Optimal Damage Schemes for CDM Forestry Projects

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Abstract:
According to the Kyoto rules the temporary Certified Emission Rights stemming from CDM forestry projects have to be replaced by the buyer, if the underlying absorption is undone. This leads to inefficiently low precaution levels the seller’s part. This paper examines the possibility to remedy this regulatory shortfall at the level of the contract between buyer and seller. While it is impossible to determine a contractual damage scheme that is efficient on all margins, from a theoretical point of view, damages corresponding to the expectation measure are to be recommended, whereas performance excuses should be narrowly defined. The damage schemes in existing CDM contracts seem, however, to deviate significantly from this recommendation.

1. Introduction: Afforestation and Reforestation projects within the CDM

Within the framework of the Clean Development Mechanism (CDM), the Kyoto Protocol enables private or public entities (e.g. companies) situated in industrialized and transformation countries to carry out reduction projects in developing countries. As the marginal costs of abatement are usually lower in developing countries, greenhouse gases can be abated at lower cost through such projects than by comparable endeavors in industrialized countries.

The decisions of the 9th Conference of the Parties (CoP9) of the United Nations Framework Convention on Climate Change (UNFCCC) prepared the inclusion of afforestation and reforestation projects within the framework of the CDM. This class of projects is based on the fact that forests absorb atmospheric carbon-dioxide for a certain time (the lifetime of the forest). Forestry projects can therefore be used as a buffer until the CO2 reductions in energy production and other processes are feasible in an affordable manner and on a large scale.

As forest absorption of CO2 is limited by its lifetime and deforestation processes consequently lead to re-emitting the CO2, forestry projects suffer from the problem of non-permanence. This non-permanence was an issue widely discussed at the Kyoto-negotiations as it has to be taken into account when it comes to the certification of the absorbed amount of CO2. In contrast to reduction projects, where emissions are permanently avoided, the certificates for forestry projects have to reflect this non-permanence in some way.

The problem of non-permanence has been solved by creating two different sorts of so-called “temporary” Certified Emission Rights (CERs) that are issued following a verification of the absorbed CO2: the tCERs and the lCERs. A project sponsor can decide in the beginning of the project on one of the two approaches. If the ICER approach is chosen, a project generates at first verification a certain amount of ICERS that are valid till the end of the project. The absorbed amount is regularly verified by an independent verifier. If during the verification it is recognized and reported that the absorbed amount has increased, additional ICERS are issued (as forests grow this should be the usual case). If, however, the absorbed amount has diminished, the respective amount of ICERS is invalidated. In contrast, tCERs are only valid for one commitment period, i.e. five years, and therefore have to be replaced by the buyer at the beginning of the next period. A project always generates as many tCERs as have been reported by the verifier in the latest verification report.
2. CDM forestry projects in the Kyoto Protocol

The responsibility for replacing temporary CERs generated by forestry projects lies within the duties of the buyer country. As we will see, this may not be efficient from an incentive perspective, but is the logical consequence of the institutional framework of the UNFCCC and the Kyoto Protocol.

While most of the industrialized and transition countries that are listed in the Annex I of the UNFCCC have agreed to greenhouse gas emission reduction targets, the developing countries did not commit to such restrictions. This widely accepted differentiation between Annex I-countries and non-Annex I-countries has been made in order to take account of the increasing energy needs in the process of development. However, the differentiation in status is also reflected in the registry system, that will be used to trace and manage the flows of the different emission rights created within the Kyoto system.

Figure 1 shows a schematic representation of the most important interlinkages that have to be taken into account in an analysis of the incentives of buyer and seller of temporary CERs.
In this figure, it is assumed that the project proposal of the project sponsor has already been accepted by the respective bodies within the UNFCCC. The project sponsor concludes an contract with the project investor (buyer of the temporary CERs). In most cases, this contract will take the form of a forward purchase agreement. Within such a contract, seller (project sponsor) and buyer (project investor) exchange the temporary CERs against a start-up investment and/or a specified payment per temporary CER, which is in fact the contracted price for these certificates. Furthermore, the number of temporary CERs are to be specified within the contract.

After the first project verification, the first temporary CERs are issued to the project sponsor, who will hand them over to the project investor. The investor uses the temporary CERs to fulfill his emission reduction obligations within his home country or sells them on the (yet emerging) secondary carbon market. The respective buyer country itself can now use these emission rights to fulfill its Kyoto target or sell those rights on the inter-state market, which is set up within the Kyoto Protocol. In both cases, the temporary CERs are accounted for in the national and international registry system.

If the amount of absorbed carbon has diminished from one verification period to another (e.g. due to a forest fire), this leads—depending on the approach chosen—to the following consequences:

- In the case of the ICER approach, ICERs corresponding to the difference in absorption have to be replaced within the registry of the Annex B-country that uses them to fulfill its emission target.\(^1\)

- In the case of tCERs, a smaller amount of tCERs is issued that reflects the true level of absorption.\(^2\)

In both cases the buyer country of the temporary CERs is liable for the replacement of those certificates that are no longer available to meet its target. If the temporary CERs have been used by the project investor in order to fulfill his individual emission target as a private entity within the country, the country will probably transfer the obligation of replacement to the respective entity. There is, however, within the Kyoto institutions no possibility to have recourse to the seller country or the project sponsor (who will usually be a private entity registered in the seller country).

In most cases, the influence of the buyer country or the project investor on forest management will be quite small. The forest management activities are likely to be within the responsibility of the project sponsor or some agent sub-contracted by him. Precautions against events that reduce the amount of carbon absorbed by the forest—such as forest fires, infestation with parasites or illegal logging—can be implemented by the project sponsor at lower cost than by the investor. Economic theory suggests that the responsibility for a damage should be attributed to the party that can best prevent it. By attributing the

\(^1\) FCCC/CP/2003/6/Add.2 § 47-48
\(^2\) FCCC/CP/2003/6/Add.2 § 41-44
responsibility for replacing invalid temporary CERs completely to the buyer countries, the Kyoto rules disrespect this “principle of the cheapest cost avoider”. If this shortcoming in the Kyoto rules is not corrected for, these rules are likely to lead to an inefficiently low level of precaution.

The resulting higher risk of the investor will be reflected in lower prices for temporary CERs. This obviously leads to a decrease in the implementation of higher-quality projects that usually imply higher costs (of precaution). Therefore, the attribution of full liability to the buyer entails a problem of adverse selection, that disincentivizes the implementation of projects with higher levels of precaution.

There are several factors that increase this disincentive. One important aspect is the distribution of the investor’s payment to the sponsor over time. The higher the “start-up” investment and the lower the contracted unit-price of the temporary CERs, the lower are the sponsor’s expected revenues after the initial investment in the future. The level of precaution will therefore decrease the more, the higher the initial investment is. Furthermore, the incentive to lower the cost of precaution will increase with project duration as the remaining future revenue flows decrease with the project’s progress in time. As project duration is limited, there might be the possibility of an uncooperative end-game phenomenon.

Another problem with attributing the liability completely to the buyer results from the fact that he has to bear the risk of changes in the seller’s opportunity costs. If, for example, timber prices rise, a breach of the contract by the project sponsor might become profitable. As in a system of pure buyer liability the seller does not have to compensate the investor, the risk of such price changes lies with the buyer of the temporary CERs. Again, if the attribution of responsibility to replace the temporary CERs is not corrected for at the contractual level, this will lead to a decrease of attractiveness of CDM forestry projects and result in lower prices for temporary CERs.

It is to be noted that the architects of the Kyoto System have been aware of these incentive problems in the design of the other flexible mechanisms of the Kyoto Protocol as the Joint Implementation (JI) and (inter-state) Emissions Trading (ET), and abode by the principle of the cheapest cost avoider by implementing seller liability. Therefore, it is reasonable to ask, why the rules for temporary CERs attribute the responsibility for replacing invalid temporary CERs to the buyer. To answer this question it is important to have a closer look at the institutional context within which the CDM is placed. Seller liability is only economically sound if it can be enforced. However, the only sanctioning mechanism that exists within the Kyoto-system is related to the emission targets. Countries that do not fulfill their emission targets have to “overfulfill” their target in the following commitment period. As CDM host-countries have not committed to a emission reduction target, there exists—within the framework of public international law related to the Kyoto-system—no mechanism to enforce a potential

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3 The seller liability within those Mechanisms is implemented by the accounting rules that regulate the accounting between national registries: “LULUCF [Land Use, Land Use Change and Forestry] JI projects are not subject to the same rule as the CDM since JI projects occur between two countries with inventories and caps on emissions. Provided that inventories are capable of precisely capturing changes in the stocks of carbon in vegetation, any reversals of initial removals of atmospheric carbon dioxide by sinks show up as debits in the host country’s inventory.” Bosquet (2005), 288.

4 FCCC/CP/2001/13/Add.3
seller liability. Given these restrictions it is currently reasonable to attribute the responsibility for invalid CERs to the buyer, as he is the only possible subject of enforcement. So, even though from a global perspective, the incentives of the current system seem to be not optimal, it has to be emphasized that from an intra-systemic perspective they are the best possible ones.

The pure buyer liability established in the Kyoto Protocol could be corrected for by a more efficient sharing of responsibilities at the level of the purchase contract. A well functioning chain of recourse from the Annex B-country via the project investor to the project sponsor may (partly) correct for the disincentives of the Kyoto Protocol by using the enforcement mechanisms of private law.

3. Contracts for CDM Forestry Projects

Contracts that deal with the transfer of Emission Rights stemming from project mechanisms (mainly JI and CDM) are generally referred to as “Carbon Contracts”. The term Carbon Contract includes agreements that deal with bilateral as well as unilateral CDM/JI projects. While bilateral projects generally have a set-up as illustrated in figure 1, the term “unilateral project” refers to project types where the investor as well as the project sponsor are entities registered in the host country (possibly they are one and the same). A specific form of “bilateral” projects can be found, where the project investor is a fund, pooling the investments of several different actors. An Example for this latter form is the World Bank’s Prototype Carbon Fund.

The organizational structure between project investor and project sponsor can vary with respect to the underlying project agreement. Here, it is important to differentiate between different levels of integration. The concluded contracts could, for example, reach from simple purchase contracts over Build/Operate/Transfer (BOT) or service contracts to joint venture contracts or other forms of equity investment. The highest level of integration is reached if the project sponsor or investor is a subsidiary or a branch office of the other party. For the analysis of the control structures of the contract between buyer and seller this differentiation is very important because within a highly integrated structure the parties can usually exercise a higher level of control, which might render contractual caveat to insure against opportunistic breach unnecessary.

The choice of contract type also depends on the sharing of risks between the parties. Related to this problem is the definition of the deliverable. In most contracts that have been concluded so far (e.g. by the World Bank’s Carbon Business or the Dutch government scheme) the risk that Kyoto will not enter into force is borne by the buyer. In this case the project sponsor does not have to deliver Kyoto certificates, like CERs, but verified Emission Reductions (ERs) that could be transformed into Kyoto Certificates as soon as the institutional framework is in place.

5 “A Carbon Contract foresees a payment against the achievement of an activity that leads to the removal or mitigation of greenhouse gases (GHGs). Once this has been verified by an independent auditor, the reduction or removal of GHGs may create a right under an existing or future regulatory regime.” Streck (2006), 357.
The buyer of temporary CERs will usually not have the expertise in forest management in developing countries. Therefore, it is likely that for Forestry CDM projects the level of integration between the project investor and the sponsor is not very high, i.e. they will be probably two separate entities independent from one another. Thus, transfers of temporary CERs will probably take the form of forward purchase contracts on verified emissions or on the respective emission rights (temporary CERs). Such contracts are also referred to as “Emission Reduction Purchase Agreements (ERPAs)”. Most agreements concluded to date take the form of ERPAs, which usually determine a price per mitigated or removed unit of Carbon resulting from the project in the future. In the following, we will assume that contracts on transactions concerning CDM forestry projects will take a similar form as existing ERPAs.

A typical forestry project within the CDM would be organized in the following way: The project investor provides an initial investment to cover the project start-up costs. The project sponsor prepares the project documentation and provides a monitoring and verification plan. The project then passes through the CDM-submission process. After having completed this process the sponsor starts the afforestation or reforestation activities in the project area. After the first project verification the reported absorption is certified and the corresponding temporary CERs are issued to the project sponsor who sells the number of CERs contracted for to the project investor at the agreed contract price. This procedure is repeated after every project verification and the resulting issuance of CERs. It is usually specified in the ERPA, what happens if the project generates a higher amount of temporary CERs than agreed upon (i.e. if the project absorption is higher than expected). Either the investor buys (or has an option to buy) the excess amount to a specified price (which can differ from the agreed contract price for the agreed amount), or the sponsor sells the excess amount on the carbon market.

In order to guarantee that the amount of the temporary CERs corresponds to the portion of carbon absorbed by the forest, the Cop 9 decisions prescribe a periodic verification of the absorption levels. This verification, performed by an independent accredited verifier (the so-called Designated Operational Entity, DOE), has to be repeated every five years. If the ICER-approach is chosen, the ICERs are issued after the first verification period. These ICERs are valid until the end of the project duration. In the following reviews the amount carbon absorbed is compared with the reported amount of the previous verification. An increase in absorbed carbon leads to the issuance of additional ICERs. If, however, the amount absorbed has decreased, the respective number of certificates is invalidated. In case the tCER approach is chosen, the tCERs issued always correspond to the amount verified in the latest review. The tCERs are only valid during one Commitment Period of the Kyoto Protocol, which corresponds to five years. It is therefore in the interest of the project sponsor to chose the verification periods accordingly.

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6 Derivative and secondary trading instruments have already started to occur in the emissions trading marketplace. A discussion of these instruments is, however, beyond the scope of this paper.
7 This is, however, not a necessary step, the ERPA could also be based on payments on delivery.
8 In the beginning of the project two different approaches to the project duration can be chosen. Either the project generates carbon credits for a maximum of 30 years without renewal or the project duration is limited to a 20 years-period, which may be renewed two times. The maximum possible project duration is therefore 60 years. (FCCC/CP/2003/6/Add.2/Art.23 p. 21)
Due to the non-permanent nature of carbon offsets stemming from CDM forestry projects, the buying party of the contract faces the same problem as the buyer country within the regulations of the Kyoto protocol. Changes in opportunity costs, like rising timber prices leading to deliberate harvest, or high control costs with respect to the precaution level can lead to opportunistic behavior on the part of the seller. The incentive problem is most obvious in the case of the ICER approach. The ICERs can be invalidated by activities (deliberate harvest) or inactivity (low levels of precaution) by the project sponsor. In the case of the tCERs the problem may be less obvious. If the number of tCERs that can be sold to the investor is lower than planned, the project sponsor will have a lower cash flow on the project. However, in the tCER approach there is potential for opportunistic behavior as well, as the project investor—while managing his carbon portfolio—is planning with the contracted amount. Furthermore, in both approaches there is the risk of being (partly of fully) expropriated of the initial investment.

One possibility to guarantee the planned amount of temporary CERs within the buyers carbon management is to follow a self-insurance strategy: Bosquet (2005) suggests that the buyer could foresee possible shortfalls within the management of his offset portfolio by taking into account the probabilities of underperformance of different sellers. This strategy will, however, not solve the underlying moral hazard problem as the incentives to opportunistic behavior from the part of the seller(s) are not mitigated. From a perspective of economic efficiency it seems to be more reasonable to include contract provisions that deal with non- or underperformance and to include damage payments. The accurate damage scheme for carbon contracts has been subject to an intensive discussion between the different players in the emerging carbon business. In order to give an answer to the question of what an efficient damage scheme might be, in the following section, we will discuss the different efficiency criteria that have been developed in the field of Law and Economics.

4. Optimal Damages in Law and Economics

Generally, in most legal systems non-performance—like not delivering the agreed number of temporary CERs—can either be ‘excused’ or is to be interpreted as a breach of contract. A performance excuse is given if a promisor—like the seller in a forestry CDM project—can prove that non-performance is due to some contingency, such that performance of the contract is no longer a reasonable option. Contract excuses that are usually codified in contract law are, for example, mistake, incapacity, duress or fraud. Whether a specific event is interpreted as a performance excuse often depends on the construction by the court. In addition to the performance excuses featuring in contract law, the contract parties can determine further excuses within the contract, that specify more or less precisely the events that allow non-performance without compensation.

Without presentation of valid performance excuses, non-performance is to be interpreted as a breach of contract. In this case the promisee can ask for compensation in the form of damage payments that are often specified in the contract. If the promisor—the seller—refuses such a payment the buyer has the possibility to seek arbitration (if the contract

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9 For an economic analysis of contract excuses see, for example, Eisenberg (1982) and Cooter (1985).
includes an arbitration clause) or take court action. The arbitrator or the legal court is then able to either determine a compensation in form of damage payments or to enforce (or—in case of the arbitrator—to ask for the enforcement of) the performance of the contract (specific performance). The remedy of specific performance is only rarely used, as in most cases it is more efficient to compensate the promisee.

Instead of relying on the courts to determine the damages after breach the parties can also \textit{ex ante} agree on how much compensation will have to be paid should one of them breach the contract. Such stipulated damages are called "liquidated damages". Liquidated damages can represent (ex ante) reasonable estimates of the true losses or they can be deliberately over- or undercompensatory. In order to discuss the efficiency of damage schemes within existing ERPAs it is useful to consult the findings in the field of Law and Economics with respect to contractual damages.

In economic terms, a contract is a mutually beneficial agreement for all contracting parties. If the agreement is so constructed that further mutually beneficial changes are not possible, the agreement is Pareto efficient. Shavell (2004) shows that in case a contract is Pareto efficient and takes into account each conceivable circumstance (complete contingent contract), the parties would agree to damages high enough that the terms would always be obeyed. As the transaction costs to include all possible circumstances, in most cases, are prohibitively high, the damage measures for these contracts can be considered as a substitute for complete contingent contracts.

In the last 25 years, a lot of work has been done within the field of Law and Economics in order to identify an efficient level of contractual damages. There is general consensus that it is impossible to formulate a Pareto-efficient damage scheme that is universally applicable to all contractual situations. In fact, there are several different variables with respect to which efficiency can be striven for and the damage schemes that are efficient for one parameter are often not efficient with respect to another.

The above-mentioned problem of changes in opportunity costs, like rising timber prices, is closely related to the question of deliberate breach, i.e. the first decision that is going to be discussed in the following subsections. This decision has to be juxtaposed to the decision to sign the contract in the first place, as the damage rule that leads to an efficient contract breach is not efficient with respect to the decision to sign and vice versa.\textsuperscript{10} Further considerations have to be made with respect to the level of precaution, reliance investments, risk-sharing and the economic effects of overcompensating contractual penalties.

### 4.1 Efficient Breach

The deliverable generated by CDM forestry projects (i.e. the carbon offset) is based on the amount of carbon sequestered through afforestation/reforestation efforts. If, however, changes in the opportunity costs of the project sponsor occur—harvesting the forest could, for example, become economically advantageous—the seller might be tempted to breach the

\textsuperscript{10} For a formal proof of this problem, see Shavell (2004).
contract. If no damages have to be paid in case of deliberate breach, the seller faces in fact no financial sanction, which renders the contract practically unenforceable. Unenforceability of a contract is inefficient as the breaching party does not take into account the consequences that his breach entails to the contract partner. In order to internalize these external costs it would be necessary to determine a damage payment that fully compensates the contract partner, i.e. the buyer should not be worse off than in the case of performance of the contract. If the court prescribes full compensation in legal terms this is referred to as “expectation measure”. In economic terms this corresponds to the Pigouvian solution to the externality-problem.

In the context of a CDM forestry project the application of the expectation measure implies that a project sponsor who does not deliver the agreed temporary CERs has to pay the investor the market value of those temporary CERs or alternatively buy certificates on the market and hand them over to the investor. The seller would therefore only breach the contract if the alternative use of the forest is higher than full compensation.

The courts in Civil as well as Common contract law systems usually prefer to apply the expectation measure and put a party injured by a breach into the position he or she would have been in had the contract been performed. As full compensation is in fact the defining property of a social optimum in the sense of Pareto, expectation damages are often said to yield a situation of “efficient breach”. However, a damage rule that guarantees full compensation to the promisee is not efficient on other margins, for example the overall number of contracts signed.

4.2 Efficient number of contracts

If a breaching party always has to set the contract partner on the same utility level as if the contract had been performed, she will take that into account at the decision to sign the contract in the first place. If there is the possibility of an unforeseen rise of production costs, the seller might not be willing to sign the contract. In order to showcase the problem of efficient signing, consider the following example: A forestry carbon contract might be worth 100'000€ for each of the parties. With a probability of 10%, a tornado destroys the forest and the project sponsor loses—after having fully compensated the project investor with 100'000€—1 million € due to the loss of future harvest. The promisor will not sign the contract as he will lose on the average 100’000€. But with respect to the overall contractual gain it would be efficient to conclude the contract as the sum of the expected gains is 90.000€. Thus, fully compensating damages corresponding to the expectation measure lead to an inefficiently low level of contracts.

The problem described here might be solved by adapting the contract-related transfers to the different probabilities of breach of each party. However, as the parties are usually poorly informed about the events that could lead to a breach by the contract partner, it would be in the interest of each party to overstate the probability to breach. Therefore, such an approach

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11 Burton (1995), 279
12 For a formal discussion on the optimality of the expectation measure, see Shavell (2004).
13 For a further discussion of this example in general terms, see Friedman (2000), 165f.
will always be subject to moral hazard-problems. The next best solution would be to apply a damage scheme under which the decision to sign a contract is only guided by the information of one’s own probability to breach. Such a damage scheme is the so-called “reliance measure”, which implies that the breaching party has to compensate the contract partner for all expenditures that have been made in reliance on the fulfillment of the contract. That means that the non-breaching party has to be made as well off as if the contract had never been signed. As the reliance measure is necessarily lower than the expectation measure, there exists no damage scheme that leads to efficient breach and efficient signing. As will be discussed below, for reasons of political acceptability of forestry projects it might be useful to opt for the expectation measure and accept the efficiency losses with respect to the number of contracts.

4.3 Optimal precaution

As mentioned earlier, the absorption of carbon by a forest is not permanent but depends on the lifetime of the trees. Thus, there are events that could lead to an untimely re-emission of the absorbed carbon into the atmosphere, like forest fires, infestation with parasites or illegal logging. If the CO2-absorption of the forest is reduced by such an event, the seller will not be able to deliver the agreed Emission Reductions, i.e. she will not adhere to the ERPA due to impossibility. If such an unforeseen event counts as performance excuse, this implies that the buyer has to bear the costs of the reduction of tCERs respectively the non-issued amount of tCERs. From an Law and Economics perspective such an extensive construction of the impossibility excuse is not per se efficient. It rather depends on the different parties’ costs of preventing or insuring against the event in question. Posner and Rosenthal (1977) have examined the impossibility excuse from this perspective and deduced that the burden of such unexpected events should be attributed to the “superior risk bearer”. The superior risk bearer is the party that has lower costs to prevent or reduce the risk. If the risk could not have been prevented, the party that is in a better position to insure itself against the risk, is the superior risk bearer.14 As mentioned earlier, it is assumed throughout this paper that the level of integration between buyer and seller of CDM forestry project is not very high. The buyer will in most cases be an entity situated in an Annex I-country that has no specific knowledge on Forestry projects in the host country of the project. The project sponsor is the party that either implements the project herself or charges an agent with the implementation of the project. In both cases the seller has a higher level of control over the project which includes also measures of precaution against events that could lead to a reduction of the absorptive capacity of the forest. So, in the transactional structure that is assumed here, the seller is the superior risk bearer with respect to such events. However, there might be cases where no measures to directly reduce a risk can be possibly taken. For example, the project might be expropriated by the host government. As no precautionary measures can be taken, the buyer would most probably be the superior risk bearer as he will be better able to insure himself against such events by diversifying his portfolio of carbon certificates.

It has to be noted that the concept of the superior risk bearer is in fact identical to the cheapest cost avoider mentioned in section 2 and that is not respected within the Kyoto

14 For a heuristic for an efficient attribution of the burden, see Schäfer and Ott (2000), 387.
rules. So, if the private contract is to correct the disincentives of the Kyoto rules the impossibility excuse should not be applicable to those cases where the seller is able to take measures against events that are harmful to the absorptive capacity of the forest. Furthermore, the optimal level of precaution will only be met if the seller is forced to take into account the value of the deliverable to the buyer. It follows that—under the assumption of risk-neutral actors—the damages that guarantee optimal precaution have to be fully compensatory in the sense of the expectation measure.

The application of the principle of the cheapest cost-avoider within forestry ERPAs represents a re-allocation of risks. Such a risk allocation leads on the one hand to the intended increase of the seller’s precaution costs but also increases his business risk by the residual risk of an uncontrollable decrease in carbon absorption. A damage scheme that is optimal with respect to precaution will therefore necessarily entail higher prices for the certificates, as the seller needs to be compensated for the increase in production costs. The problem of optimal-risk sharing will be further discussed below.

4.4 Efficient Reliance

The above-described problem of which party should prevent a contingency in a contract situation is similar to the idea of incentivizing precaution in a tort setting. The similarity to a tort case goes even further as not only the seller is able to reduce the harm from the contingency but also the buyer. Cooter (1985) describes the economic problem of this dual responsibility in a contract as follows:

“In general, the possibility of successful excuses may externalize the costs of not taking precaution, so that the promisor takes too little precaution and the probability of breach is excessive. Similarly, the possibility of compensation may externalize the costs of reliance, so the promisee relies too heavily and the harm that materializes in the event of breach is excessive." Cooter (1985), 14.

The problem of overreliance addressed by Cooter can appear when the buyer makes investments that are specific to the contract. For example, in a CDM reduction project the agreement can include the transfer of technology from the buyer to the seller. The buyer might deliver a new electricity generator that the seller uses in a power plant. Such a project showcases the idea of “Clean Development” very well, as new and more energy-efficient technology replaces older technology. The reduced emissions with respect to a “business as usual”-scenario or baseline can then be certified and transferred to the buyer. In such a set-up there will most probably occur contract-specific investments as the buyer will have to adapt his generator to the technical specifications of the seller’s power plant. Overreliance occurs when those specific investments—or in the terms of Law and Economics: “reliance investments”—are higher than could be justified by the probability that the seller will be able to perform. Whether the problem of overreliance occurs or not, depends on the choice of the contractual damage scheme. Shavell (1980) shows that expectation damages—that, as discussed above, are preferable with respect to efficient breach—will lead to excessively high levels of reliance. As expectation damages “insure” each party against the breach of the
other party, the private returns of reliance investments exceed the joint return. In order to overcome the problem of overreliance, the damages would have to be stipulated on a specific level in advance. In such a case of liquidated damages, the amount of damages to be paid in case of non-performance will be completely independent from the level of reliance. As the expected damages to the non-breaching party will be the same in any case, the party will choose the efficient reliance level. By choosing a scheme of liquidated damages, it is theoretically possible to achieve efficiency on another margin, too. If the liquidated damages equal the level of expectation damages they result in efficient breach, if they are set at the level of reliance damages, they result in an efficient number of contracts.

As liquidated damages have to be set in advance, they suffer, however, from a lower level of information with respect to the true loss than if the damages were set by a court after the breach. Whether stipulating damages is Pareto-superior to the other damage schemes depends on the size of the potential loss in efficiency through overreliance as well as how well damages can be predicted in advance. As far as CDM forestry projects are concerned, specific investments from the part of the buyer are supposedly quite insignificant. The problem of overreliance will therefore not be decisive in the choice of an optimal damage scheme.

4.5 Optimal risk sharing

In the discussion on optimal precaution it has been argued that a risk of non-performance should be borne by the contract party that can best avoid it or, if that is not possible, by the party that is the “cheapest insurer” against such a risk. It follows, with respect to the damage scheme, that positive damages are efficient if the seller is the superior risk bearer, otherwise zero damages are efficient. While the latter case would be identical to a valid performance excuse to the seller, the optimal level of damages for the first case can differ. White (1988) shows that the choice of the right level of damages is dependent on the risk preferences of the contract partners. Optimal risk sharing requires that the buyer’s, respectively the seller’s incomes, are the same in the breach as well as in the non-breach states. In case that both parties are risk neutral this leads to a level of damages that equals the expectation measure. As both parties to the contract are assumed to be companies—for which standard microeconomic theory assumes profit maximization—it is not implausible that risk neutrality of both parties might be the standard case. It is, however, possible that one or both parties are risk averse, which can lead to different efficient damage levels with respect to risk sharing. If the buyer is risk neutral and the seller is risk averse, the damage guaranteeing optimal risk sharing is necessarily lower than the expectation measure. Such a combination is also plausible as the buyer is often a large transnational company or a fund, while the project sponsor is possibly a small company (specialized in forestry projects in the host country), the decisions of which might be determined by its owners’ risk preferences. In this case the damage level is efficient with respect to risk sharing but entails excessive breach. The same is the case when both parties are risk averse, even though the damage level will then be closer to the expectation measure. The optimal remedy for the remaining

\[\text{However, the choice of expectation damages leads to more efficient investment in reliance than reliance damages. It can be shown that for any contract using reliance damages a contract using expectation damages exists such that the buyer and the seller are at least as well off as under the former contract. Shavell (1980, 2004).}\]
combination, a risk averse buyer and a risk neutral seller, would again be the expectation measure. The latter two cases, however, might not be very frequent as in most cases profit maximization can be reasonably assumed for the buyer.

There is a plethora of risks to be considered prior to the conclusion of an CDM Forestry ERPA. The risk that has been considered most important in the carbon business for a few years, the risk that the Kyoto Protocol will not enter into force (“Kyoto Risk”), has ceased to exist since the ratification of the Protocol through Russia, which entailed the entry into force of the Protocol. The remaining risks are more directly related to the project or the institutional framework of the countries involved. While most project related risks, like the dangers to the forest through fire are better controlled by the seller, the attribution of the so-called “regulatory risks” needs further discussion. The term regulatory risk refers to those risks genuine to all Carbon Contracts, which heavily depend on the regulatory design of the national climate policy. Regulatory risks can be divided into three categories:

- Risks in the implementation of the Kyoto Protocol
- Risks within the CDM process
- Other host country related risks\textsuperscript{16}

The first category of regulatory risks is related to the fact that the commodity exchanged, the temporary absorption of CO\textsubscript{2}, is in fact only valuable if it is accepted within a regulatory framework as an offset of GHG emissions. Like all Emission Rights stemming from the flexible mechanisms, temporary CERs are rights that are created under public international law, i.e. their existence depends on the correct implementation of an institutional framework within the host as well as the investor country. The host country has to assign a so-called Designated National Authority (DNA), that has to give its approval to the project. The DNA is also responsible for assuring that the project fulfills the criterion of sustainability, that is constitutive to a CDM project. The investor country, on the other hand, has to integrate the CDM specific regulation into its national regulation as otherwise the project investor will not be able to use the credits stemming from the project to offset his emissions or to sell them on the market. As this institutional framework is only about to come into existence such regulatory risks are considerable. An optimal sharing of these risks based on the principle of the superior risk bearer would probably result in each party bearing the risks of their respective home country. This assertion is based on the assumption that each party will be best informed with respect to the political and procedural preconditions in his own country. An investor from the EU, for example, will know better about the integration of CDM projects into the national regulation than his contract partner. The seller, on the other hand, will be more familiar with the necessary steps to be taken in the host country.

In order to receive certificates for CDM projects the project proposal has to go through a thorough pre-defined process including verification and validation of the reported carbon offset. Temporary CERs will only be issued if the project has passed the different checks

\textsuperscript{16} For a more detailed distinction between the different risks in Carbon Contracts see Streck (2005) and Wilder et al. (2005).
within the CDM process. In some existing Carbon Contracts, the risk that the parties may not be able to establish legal title to the carbon offset of the project is borne by the buyer. In these contracts the exchanged commodity consists of so-called verified Emission Reductions (ERs), which is in fact a right defined within the contract but cannot directly be used to offset Greenhouse Gas emissions within a regulatory regime. It is only when the project has successfully passed the CDM process, that the ERs can be transformed into CERs. So, some buyers in the “early action” phase of the carbon market were willing to fully bear the regulatory risk associated with the CDM process. Whether this risk attribution of these risks is economically sound depends on the distribution of responsibilities for the different steps of the CDM process between the parties. In most of the existing contracts the role of the buyer is played by a multinational institution (World Bank) or a Dutch national authority (ERUPT/CERUPT) more willing to bear the first-mover costs that represent in fact a public good insofar as know-how on the specificity of carbon offsets are created within the national and international regulatory authorities. It is, however, unlikely that private sector players who will enter the market for project offsets in the years to come will be willing to completely assume these risks. From a Law and Economics point of view this might contribute to the efficiency of the contracts. With respect to monitoring and accounting, the project sponsor will probably have lower costs of precaution than the project investor.

In addition to the risks described so far that deal with the institutional and regulatory design of national and international Kyoto institutions, there might appear other risks specific to the host country of the forestry project. Werksman et al. (2002) identify a tendency of expropriations in the natural resources sector through developing countries than in other fields, which might constitute an additional risk to CDM projects in general and forestry projects in particular. While such direct expropriations are quite rare, the risk of indirect expropriation through taxes or additional regulatory measures should not be underestimated.

Another risk specific to the host country might be unexpected local opposition to the nature of the project or its participants. It is difficult to determine a party that might be in general more qualified to foresee and insure against these country specific risks described here. In some circumstances the seller might be better informed about the political preferences leading to NGO opposition or expropriation through the state. In other cases, the buyer might be capable to assess these risks in a more appropriate way—due to larger experience in active foreign investment. It is probable that in these cases the optimal sharing of the risk can only be determined ex post (possibly by a court).

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17 “... since 1990, four of the fourteen investment disputes concluded by the International Center for the Settlement of Investment Disputes involved either petroleum extraction or electricity distribution. ... In addition, one recent dispute involved disagreements between a host and an investor over the valuation of a tract of rainforest that was expropriated for the purpose of creating a national park. This arose, in part, because many developing countries in the post-independence period were persuaded to sign over their natural resources on long-term concessions to foreign investors at prices well below their market value. When true prices were revealed, or when domestic demand for these resources grew, governments broke extortionate deals by exercising their “permanent sovereignty” over their natural resources. This history holds a salutary lesson for CDM. If similar extortionate deals are done in the CDM, including those that restrict land use over indefinite time periods, similar pressures could motivate a host government to directly expropriate either CDM projects or the contractual rights to the credits they may produce.” Werksman et al. (2002), 11-12. Further on the topic see also Ratliff (2005), 383.

18 Indirect expropriation through regulation might appear through changes in the project baseline due to unforeseeable environmental regulations or—more ill-natured—the refusal of entry to the third-party verifier that is prescribed by the Kyoto rules. Werksman et al. (2002), 12.
The risk sharing with respect to Carbon Contracts has been widely discussed by the major players on the pre-Kyoto carbon market. As a general conclusion from the viewpoint of economics, optimal sharing of the above-described risks depends on which party has control over the occurrence of the particular risk. That means, it will add to efficiency to attribute the risks to the superior risk bearer. However, it is to be mentioned that the contractual set-ups in CDM forestry project might involve a considerable amount of asymmetric information, i.e. a first best optimum is unlikely to be obtained within these contracts. One of the lessons of economic contract theory is that eliminating moral hazard by assigning a risk to one party will increase moral hazard by the other. So, in general, efficient risk allocation minimizes the inefficiency due to moral hazard but does not eliminate it.

4.6 Overcompensation through penalties

The above-presented arguments on the efficiency of different damage-schemes have treated so far only compensatory or undercompensatory damages. The contract parties have, however, the possibility to include overcompensating “penalty” clauses in the ERPA. In general, such penalties are not allowed within common law systems, but are permitted and enforced in civil law countries.

Whether such penalties are desirable from an efficiency viewpoint has been widely discussed by the scholars of Law and Economics. The discussion has been summarized by Hatzis (2003) who concludes that penalties are neither per se efficient nor inefficient. The efficiency of the penalty depends rather on the contractual context. In general, if the good has idiosyncratic value to the buyer, a penalty that is agreed upon by the buyer and the seller fulfills the function of an insurance against non-pecuniary damages. So, if the buyer places a subjective value on the good that is above the price of the next-best substitute, penalty payments are efficient. With respect to carbon certificates, like temporary CERs, this reasoning will in most cases not be applicable because a functioning carbon market would provide identical substitutes. Therefore, overcompensating damages would lead to inefficient breach as well as a precaution level that cannot be justified by the objective (market) value of the emission rights. However, there might be (rare) cases in which the buyer benefits from a higher reputation by financing a specific project. Here, overcompensation would be justified.

Based on Kronman and Posner (1979) it could also be argued that penalties fulfill a signaling function, which would be especially useful in an emerging carbon market. Those sellers ready to sign a contract featuring overcompensating damages convey information about their reliability. The penalty would then represent a “risk premium” that could settle the credibility balance with respect to other sellers that are reputed to be more reliable.

As the buyer side of the emerging carbon market is dominated by a few large players, there is the risk that penalty clauses are the result of asymmetric bargaining power. This problem will hopefully be reduced as soon as the market reaches maturity.

5. Damages in World Bank and ERUPT/CERUPT Contracts

To date, very few CDM forestry projects—supposed to absorb carbon for a limited amount of time—are about to enter the implementation stage. However, a significant amount of
contracts have been concluded with respect to CDM projects that are to reduce greenhouse gas emissions. Two main buyers in the pre-Kyoto market for such project certificates are the World Bank Carbon Business Unit—especially the Prototype Carbon Fund (PCF)—and the two Dutch government procurement tenders, the Emission Reduction Procurement Tender (ERUPT) for JI projects and the Certified Emission Reduction Procurement Tender (CERUPT) for CDM projects. Both players have made public the general principles underlying their standard contracts, including the contract remedies in case of non-performance. While it is of particular interest to apply the efficiency criteria developed in the Law and Economics literature, it has to be kept in mind that damage schemes for forestry CDM project would require some specific adjustments due to increased moral hazard resulting from the non-permanence of the offsets. In the following we will discuss the PCF and ERUPT/CERUPT damage provisions in light of these considerations.

5.1 PCF contracts

Through the establishment of the Prototype Carbon Fund (PCF) in early 2000, the World Bank became one of the early actors in the emerging carbon market. The PCF is managed by the World Bank’s Carbon Finance Business unit (CFB) while its investors consist of a number of countries and transnational companies. The World Bank has also launched other Carbon Funds specialized in specific kinds of projects, like the Community Development Carbon Fund or the BioCarbon Fund. As the ERPAs under these specific funds follow the same basic model as the PCF we will concentrate on the analysis of the damage scheme of PCF ERPAs, as they are described in Baker & McKenzie (2004) and Streck (2005).

The PCF purchases verified Emission Reductions for a fixed price per ER determined in the beginning of the contract.\(^{19}\) That means that the PCF bears practically all regulatory risks that are related to the transformation of ERs into CERs. It is to be expected that with a further development of the market, the CFB will shift to purchasing Kyoto Credits only.

As the PCF contract price is fixed, possible rents due to future market prices that are higher than the contract price are fully collected by the buyer. Even though this pricing agreement guarantees a reliable cash flow to the seller, this one-sided distribution of future rents might be seen as disadvantageous to the buyer. In order to mitigate this disadvantage the agreements are “over-collarealized”, i.e. only a part of the planned offsets are purchased within the contract, while the surplus could be sold at future market prices.\(^{20}\) This contract feature has several advantages, on the one hand it represents a buffer that insures against underperformance, on the other hand the seller has an incentive to implement the project and over-perform on his promise.

The upfront costs related to the CDM process—like baseline development, preparation of the Project Design Document and the monitoring plan—are borne by the PCF and then deducted from the payments made upon delivery. As described above, this contract feature as well as possible advance payments might increase opportunistic behavior as soon as

\(^{19}\) Streck (2005), 371ff.

\(^{20}\) In many cases the World Bank has a call option at the market price on the surplus, that adds to the flexibility in the management of the fund.
changes in the opportunity costs occur or with respect to the precaution level. In order to deal with this problem the PCF will seek damages from the seller in case of gross negligence or willful misconduct by the seller. For other reasons of non- or under-delivery of carbon offsets the PCF contracts provide for a large amount of flexibility. In such a case, a plan of action is to be proposed by the project sponsor in order to remedy the shortfall. In case of persistent under-delivery the PCF is able to terminate the agreement. The same is possible for the seller if the PCF fails to make timely payments. After a termination of the agreement, damages will only be sought if the breach is intentional or due to gross negligence. All risks related to non-deliberate contract breaches are therefore borne by the PCF.

The sharing of regulatory as well as project-related risks is within the PCF contracts asymmetrical in favor of the seller. This asymmetry is necessarily a consequence of the World Bank’s mandate as a multilateral development organization. However, it is to question, whether the damage scheme applied within the CBF contracts is economically efficient. We will therefore discuss the contract features in the light of the criteria described in section 4. In case of those contract breaches by the seller that are due to changing opportunity costs, the seller has to pay damages. The amount of such damages does not seem to be stipulated in the contract, but it is to be expected that the damages will be determined in the range of the expectation measure, i.e. that they will fully compensate the buyer for his loss. In such situations where a deliberate breach from the part of the seller can be proven the PCF damage scheme will lead to efficient breach. However, the PCF damage scheme barely disincentivizes moral hazard in situations where the seller has private information. There might be situations where the true reason for non-delivery is due to a deliberate decision of the seller, (like a low precaution level), but the non-performance is attributed to an event that excuses performance. The principle of the cheapest cost avoider would ask for an attribution of most project-related (as well as some of the regulatory) risks to the seller. The level of the optimal damages depend on the risk preferences of the seller. If the seller is risk neutral the optimal damages would have fully compensate the buyer for his loss. If the seller is risk averse, which might be the case with smaller companies, the optimal damage would lie below the full compensation but well above the zero-damages included in the PCF contracts. Such a shift in the risk sharing would necessarily lead to an increase of the prices paid for the offsets, but would add to the overall efficiency of the contract. It goes without saying that even without problems of opportunistic behavior it would be more efficient to attribute risks to the party that has less costs to mitigate or reduce the risk.

While the criteria of optimal risk-sharing and optimal precaution would ask for a reduction of performance excuses and the introduction of compensating damages from the part of the seller, the PCF damage scheme is likely to lead to an outcome that is closer to the efficient number of contracts. As the sellers face relatively little costs in cases where they are unable to perform, a larger number of sellers will be inclined to agree to a transaction with the PCF. It needs to be mentioned, however, that the theoretical level of efficient signing will not be reached, as in the many cases of excused non-performance, the sellers will not have to pay

21 It is to mention that the World Bank as a multilateral organization has granted immunities in many countries. Therefore, the seller must rely on the cooperation of the World Bank as he is not able to enforce his contractual rights within a domestic legal framework. The PCF ERPAs do not include a governing law clause. Contract disputes are to be settled within the framework of the international UNCITRAL arbitration rules.
damages amounting to the reliance measure but they will pay no damages at all. The large number of events defined in the contracts in which performance is excused, would therefore in theory lead to a number of contracts too large to be efficient. The above-mentioned trade-off between efficient signing and other margins of efficiency like the precaution level would have to be related to the political background in which forestry CDM projects are situated. While the Kyoto accounting and certification rules seem to reflect the non-permanence of forestry offsets quite well, many environmentalists still argue against the environmental additionality of such projects. This skepticism has also been translated into the national regulation, the EU, for example, excludes forestry offsets in its newly set-up Emissions Trading System (EU ETS). Therefore, it might be politically opportune to choose a damage scheme that does increase the quality of CDM forestry projects rather than their quantity.

According to Streck (2005) potential sellers often consider an ERPA, where prices are fixed damages or penalties are based on future (possibly higher) prices, as “unfair”. At first sight, the validity of this argument might be difficult to accept. In other contractual contexts—like most forward purchase contracts—fully compensating damages are rather the rule than the exception, which indicates that such damages are not contrary to the existing “fairness norm” in business. A seller facing a higher risk will usually ask for a higher price for the exchanged good, which would equalize his perceived advantages and disadvantages. Under the specific circumstances of the market for carbon offsets the argument might, however, be valid. As the carbon market is about to emerge it might be difficult to assess the risk for underperformance and adequately reflect it in the price of the offsets. The large number of performance excuses in the PCF contracts is therefore to be interpreted as a contribution to the development of the carbon market, i.e. the World Bank as a multilateral development organization is in fact generating a public good and distributing the associated risks to the contributors of the fund (i.e. the World Bank member states as well as the private investors to the fund). Therefore, it cannot be expected that purely commercial contracts at a later stage will adopt the same damage scheme as featured in the PCF contracts. With further development of the carbon market, the contracts on offsets will probably resemble more “normal” forward purchase contracts, including fully compensating damages based on the market price in most cases of non-performance. So it is to be expected that business interests of the buyer will drive the damage schemes of future ERPAs towards more efficiency.

5.2 ERUPT/CERUPT Contracts

The Netherlands have been the first country to organize carbon credit procurement tenders in order to meet their GHG reduction targets under the Kyoto Protocol and its EU commitment in a cost-efficient way. To date, the Dutch government has published four calls for tender for JI certificates, within ERUPT, and one call for tender for CDM certificates, within CERUPT. In the following, we will analyze the damage scheme in the ERUPT/CERUPT contracts as described by Baker & McKenzie (2004) and van der Weerd (2005).

In contrast to the PCF, the deliverable in ERUPT/CERUPT contracts are Kyoto-defined credits. Only if the Kyoto Protocol had not entered into force the Netherlands would have accepted verified ERs. So, in this case the buyer accepted to bear the “Kyoto Risk” while most other regulatory risks are attributed to the seller. Like some ERPAs of the PCF, the
Dutch contracts usually include a call option at the market price on surplus certificates that might result from the project. Furthermore, both tender programs offer the possibility of advance payments of up to 50% of the contract value. The resulting increase in the risk of opportunistic behavior is being reduced by a system of penalty and damage payments that has undergone several changes between the different tender procedures.

Within ERUPT/CERUPT, excuses for performance are mainly limited to force majeure events, like natural disasters or the nationalization of the project. All classes of such events are listed in the contracts. In those cases of under-delivery that are not excused within the contract, the seller either has to deliver suitable alternative credits or he risks to be obliged to make penalty payments specified in the ERPA. The structure of the penalty scheme varies between the CERUPT program and the different tenders of ERUPT. In the first two ERUPT tenders the penalty was independent of the shortfall and amounted to 2.5% of the total contract value, payable each month that delivery remains outstanding. In the following ERUPT 3 tender, the penalty has been set in relation to the shortfall and amounted to the fivefold of the price of the non-delivered credits. Upon subsequent delivery of the shortfall within one year, 60% of the penalty is to be reimbursed to the seller. For the last ERUPT tender the penalty has been reduced to 120% of the market price of the non-delivered credits. The CERUPT tender has a similar scheme as within the first two ERUPT tenders, but the penalty is only payable if less than 70% of the agreed credits are delivered. It is to mention that the ERUPT/CERUPT contracts are governed by Dutch private law, which contains a doctrine on reasonableness and fairness. It is therefore to be doubted, if the contractual penalties, that might be considered as being excessive, will be fully enforced by Dutch courts.

The penalties established in the different stages of the ERUPT/CERUPT programs will be in most cases overcompensating. As we have discussed above, such overcompensation will lead to inefficient breach as well as inefficiently high precaution levels. According to van der Weerd (2005), a clause has been introduced into the ERPAs which allows the seller to cover the shortfall by delivering alternative credits instead of paying the penalty. This option would be identical to the expectation measure as the seller could for example buy suitable credits on the market which would fully compensate the buyer. So, this contract clause guarantees efficient breach in case of changing opportunity costs. Furthermore, such a provision is likely to induce the optimal precaution level from the part of the seller. Due to the restricted number of performance excuses the seller has to bear a great number of risks related to the CDM process as well as those related to the project itself. For CDM forestry projects we can reasonably assume that these risks are better controlled by the seller so that the compensation option reflects an efficient sharing of these risks. Risks that are not controllable by either of the parties, like expropriation of the project through the host country, are subject to the performance excuses and have to be borne by the buyer. In a large program such as the ERUPT/CERUPT such a provision probably adds further to efficiency as the Dutch government can better insure against such risks by diversifying its project.

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22 For a more detailed description of the different penalties, see van der Weerd (2005), 325
23 There might be exceptions. If for example in the first contracts the market price lies above the fivefold of the contract price, or the 70 percent threshold within a CERUPT agreement is not exceeded.
24 van der Weerd (2005), 325
portfolio. The criterion of efficient signing, however, can not be met by such a damage scheme as has been discussed in section 4.2. Inefficient reliance from the part of the buyer does not seem to be a decisive criterion in the analysis of the applicability of the CERUPT/ERUPT provisions to forestry projects as contract specific investments will probably be insignificant. As the Dutch government purchases Kyoto credits, the specific investments related to the CDM process are to be borne by the seller.

As the seller in case of non-performance has the possibility to provide the buyer with alternative credits, it is to be asked what function the contractual penalty scheme might fulfill. As the good purchased is homogenous with comparable certificates available on the carbon market, the subjective value of the temporary CERs will be identical to the market price. For example, in the case of ERUPT 4 the problem can be formulated as follows: Why would the seller pay a penalty based on 120% of the market price if he has the possibility to compensate the buyer by buying credits at the market price? And why should the buyer ask for being overcompensated? A comprehensible answer to these questions might lie in the signaling function of penalties. There might be cases in which the seller wants to signal being a credible and reliable partner for future contracts. If the seller is ready to deliberately overcompensate the buyer, this can be seen as an investment into a longer-term business relationship. So, by giving the choice between the penalty and the a normal compensation the ERUPT/CERUPT contracts have enlarged the functionality of the damage scheme. On the other hand, as Streck (2005) points out, such excessive penalties might have the opposite effect. As the penalty clause is part of the ERUPT/CERUPT standard contracts, it might be seen as a sign of distrust from the part of the buyer, which would undermine a trustful relationship between buyer and seller. In any case, it is still to be seen whether such penalties are enforceable within Dutch courts.25

Even without considering the penalty clause, the ERUPT/CERUPT damage scheme induces—due to the precaution and insurance against risks—way higher costs to the seller than the PCF contracts. While this seems to be in most cases preferable from an efficiency viewpoint, it is to be emphasized that the prices for the exchanged certificates should be higher within such regimes.26 As the credibility of forestry projects will crucially depend on the quality (i.e. lifetime) of the project offsets, higher prices leading to higher precaution levels would also be desirable from a climate policy perspective.

6. Conclusions

As carbon offsets resulting from forestry projects are of a non-permanent nature, pure buyer liability, as established within the Kyoto Protocol, might lead to an inefficiently low level of

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25 “From the buyers perspective, penalties may not necessarily contribute to the success of the project. Carbon Contracts rely largely on trust built and maintained between the parties. The insecure regulatory environment in which a Carbon Project will be implemented requires a closely maintained and managed relationship between the parties to the Carbon Contract. Penalties may create barriers in the communication where they discourage the seller from communicating problems to the buyer. The buyer may therefore only be notified about a problem after it is too late to take measures to mitigate the situation. Finally, carbon buyer should keep in mind that penalties may be hard to enforce in case of underperformance of the project. It is unlikely that carbon buyers will have seniority over lenders or suppliers when it comes to serving debts or paying liabilities.” Streck (2005), 363

26 As UNEP (2004) states the prices within ERUPT/CERUPT are slightly higher than within PCF ERPAs. The authors attribute this price differential to exchange rate fluctuations rather than intention by the buyer.
precaution against the reduction of the absorptive capacity of the forest. This inefficient attribution of risks can be corrected for on the level of the contract between the project sponsor and the project investor. This correction requires a detailed definition of contractual damages and performance excuses within the contract. It is, however, difficult to determine an efficient damage scheme for such contracts in general, as contractual damages influence different contract-related decisions. One of the general lessons of the analysis of contracts within the field of Law and Economics is that a damage scheme cannot be designed to achieve optimality on all margins. So, a suggestion for efficient damages must make allowance for the specific contractual context to be expected within CDM forestry project agreements. It can be reasonably expected that contract specific investments from the part of the buyer are rather low. It follows that the criterion of efficient reliance will not have to be taken into account in the choice of the damage scheme. The other criteria presented within this paper are more relevant to forestry projects. The criteria of efficient signing and efficient breach are mutually exclusive, which raises the question of which criterion seems to be more reasonable to fulfill. In order to improve the political acceptability of CDM forestry projects, it might be sound to decide this trade-off problem in favor of the quality and against the quantity of the projects. If one follows this reasoning, the optimal damages for intentional contract breach would be equal to the expectation measure, i.e. the buyer would have to be set on the same utility level as if the contract had been performed. As far as overcompensating damages are concerned, the cases in which such penalty clauses are economically justified will be quite rare in the context of forestry projects. As an organized market for temporary CERs is likely to exist, a failure in delivery can be compensated by perfect substitutes. There might be exceptional cases, where the offsets from a reputed project might have an additional, more or less subjective, value to the buyer. It is, however, to be expected that for most forestry CDM projects contractual penalties will be inefficient.

The principle of the superior risk bearer would require to ask damages in case of underperformance that is due to events that could be better prevented by the seller. As this is the case for many regulatory risks related to forestry projects as well as most project-related risks, the performance excuses would have to be formulated accordingly. Risks that are not controlled by the seller, should be fully attributed to the buyer as he is better able to insure against such risks by diversifying his carbon portfolio. In general, the level of the optimal damages in these cases is dependent on the risk preferences of the contract parties. If risk neutrality is assumed, the optimal damages would be fully compensating. If the seller is risk averse the optimal damages lie below the expectation measure but well above zero-damages.

An application of the theoretical considerations depicted above leads to the conclusion that if the specific circumstances of forestry CDM projects are taken into account, damages corresponding to the expectation measure are the most advisable. Contingencies leading to performance excuse should be narrowly defined and the resulting higher business risk to the seller is to be compensated by higher contract prices. The optimal damages for non-performance due to these contingencies might lie below the expectation measure if the seller is risk averse.

In light of these theoretical considerations two groups of ERPAs have been examined, the PCF and the ERUPT/CERUPT contracts. The standard contract features of the PCF
prescribe full compensation in case of deliberate breach or non-performance due to gross negligence. The PCF contracts therefore fulfill the criterion of efficient breach. However, the large amount of performance excuses attribute practically all project-related and regulatory risks to the buyer. While this asymmetrical risk sharing is motivated by the World Bank’s mandate as a development organization, a direct transmission of the described contract features to future CDM forestry ERPAs can not be recommended. The extensive list of performance excuses combined with asymmetric information on the precaution level is likely to lead to an adverse selection of the projects. As the precaution level of the project cannot be observed, the average risk of non-performance to the buyer will be reflected in the price he is ready to pay. As a result, higher quality projects (with higher costs of precaution) will not be competitive with lower quality projects. This adverse selection problem can be avoided by attributing the risks according to the principle of the superior risk bearer.

The risk sharing within the ERPAs of ERUPT/CERUPT seems to be more in line with the principle of the superior risk bearer, as performance excuses are apparently restricted to events that are not controlled by the seller. In case of under- or non-performance the different ERUPT/CERUPT contracts include a contract penalty that differs with the different tenders. The penalties do, however, not lead to inefficient breach or inefficiently high precaution measures as the seller has the option to provide alternative credits, i.e. to fully compensate the buyer. As such an option exists, the intended function of the contract penalty remains unclear. While it might serve as a signal for the reliability of the seller, a positive effect on future contracts is still to be examined.

It is to mention that the two groups of ERPAs examined here are formulated for Kyoto Offset projects in general, i.e. the specificities of CDM forestry projects have not been taken into account. Furthermore, the PCF contracts reflect also development goals that will not be represented in future, purely commercial contracts. As it is not within the business interest of a commercial buyer to bear risks that are better controlled by the seller, the risk sharing is likely to move towards an adjustment to the principle of the superior risk bearer. Therefore, it is unlikely that future ERPAs for CDM forestry projects will take the form of the contracts examined here.
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