reduction.

The choice of policies depends on the type of financing: from a reduction of agricultural rents to an increase in forests rents

Basing the fight against deforestation on a market-based mechanism has a third implication, with regard to the choice of domestic policies and measures. To a certain extent this choice is linked, as we propose to discuss, to a particular mode of financing which follows reward logic rather than one of compensation and support.

Although numerous studies are available to calculate the opportunity costs of avoided deforestation, in reality their utility seems very limited to forecasting what would be the financial requirement to act against deforestation. As the price of carbon credits will fluctuate according to parameters that have no link with tropical forestry (level of commitment for reduction in Annex B countries, costs of reduction in other sectors...), there is no reason why this price should correspond to the opportunity costs of ending large scale cultivation of soya in the Brazilian Amazon, shifting cultivation in the Congo basin, or oil palm in Indonesia. Yet, the study commissioned on this topic by the Stern report on climate change, calculates that reducing tropical deforestation by half would cost \$5 billion per year (Grieg-Gran 2006), based on opportunity costs updated over a period of thirty years. Two years later the study was revised and the cost was re-evaluated to \$7 billion per year... an increase that was due to international price rises of certain agricultural commodities. We can clearly see that the limitations of this exercise are that it is incapable of giving useful indications in terms of the real costs of the implementation of policies and measures against deforestation.

The rules of the game, as defined by a market-based mechanism, will therefore follow the idea of reward for the parties eligible for forest carbon stocks: governments, local administrations, private companies, local populations, etc. This reward will vary according to their ability to: negotiate favourable reference scenarios at the beginning of the period; impact upon the deforestation dynamic; negotiate fair contracts with investors; and forecast the evolution of the market prices of carbon and agricultural commodities over several years. According to economic theory, it is in the interest of the market to create conditions for a dynamic price equilibrium, unknown at the beginning, according to supply and demand and production costs (which here are the costs for emission reduction).

Therefore, the position that supporters of a market-based mechanism must hold is to reject the concept of compensation for deforestation agents who endure opportunity costs resulting from a rejection of forest conversion (or even degradation, depending on the mechanism's

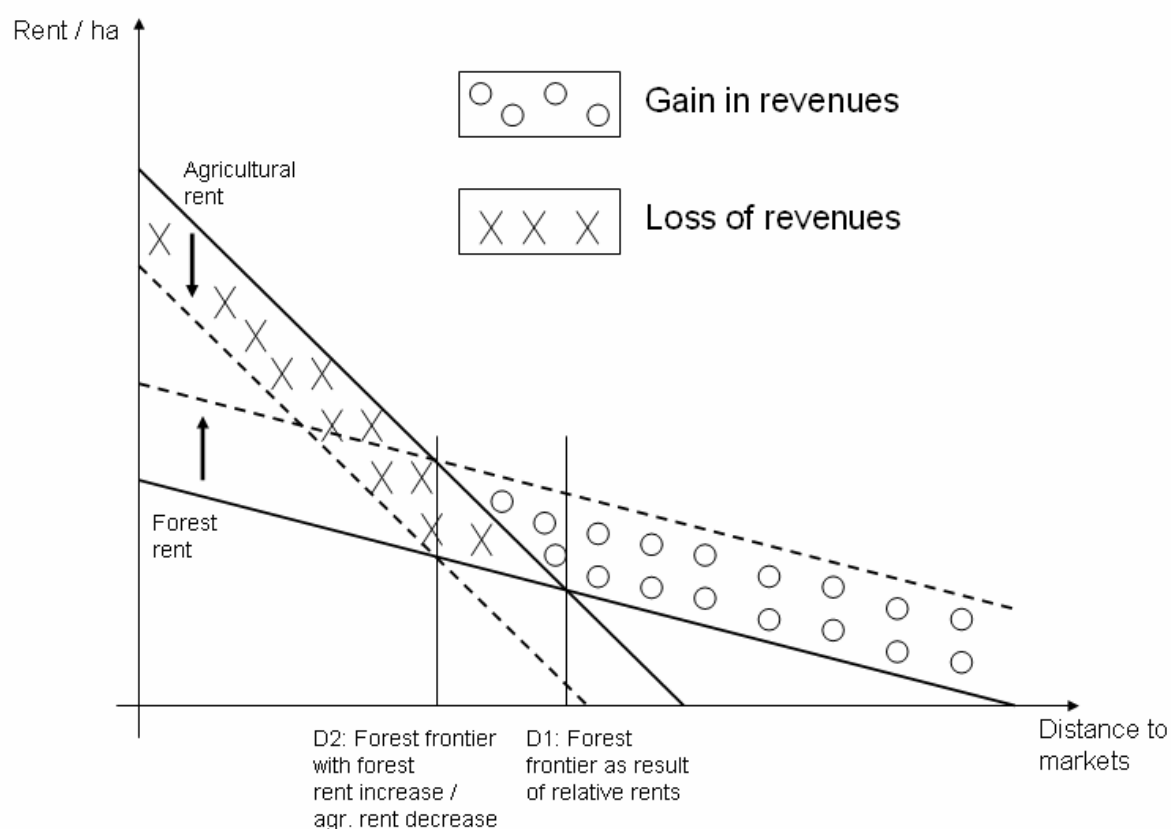
modalities). But it has to be acknowledged, and the consequences drawn from it. These consequences are linked mainly to two points that we will briefly discuss: the relative evolution of forest and agricultural rents, and the political economy of decisions concerning public forest policies.

According to the most common theories used to explain tropical deforestation, the evolution of relative agricultural and forest rents (management with the maintenance of forest cover) is a decisive factor and varies in time and space (Angelsen 2007). On one side, the distance between land and its market has a varying impact on these rents - the nearer the land is to a market, the more agriculture offers greater profitability than forest (model of spatial economy by von Thünen). On the other side, some changes occur in time that modify these rents, whether it is the building of roads, an increase in the demand and of labour costs, economic development, etc (theory of forest transition, see Rudel *et al* 2005). To somewhat simplify the issue, we can therefore deduce that decisions causing deforestation are taken according to the relative value of these agricultural and forest rents on a given area. This is only a schematic view, as decisions of land use can be made with a lack of information, or independently from such information (e.g. some licences are distributed to certain groups whose agricultural activity is globally less profitable than the sustainable use of the forest by local populations, often in the production of non-commercial goods). However, this framework of analysis allows a synthetic, operational and productive visualization of the different possible policies aimed at addressing deforestation.

Then, we can consider two large categories of domestic policies and measures: those that diminish the agricultural rent and those that increase the forest rent. For example, better control over illegal activities and encroachment, the creation of protected areas, the restriction of licences for agricultural production, or a decrease of subsidies for livestock farming, are translated in practice by a reduction or even suppression of agricultural rent. Indeed, these measures either result in the pure and simple suppression of agricultural income (protected areas), or to their reduction (less subsidies allocated to farmers). On the other hand, a recognition of the property rights of local populations, the decrease of taxes for sustainable forest management or direct financial aid with systems such as the Payments for Environmental Services (PES), are translated in practice by an increase, or even a creation of forest rent.

These two categories are opposed to each other in terms of redistribution, because policies that increase the forest rent require the engagement of financial transfers to deforestation agents, whereas policies that reduce agricultural rent are more about the ceasing of such financial transfers, or even of cuts in public spending (abandonment of road infrastructure projects or programmes of agricultural subsidies). For deforestation agents, the nature of these policies is therefore far from economically neutral, as shown in Figure 3. This is an important point to underline, because most policy types that diminish agricultural rents are inexpensive for governments, who could therefore favour them in order to optimise profits. Which is all the more likely to happen with the reward (rather than compensation) logic of the market, in the case of governments that are not necessarily 'benevolent', and where the interests of its leaders sometimes differ from those of the people they govern (Karsenty and Fournier 2008).

Figure 3 Avoiding deforestation with lower agricultural rents or higher forest rents (or off farm economic activities)



Conclusive comments

Some negotiations are in progress to decide on the nature and the functioning of an international REDD mechanism that would allow the financing of the fight against tropical deforestation through reduction of carbon emission, within the UNFCCC framework. We have analysed some implications of the adoption of a market-based mechanism for this purpose, which would consist of the distribution of tradable carbon credits to countries that reduced their emissions.

A first implication is that the quantification of results becomes unavoidable with this option. However, the calculation of a reference scenario, which is the crux of this quantification, poses possibly insurmountable problems because of the complex dynamic of deforestation and of its unpredictable nature. This could lead to the development of alternative approaches, for example the creation of an indicator that allows the identification of countries that have made efficient efforts. The issue is therefore raised concerning the best compromise between, on one hand the granting of rewards proportional to the results, and these results having to be estimated according to an objective that will, to a certain extent, be the product of negotiation between the participating countries: and on the other hand, a financing of policies and measures capable of reducing deforestation, this financing being partially disconnected

from the quantification of results. It must be emphasised that a market-based mechanism becomes difficult to apply in the latter case.

A second implication is that the property rights over forest resources, which are generally public or poorly defined in the countries concerned, raise the problem of the domestic redistribution of the benefits generated by the allocation and then the sale of carbon credits. While the least expensive options will probably concern forest populations whose property rights are poorly recognised, there is real risk that the market will only consider visible costs (implementation) and not the entire opportunity costs (compensation of losses). In this regard, it is possible to think about a safety net that could ensure that REDD mechanisms are not vectors for the deepening of inequality in the countries that benefit from carbon credit grants. This is a delicate issue because the sovereignty principle is often put forward to justify that only the results should be taken into account, without considering the means implemented within the countries that benefit from financial transfers.

A third implication is that a market-based mechanism will translate into an encouragement for governments to optimise the profits coming from deforestation reduction, by favouring the principle of reward over compensation. Moreover, initial financing will be used mainly to prepare the participating countries, while domestic policies might be financed subsequently on the basis of quantifiable results. This runs the risk of encouraging governments to favour the reduction of agricultural rents (low cost) rather than increasing forest rents (high cost). This is far from being financially neutral for local deforestation agents who are the first to be affected. This risk is inherent to the market logic, at least in the short and medium term, as long as the governments are able to control the activities of forest populations in the absence of satisfying revenue distribution. Furthermore, this risk decreases when governments act with greater benevolence and follow objectives of general concern.

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In the context of the 14th Conference of the Parties to be held in Poznan in December 2008, this paper discusses the REDD mechanism (Reducing Emissions from Deforestation and Degradation) which is currently under negotiation. As the role of the market is a central element in these discussions, the author explains the terms of the debate in order to enable a better understanding of the issues at stake in the upcoming decision-making process.

There are three main implications of a market mechanism:

- A precise quantification of emission reductions in comparison to a reference scenario is a challenge with consequences for the optimal allocation of financial resources (where efforts are made), and thus on the economic efficiency of the mechanism.
- The nature and status of the property rights on forest resources are key to the fair redistribution of benefits accrued from the sale of carbon credits. Generally, these rights (use and ownership) will greatly determine whether seemingly lower cost emission reduction activities will properly take into account the opportunity costs.
- The notion of reward is favoured rather than compensation, and governments are thus encouraged to maximise the profits of deforestation reduction. This could lead to a preference for domestic policies that favour a reduction in agricultural rents and, in consequence, a reduction of local revenues; rather than desirable policies that increase forest rents and as such are likely to be the only ones capable of increasing local revenues and tackling poverty.

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