

Who's Collecting the Rent?
Taxation and Superprofits in the Forest
Sector

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1. THE FOREST SECTOR

1.1 Introduction

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2. THE VALUE OF TIMBER: STUMPAGE VALUE & ECONOMIC RENT

2.1 Introduction

The scale and importance of the forest sector in many countries suggests that the extraction and processing of timber from forests can be a profitable business. But exactly how profitable? Do the companies in the forest sector make profits above and beyond those that are enjoyed by companies in other sectors?

In this chapter, we begin by examining how valuable timber could be to those who extract it (logging companies), a quantity often referred to as *stumpage value*. Following on from this we look at the maximum value that the government (as owner of the forest) might enjoy for allowing timber to be used by the forest sector, a quantity known as *economic rent*. Not surprisingly, stumpage value (a forestry term) and economic rent (an economic term) have frequently been equated, though, as shall be explained, the two values may be subtly different.

The chapter ends by charting how the economic rents that would ideally be realised by governments in a perfect economic world, might in reality end up divided between governments and companies in the forest sector or simply dissipated through waste and inefficiency.

2.2 The Value of a Tree in a Forest

What then is the value of a tree standing in the forest? Let us look at this question from the point of view of a logging company setting out to harvest the tree. Clearly, the *very most* it could be worth is the revenue that the timber from the tree would fetch when the logging company sells it for export or sells it on to the timber processing industry. Of course, the logging company will only realise this revenue once it has cut the tree down, dragged it from the forest and transported it to the final buyer. Setting up and running this logging operation costs the company money. For the logging company the value of the tree standing in the forest - the stumpage value - will not be the revenue it gets from the final sale of the timber from the tree, but this amount minus all the costs it has to face in making this sale possible.

2.2.1 The costs of harvesting a tree

In general, we might think of the costs that a logging company has to write-off against the sales price of a tree as falling into six categories.

1. Getting to the trees: Fixed costs of Logging

In setting up the logging operation in a concession, the company faces a number of costs. It must invest in roads, buildings, skidders, trucks, chainsaws, in fact all the items of machinery and the infrastructure that make harvesting possible. These are the up-front costs and along with insurance, interest on loans, and depreciation of capital¹, part of

¹ It may seem rather illogical to classify depreciation as a fixed cost since the rate of depreciation of a capital asset might be thought as being directly related to the extent to which it is used. In fact the life of capital assets tends to be measured in economic rather than technical terms. Machinery depreciates even when not in use and,

these costs will have to be reimbursed from the sale of the tree. In economic terms, these costs are referred to as the fixed costs of the operation, they are the costs that have to be paid even when the logging company is not harvesting trees.

2. Looking after the Forest: The Costs of Forest Management

Another category of costs are those fixed costs that are imposed by the concession agreement. As discussed in Section 1.???, the logging company may be committed to a number of undertakings, such as

- carrying out an inventory of all the trees in the concession (see, for example, Box 2.1)
- preparing a forest management plan that presents what areas in the concession are going to be logged, when and how
- taking measures that protect the forest against fire or pest attack

Some or all of these responsibilities may be taken on by the landowner, though more usually, the logging company who are already in the forest, are better placed to carry out these tasks. If the logging company is exempted from these duties then it might be expected to pay the landowner to perform these tasks (see, for example, Box 3.1 on auctions in British Columbia).

3. Getting the trees out of the forest: Cost of Extraction

Having set up a functioning operation in the concession, the logging company is in a position to harvest the tree, drag it from the forest and transport it to the final buyer. Each of these operations incurs costs, the most obvious amongst which are the wages of labour and the costs of fuel and power. In economic terms these would be known as the variable costs; they would not be incurred if the company stopped harvesting trees.

4. Ensuring the Forest Grows Back: Costs of Forest Regeneration

The concession agreement may include terms that commit the logging company to ensuring the forest regenerates in a way that will allow a future cut. These silvicultural practices might increase the logging company's costs by placing restrictions on the way they harvest trees (e.g. only trees over a certain size, directional felling, low impact extraction etc.) or may involve proactive measures such as replanting (see, for example, Box 2.1). Either way, the variable cost of the logging company will be increased by these commitments.

Unlike the previous costs discussed, these costs are not directly related to the harvesting of the tree and, as we shall see later, from a purely economic standpoint should not be considered a cost of the present harvest but of a future harvest.

5. Government Taxes

As with companies in all other sectors of the economy, the logging company knows it will have to pay the normal set of taxes due to the government². Most important amongst these will likely be the corporate profit tax, usually charged as a percentage of profits net

even more important, it becomes obsolete. It is normal practice, therefore, to fix an annual depreciation charge which will write off the cost of equipment over some estimated working lifetime.

² Note that these taxes are those that apply in all areas of the economy and not those specifically applied to the forest sector.

of depreciation. Once again, the logging company knows that part of the revenue it receives from cutting the tree will go towards paying the government these taxes.

6. 'Normal' Returns

The final item that the logging company will have to cover from the revenue it receives from selling the harvested tree, is its so-called normal returns. Normal returns are a measure of the opportunity cost of the capital and entrepreneurial risk that the logging company has invested in the logging operation. Effectively it amounts to how much that capital and entrepreneurial acumen could have earned if it had been invested in some other sector of the economy (we will discuss this in more detail later). If the revenue from cutting the tree doesn't provide enough to cover these opportunity costs as well as the other costs then it would make no sense for the logging company to be in this business.

To give an idea of the relative size of some of these costs, Table 2.1 gives an example of the average costs reported by logging companies from the three major harvesting regions of the Province of British Columbia in Canada.

2.2.2 Stumpage Value

Once the logging company has written off all these costs against the revenue it will get from selling the tree, anything left over (the residual) will be pure profit. In forestry terminology this residual is known as the *stumpage value* of a tree; stumpage value because it is the value *to the logging company* of the tree standing on the stump in the forest. The logging company would be willing to pay this much (and no more) to the landowner to gain the rights to harvest the tree from the forest.

Figure 2.1 illustrates stumpage value as the residual (unshaded portion of the pie) remaining from the revenue received from the sale of a harvested log once all the costs faced by the logging company (shaded portions of the pie) have been subtracted.

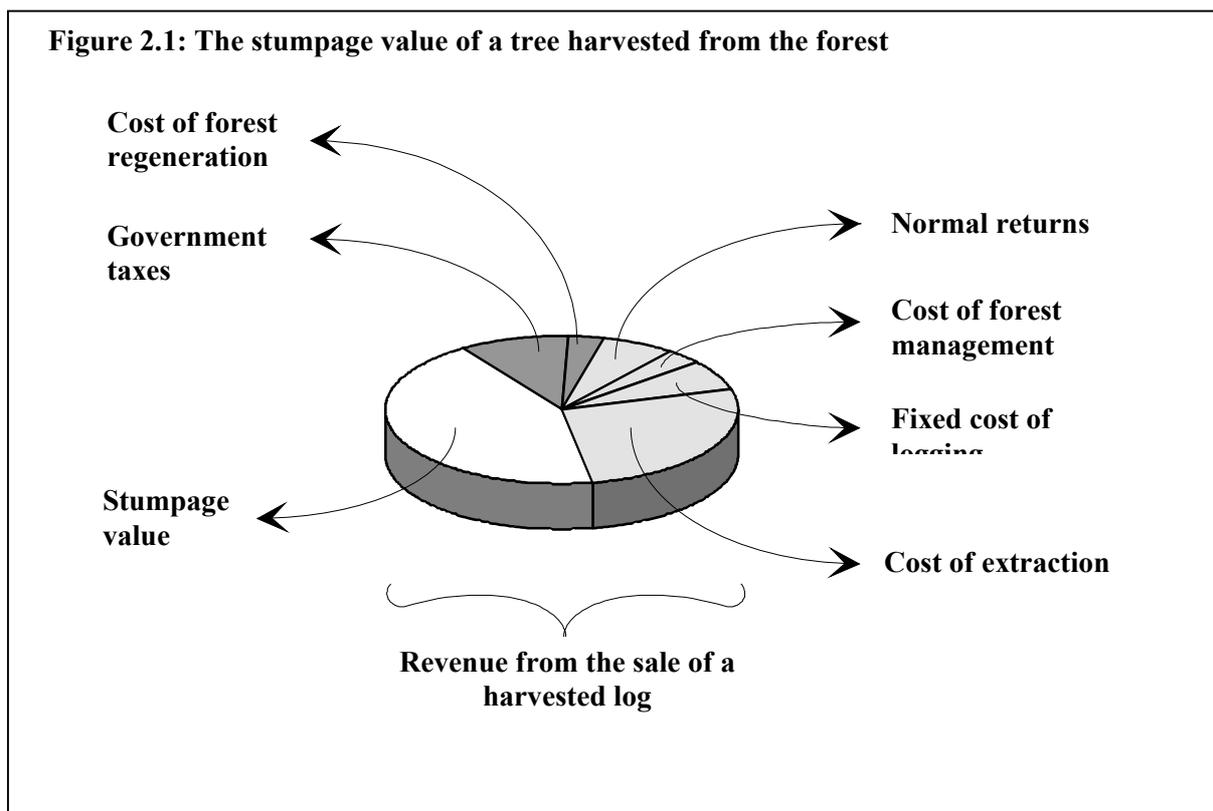


Table 2-1: Average costs associated with timber harvested in different regions of the Province of British Columbia, Canada (1996)

	Northern Interior (\$ per m ³)	Southern Interior (\$ per m ³)	Coast (\$ per m ³)	All B.C. (\$ per m ³)	Percentage of Total
Road expenses (road and bridge construction)	6.64	6.7	16.53	10.01	16.2%
Other overhead (administrative support, insurance, taxes, leases, loans, depreciation etc.)	3.18	4.26	15.84	7.81	12.6%
Forest management and engineering (forest protection, road layout, forest inventory etc.)	3.16	4.95	5.38	4.47	7.2%
Total Fixed Costs:	9.82	15.91	37.75	22.29	36.1%
Tree to truck (logging and dragging from forest)	19.29	20.85	27.12	22.43	36.3%
Hauling (transport to intermediate collection site)	8.21	9.17	6.7	8.00	12.9%
Dump, sort, boom and rehaul (transport to mill)	1.33	0.72	12.63	4.97	8%
Forest regeneration	4.86	4.12	3.31	4.11	6.7%
Total Variable Costs:	33.69	34.86	46.45	39.51	63.9%
Total log cost	46.67	50.77	87.51	61.80	100%

Source: Adapted from KPMG & Perrin, Thoreau & Associates Ltd. (1997)

Clearly not all trees in the forest have the same stumpage value; the variable costs of extracting each tree will be different according to where it is located (for example, note the different total log costs in *Table 2.1*) and the revenue that can be realised from selling the timber from each tree will be different according to its particular size, quality and species.

In the same way, stumpage value is not a static concept; as the demand for different types of timber change over time, so will the price that trees command. Similarly, as technology advances the costs of extracting timber will likely reduce and, as a result, stumpage values would be expected to increase over time.

2.2.3 Stumpage Values and Efficiency

Of course, stumpage value will also be dependent on the logging company. In general, a more *efficient* operator is able to realise a greater stumpage value from any one tree, than a less efficient operator. There are a number of factors that might make one logging company more efficient than another. Important examples include:

- *maximised revenues*: an operator can employ better trained labour, use better tools and apply better logging techniques, to ensure that for each tree cut, the maximum amount of merchantable timber is extracted from the forest

- *minimised variable costs*: in a similar way, employing high quality labour, tools and techniques can ensure the cost of cutting each tree is kept to a minimum
- *minimised average fixed costs*: also, an operator can achieve greater efficiency if he can spread the fixed costs of his operation more thinly. By achieving economies of scale, an operator can ensure that the amount of revenue from the sale of any one tree harvested that has to be written off against fixed costs is kept to a minimum.

So, finally, we can answer the question that was posed at the beginning of this section, “What is the value of a tree in the forest?”. It is simply that tree’s stumpage value; the maximum amount that the most efficient logging company would be willing to pay the forest owner for the right to harvest that tree.

Often it makes more sense to talk about the value of an entire concession to a logging company, rather than the value of any individual tree. In effect, this entire value is simply the sum of all the *positive* stumpage values in the concession³.

In the ‘*perfect economic world*’, in which the prices of timber are set in freely operating markets and a large number of logging companies are in competition, the stumpage value of the trees (and consequently stumpage value of the entire concession) will be the maximum amount that the forest owner could charge a logging company for the rights to harvest timber from the concession.

In the rest of this paper when the terms *stumpage value* or the *stumpage value of the entire concession* are used, they refer to this ‘perfect economic world’ amount.

³ Literally speaking, certain trees in the forest may have *negative* stumpage values, as the costs of extracting them outweigh the revenues that can be earned from selling them. Rather than incur these negative stumpage values, a logging company will leave these trees unharvested in the forest.

2.3 Stumpage Value and Economic Rent

In many texts the forestry term *stumpage value* and the economic term *rent* (or more correctly *economic rent*) have been equated. What exactly is meant by economic rent? And what is the relationship between economic rent and stumpage value?

Understanding the concept of economic rent involves understanding how economists regard the process whereby goods are produced in an economy. In this particular case the good we are interested in is raw timber - harvested and transported from the forest by a logging company.

2.3.1 Why does raw timber have a price?

Since there is demand for the vast variety of products that can be manufactured from raw timber (see, for example, *Table 1.1*) it is no surprise that exporters and the companies that make up the timber processing industry compete with each other for access to their basic input. In our 'perfect economic world' this competition results in a market that ensures the logging company is offered the highest possible price for its product.

2.3.2 'Making' raw timber: the factors of production

How does the logging company go about delivering its product to this market and realising its returns? The process of turning a tree in a forest into delivered raw timber requires the combined efforts of *factors of production*. Producing raw timber requires inputs of;

- *natural resources*: the tree itself,
- *labour*: the men and women in the logging company who are responsible for harvesting and transporting the timber and providing the administrative and logistical backup to support the needs of the operation,
- *capital*: the roads, buildings and machinery that are used in the operation (*the fixed capital*) along with the resources (petrol, spare parts etc.) that are required to ensure these operate (*the working capital*),
- *enterprise*: the entrepreneurial talents of an individual, partnership or corporation to exploit the economic opportunity presented by harvesting timber. These entrepreneurs provide their business acumen to organise the other factors to allow the logging operation to function. Importantly they also provide the money to buy the capital needed to set the operation up, thereby shouldering the risks of the entire enterprise. For simplicity we'll refer to this individual, partnership or corporation as the *logging company*.

The combination of these four factors of production allows raw timber to be delivered to the market.

2.3.3 Wages, profits and rents: the returns to factors of production

Each of the four factors of production used to produce raw timber has an owner; the trees are the property of the forest owner, the labour is the property of the men and women who supply it, the enterprise and the capital are the property of the logging company. Of course these owners do not supply their factors of production for free, they expect a return;

individuals expect to be paid *wages* for their labour and the company expects to receive *profits* for providing capital, business acumen and shouldering the risks of the enterprise (we'll come back to the return to the forest owner later).

Exactly how much in returns do these owners expect? In very simple terms they would expect to get at least as much as they could get if they employed their factors of production elsewhere⁴. For labour, capital and enterprise to remain in the production of raw timber they must at least be earning the wages and profits that they could make if they were switched to some other productive pursuit. This amount is known as the *transfer earnings, supply price or opportunity cost* of a factor of production; it is the minimum reward necessary to retain a factor in its present employment.

And hence we arrive at the concept of *economic rent*. If a factor of production is earning more than its transfer earnings, then it is receiving a part of its income in the form of economic rent. Economic rent is the return earned by a factor over and above what it could earn in any other productive use in the economy. In terms of capital and enterprise these economic rents are known as *superprofits*.

Notice, that should a government introduce a tax that collected part or all of this rent, it would not effect the decision of the factor of production to remain in its present employment; by switching to an alternative employment that was not subject to this tax, the factor could not increase its returns.

2.3.4 Returns to the forest owner

What then about the forest owner? What returns does he expect for providing trees to the logging company? Surprisingly, the answer is none at all. There are two clear reasons for this.

- First, the trees in an old-growth forest (we discuss second cut and plantation forests later) are, like land, a purely natural resource. The forest owner can expect no returns on labour, capital or enterprise for supplying this good, since none were expended bringing the trees into existence.
- Second, the trees in the forest have no alternative use. They are either harvested or they are not. There is no opportunity cost associated with their being harvested. In effect, any return the forest owner receives from supplying the trees to the logging industry is an economic rent. The forest owner would have no incentive *not* to supply trees to the logging industry even if he received no returns at all. From now on we refer to these returns as *forest rents*.

In recent years, forest economists have come to recognise that the latter point is not strictly true. The trees which make up a forest do return benefits in a number of other forms, particularly through non-timber forest products (NTFPs) such as fruits, bush meat and traded wild animals, and also, and possibly most importantly, in the form of non-market values such as the protection of watersheds, the conservation of biodiversity and the sequestration of carbon. From the point of view of society, therefore, there may be a

⁴ In general, an economy which does not have too many distortions will have what is termed a *normal rate of return* for each factor of production. That is, factors of production will move between the different productive possibilities in the economy increasing supply where returns are high, decreasing supply where returns are low, until an equilibrium is reached in which no factor of production could increase its returns by switching occupation. This is the quantity used in the calculation of stumpage value in the previous section.

considerable opportunity cost in harvesting trees. For the purposes of this paper we assume that these benefits are already catered for in the form of protected areas, extractive reserves and through the imposition of silvicultural cutting restrictions on the harvesting of timber from steep slopes and along watersheds.

2.3.5 Returns to the land: the owner as land owner and forest owner

One other consideration is that of the value of the land on which the forest stands. The owner is, in effect, the possessor of *two* factors of production - mature trees and land. A mature unharvested forest does not provide the owner with returns from either factor of production. If, however, land could be employed in an alternative, productive use apart from hosting mature trees, then the owner is experiencing an opportunity cost. He is not realising the returns that are possible from employing his land in another occupation.

It would pay the landowner to remove the trees and allow the land to be employed in this alternative use. Of course, the alternative may be the growing of a second crop of trees, but it could quite easily be the ranching of cattle, the growing of crops or the building of real estate. In the extreme, the situation may arise (and has arisen) where the value the forest owner can realise from the timber in the trees is so small that he will simply burn down the forest or even pay someone to log it so that he can realise these opportunity costs.

2.3.6 Rents in a second cut?

For a second cut from a natural forest (or, for that matter, harvesting from a plantation forest) the situation is slightly different. The timber that results from these harvests is not a pure natural resource but the result of a production process; silvicultural restrictions had to be observed in initial cuts, forest regeneration measures had to be taken and seedlings had to be purchased and planted. Since factors of production are used in the generation of this second cut, revenues from selling this timber will not be a pure rent, part will cover the costs of production, part will provide returns to the factors.

2.3.7 What happens to forest rents?

The landowner can only enjoy returns from his forest if he charges the logging companies for the use of his trees as a factor in the production of raw timber. If he does not charge them, or does not charge them enough, then some of these rents will be captured by the other factors involved in the industry. The logging company will likely enjoy superprofits and labour will likely earn more than it would in any other possible occupation.

Of course in a perfect world, the forest owner would have logging companies competing against each other to gain access to his trees. Competitive forces would ensure that the other factors would only receive normal returns whilst the forest owner would be paid the full rental value for his trees.

In the next section we shall take a look at the possible repercussions of allowing the other factors to capture some or all of the forest rents. And in the final section we shall look more closely at what happens to the distribution of forest rents when some of the assumptions concerning a 'perfect economic world' are relaxed.

2.3.8 *Forest Rents and Stumpage Values, are they the same thing?*

The concepts of forest rents and stumpage values are very similar. They differ in the perspective from which the value is measured.:

- *stumpage value* is measured from the point of view of the *logging company*. It is the maximum amount the logging company would be willing to pay to gain the rights to harvest trees for the production of raw timber
- *forest rent* is measured from the point of view of the *forest owner*. It is the maximum returns that the forest owner can expect from providing his trees as a factor in the production of raw timber

At first glance, it would seem that these two measures represent the same amount, however, several issues cloud this equivalence.

Opportunity costs of trees and land: from our definition of economic rent, forest rents were earnings up and above those that could be used by employing the productive assets of forest trees and forest land in any other use. The issues here are slightly different for the two productive assets.

It is possible that the forest owner might receive earnings from using the *forest trees* in a different way. For example, it is possible that the forest owner might receive payments from the government to preserve the forest cover so as to protect a vulnerable watershed. In such a case, the forest owner would incur an opportunity cost in allowing the trees to be harvested for timber. The forest rent would be the maximum returns that could be expected from selling the trees for timber less the amount foregone from not using the trees for other purposes. Clearly, forest rents would be less than stumpage values by the amount of this opportunity cost.

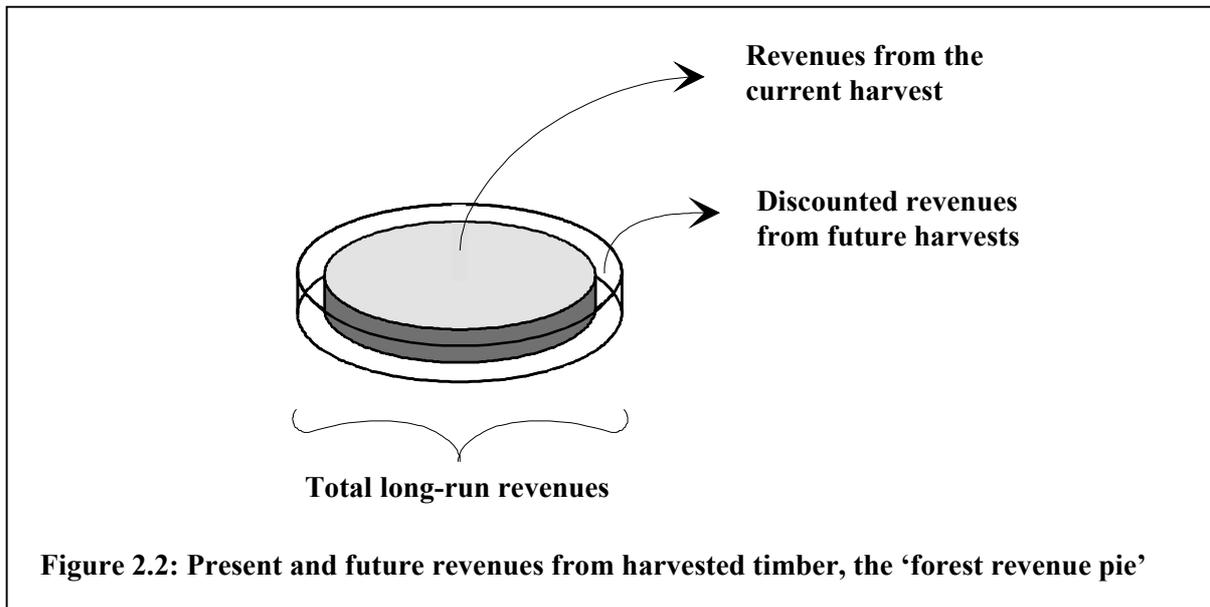
At the same time, the forest owner might incur an opportunity cost in not employing the *forest land* for some other productive use such as growing crops. Of course, selling the trees in the forest to a logging company for timber production may simply be the first step in clearing the forest to realise an alternative productive use of the land. Indeed, it is reasonable to assert that only if the forest owner postpones harvest of the trees on the land (e.g. in the hope that timber prices will rise in the future) will an opportunity cost be incurred. Since this paper is primarily concerned with the pricing of timber sales from the first cut of mature natural forests, we can reasonably ignore the opportunity cost of the forest land in our definition of forest rents. However, when harvest is delayed or the forest owner decides to allow the forest to regenerate in order to enjoy returns from a future second harvest, then the opportunity cost of the forest land must be considered in the definition of forest rents. Again, forest rents will be less than stumpage values since the opportunity costs of foregone productive possibilities of the land must be considered in their calculation.

Taxes and regeneration costs: A second area in which the definition of forest rents and stumpage value may diverge is in the consideration of government taxes and the costs of forest regeneration. Referring back to *Figure 2.1*, notice that these two portions of the pie have been heavily shaded. Under certain circumstances, one or both of these amounts are better interpreted as being part of the available forest rent whilst being subtracted as costs from the available stumpage value.

Government Taxes: Clearly, if the forest is owned by the government then the revenues it raises from logging companies through the imposition of normal corporate taxes can

be considered as a captured forest rent. The forest rent, as perceived by the government, will be higher than the stumpage value, as perceived by the logging company, to the tune of these government taxes. Of course, if the forest is privately or communally owned, then government taxes will not be collected by the forest owner and will be deducted from the calculation of available forest rents as well as from stumpage value.

Forest Regeneration and a Second Harvest: The flow of revenues from a forest do not necessarily stop after the first cut. Given a certain amount of silvicultural care there is no reason why a forest shouldn't support subsequent harvests. When discussing forest rents as viewed by the forest owner, it is probably more appropriate to present the 'pie' of possible revenues as the sum of revenues from the current harvest and the discounted revenues from future harvests, as depicted in *Figure 2.2*.



To ensure returns from future harvests, forest owners will frequently require the logging company, having harvested the first cut, to carry out regeneration activities (e.g. planting seedlings in logged over forests).

Naturally, the logging company regards their expenditures on these activities simply as costs that reduce the stumpage value of trees cut from the concession. Conversely, the forest owner regards them as an investment in the production of a future harvest. Far from being a cost associated with harvesting the first cut, the logging company's expenditures on forest regeneration are effectively payments 'in kind'; the logging company partly reimburses the forest owner for access to the first cut of timber by providing for the existence of timber in a future cut.

By the same token, if the logging company's tenure of the concession is long enough for them to have rights over the second cut as well as the present cut, then stumpage value and forest rent will be identical. The logging company, like the forest owner, would perceive these silvicultural expenditure as production costs of a future harvest not harvesting costs of the present harvest.

Building on *Figure 2.2*, a stylised presentation of the long-run costs of harvesting timber could be shown as in *Figure 2.3*. Notice that there are no costs associated with the production of the current harvest only with future harvests.

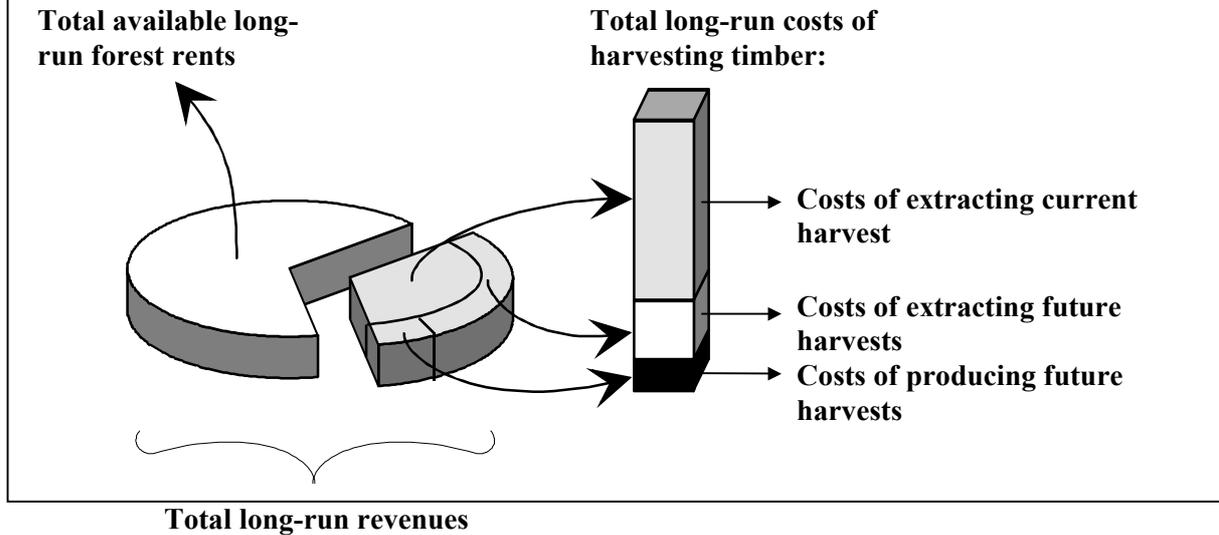


Figure 2.3: The costs of extraction and production of current and future harvests

The residual that remains after the total long-run costs of extraction and production of timber have been subtracted from the total long-run revenues is a measure of the *total available long-run forest rents*.

2.4 Who should collect the rent?

As discussed in *Chapter 1*, the majority of old-growth forests around the world are owned by the state and harvested by the private sector. The harvesting of the timber from these forests generates forest rents. As shall be discussed in far greater detail in the next chapter, governments collect this rent by charging logging companies for the right to harvest the trees in the forest. These charges are called *forest fees*. Now, depending on the design of the forest fees, the government may be more or less successful in collecting the full value of the forest rent. In many cases, part, or all, of the forest rent may be captured by the other factors of production in the industry, where otherwise they would only have earned normal returns.

In recent years the consequences of this incomplete rent capture have been the subject of heated debate, (Vincent and Panayatou, 1994, provide a thorough review of this literature). The major issues are as follows:

2.4.1 Whose is the Rent?

As the owner of the forest, the flow of rents from the use of trees in the log extraction industry should, by rights, accrue to the government. This is as compelling an argument as any in favour of governments capturing rent.

The government effectively controls the forests as the representative of the people of the nation. If the government collects the rents it is a source of income that can be used for the benefit of society in general. In particular, if a logging company is foreign owned, any failure to appropriate rents results in capital outflow from the country.

A number of issues should, however, be borne in mind

Are all the rents in the industry from the trees?: It is possible that a particular logging company may achieve levels of efficiency that are not attainable by the other companies in the sector. The cause of this efficiency will likely result from either innovative practices devised by the company's management or through their investment in the very best capital equipment. The higher level of efficiency demonstrated by this one firm results in the stumpage value of trees being higher than those that can be realised by any other company in the industry. This increase in available rent⁵ is a result of the entrepreneurial talents of the company and its employment of capital. The benefits that result should be rewards to these factors of production and not to the forest owner.

How does the government spend the revenues? If governments disburse captured rents in uneconomic projects and programs that do not enhance social welfare, then there may be an argument for allowing private companies to retain this rent and invest it more wisely. As we shall discuss in the next section there is no reason to assume that private companies will invest money more wisely than governments.

⁵ In economic parlance these are not strictly rents, they are quasi-rents. Over time the efficiency levels achieved by this firm will be matched by other companies as they themselves change techniques and invest in new capital. Since these rents are eroded over time they are known as quasi-rents.

2.4.2 Does incomplete rent capture change the behaviour of logging companies in the forest?

It should be clear from our understanding of rents that for both the logging company and the forest owner the exact division of rents will not alter their behaviour. Rent or no rent, the logging company will still be able to make normal returns on its operation. Rent or no rent, the company will still only find it advantageous to log the trees from which it is guaranteed at least normal returns. Efficient companies in the log extraction industry have no need for superprofits to stay in business.

Paris and Ruzicka (1991) are particularly firm on this point, declaring that the dividing up of rents is “a ‘zero sum’ game having consequences for income and wealth distribution between private parties and the government but not for efficient resource use”.

This is true, but only in a ‘perfect world’. In reality, at least two factors may influence the behaviour of a logging company enjoying superprofits:

1. *Competitive Pressure:* Logging companies that successfully capture at least part of the forest rent, earn returns above that which they could get in other sectors of the economy. Effectively, the competitive pressures are relaxed. The company can afford to operate inefficiently whilst still being able to provide at least normal returns to all of its factors of production. In a perfect world, the company would be driven by profit-maximising motives to improve its efficiency, but in the real world companies’ may be content with earning normal returns, whilst dissipating rent through inefficient logging operations.

In a similar manner, rents can be passed on through the forest sector encouraging inefficiency in the timber processing industry. If the timber processing industry is relatively powerful, it may be in a position to offer lower prices for timber to logging companies. The logging companies can accept these lower prices since they are effectively subsidised through the portion of forest rent not captured by the government. Cheap logs encourage the processing industry to use timber wastefully, since the price they pay does not reflect the scarcity value of the wood. Again the rent may simply be dissipated through inefficiency.

Either through inefficient logging or inefficient processing, rents are lost to the economy. The value derived from the trees in the forest is wasted.

2. *Uncertainty:* The logging company is, of course, aware that it is earning superprofits, even if the government is not. Another important issue that might influence the way that logging companies behave in the forest derives from the logging company’s uncertainty as to how long it will continue enjoying these superprofits. If the company anticipates that in the future the government will revise its policies to achieve higher levels of rent capture, then it will make sense to log as quickly and profitably as possible whilst the favourable forest fees last.

As a result the logging company may open up large areas of the concession, creaming off the most profitable trees and leaving the less profitable ones behind (a practice known as *high-grading*). In the future, once the government has revised its forest fees, the company will still go back and harvest the stems that it originally left behind in its rush to realise the large superprofits on the high-valued stems. Forest scientists suggest that re-entering a logged over area is extremely harmful for regeneration of the forest.

Clearly, the behaviour of logging companies in the forest may well be influenced by earning superprofits. Given certain conditions, rents can be wasted through inefficient logging and processing and the forest can be damaged through high-grading.

2.4.3 Does incomplete rent capture change the behaviour of logging companies towards other forest lands?

It has been argued (Repetto and Gillis, 1988), that superprofits spur logging companies into putting intense pressure on forest owners to make forests available for logging. In the same vein, logging companies might rush to log areas out of concern that another company might capture the superprofits if they do not get there first. The suggestion is that superprofits lead to an overly rapid expansion of timber harvesting.

However, our understanding of rents would suggest that this argument does not really hold water. If a tree is worth harvesting when it provides superprofits, it is still worth harvesting when it only provides normal returns. Any trees that would be harvested in this rush to collect superprofits, would be harvested anyhow. There seems little reason to think that the extent of harvesting will be higher if rents are captured or not.

On the other hand, the existence of superprofits may induce some inefficiencies in the use of other forest lands.

Logging companies who have to pay very little to obtain harvesting rights over forest lands may be induced into acquiring vast areas, more for insurance purposes or speculation than for timber harvesting. In effect, the productive capacity of the trees in the forest is left idle, to the detriment of the country's economy. This same phenomenon may encourage deforestation by shifting cultivators since logging companies have little incentive to control encroachment if they have excess area.

It would appear that the perverse incentives and inefficiencies that result from allowing logging companies to collect economic rents are good reasons to increase the capture of rents by governments⁶. Moreover, provided governments set fees that only capture the rents from the trees in the forest (and not the superprofits that are genuine returns to the logging company's capital and enterprise), then they are entitled to this return as the owner of the resource.

⁶ Note that this paper does not suggest that capturing economic rent will necessarily lead to a sustainable forest sector. It simply asserts that capturing the rents due on trees (no more no less) removes incentives for inefficiency whilst not impacting on the other behaviours of the logging companies. For a truly sustainable forest sector other issues such as increasing the length of tenure on concessions, removing distortions from other sectors of the economy and strengthening forest services may well be more important.

2.5 The distribution and dissipation of forest rents in the real world

The presentation of total available long-term forest rents in *Figure 2.3* was based on the assumption that both companies and governments were operating in a ‘perfect economic world’. In this perfect economic world, prices are set in competitive, undistorted markets, forest sector companies, driven by the desire to maximise their profits, behave as efficiently as possible, and governments employ forest fees that capture all the available rent.

As will become clear, it is likely that only a portion of the forest rents that could possibly be realised by governments are actually collected. The rents that are actually collected by governments may be less than what could potentially be realised for four reasons:

1. Logging companies fail to extract all the merchantable timber from a concession
2. It costs logging companies more than necessary to harvest timber from the forest
3. Harvested timber does not realise its full potential revenue through prices being depressed below a competitively optimal level
4. The companies of the forest sector manage to capture part of the forest rents for themselves, thereby earning superprofits.

In this section we shall take a more detailed look at these causes of reduced capture of available rents.

2.5.1 Lower than optimal extraction of timber

From our previous discussions we would expect a logging company in the perfect world to extract all the wood from a concession that had a positive stumpage value. The total quantity of timber that this represents is often referred to as the *total merchantable volume*. If, in practice, less than this amount is harvested, the concession does not realise its full possible value.

There are a number of reasons why not all merchantable volume is extracted from a concession. Some of these are the result of restrictions imposed on the logging company from outside parties, some are the result of inefficiencies within the logging company and some are the result of incentives that distort the decisions made by the logging company.

1. Logging Restrictions

There are two basic reasons why governments might impose restrictions on the trees which it allows a logging company to harvest from a concession.

First, the logging company may not be permitted to harvest trees that provide important ‘external social values’. As examples;

- Trees on steep slopes or bordering water courses perform important functions in protecting watersheds. By preventing large-scale runoff, preserving soils and the resultant siltation of water courses, these trees protect against external costs being created by the logging operation⁷.

⁷ Denudation of watersheds through deforestation has been blamed for severe flooding (e.g. in Thailand in ????) and for the destruction of downstream fisheries and delicate coral ecosystems (e.g. ?????)

- Trees of particular endangered species may have value to the global community in preserving the genetic richness of the Earth.

The value to the forest owner of the services presently being fulfilled by these trees (e.g. protecting watersheds or endangered species) is higher than the value that could be realised from selling them for timber. Such trees have an opportunity cost associated with harvesting for timber.

In terms of our earlier discussion, trees with an opportunity cost may well have no ‘timber-associated’ rental value from the point of view of the forest owner, though they may still possess a positive stumpage value through the eyes of the logging company. Clearly, logging companies may be tempted to harvest such trees, despite logging restrictions, unless careful monitoring of concessions is undertaken.

Second, the logging company may be obliged to respect certain silvicultural restrictions that are designed to improve the prospects for a second harvest from the forest. As examples loggers may be compelled:

- Not to fell trees under a certain size
- To leave specific ‘seed trees’ uncut so that they can grow through and dominate newly created gaps in the canopy (see, for example, *Box 2.1*)

From the forest owner’s point of view the returns from an enhanced second harvest outweigh the revenues it forgoes in restricting the first harvest.

Clearly, logging restrictions can reduce the total stumpage value that is perceived by a logging company with only a short term concession. However, to the forest owner, they do not represent a reduction in the available rents. Logging restrictions merely represent short term losses in timber revenues that are more than offset by the value of reduced external costs and the future returns of improved second cuts. Indeed, such restrictions are designed to enhance the long term social welfare that can be realised from the forest.

Box 2.1: Silvicultural Requirements in Indonesia

Since a Presidential Decree in 1989, a modification of the former Indonesian Selective System (TPI), the TPTI system was imposed on forestry activities.

The harvesting system is based on a 35 year rotation period. Concessionaires must prepare a 20 year management plan linked to a 1% to 1.25% inventory of the entire concession. The concession is divided into seven five-year blocks and each of these blocks is divided into five annual harvesting block. The concessionaire is required to carry out a 5% inventory of the entire 5-year harvesting block and to record all commercial trees greater than 50 cm in diameter. Finally, prior to preparing the annual program, a full 100% inventory of all commercial species greater than 20 cm in diameter is required.

The new system puts far more emphasis on regeneration and planting activities. For a start, the concessionaire must not cut any trees which are less than 50 cm in diameter. Second, the concessionaire must retain a minimum of 25 future crop trees per ha within the diameter range 25-49 cm. Two years after harvesting, the concessionaire and Forest Service carry out parallel inventories along transects 20m apart. If these subsequent inventories show the number of regenerating seedlings to be inadequate, then the concessionaire is required to carry out enrichment planting.

2. Inefficient Logging

Damage and waste in current harvest

A great deal of merchantable timber can be damaged or wastefully discarded in the process of harvesting logs from the forest. In the main, damage and waste result from inadequate planning or poor harvesting techniques. Examples include:

- a. *Wastage in docking:* Docking, the process of trimming log ends and removing malformations in felled trees, frequently takes place in remote locations. Where local markets are restricted and the logging company does not employ portable sawmills, the waste from trimmed log ends and removed buttresses may simply be left to rot in the forest.

Box 2.2: Market Distortions and Inefficiency in the Russian Forest Sector

95% of Russia's forest is under federal administration and is administered by the Federal Forest Service. The rights and responsibilities for forest management, including responsibility for establishing leasing arrangements, the location and size of harvesting areas and stumpage payments are the responsibility of the regions.

Most logging enterprises were privatised in 1993 as joint-stock companies, though nearly a fifth remain partly owned by the federal government. As of July 1st 1995, 62% of the logging industry, 95% of wood processing, 95% of pulp and paper and 100% of the furniture industry had been privatised. Despite this move towards a more competitive, market-based forest sector, the tremendous costs of the inefficient practices developed under central planning still persist.

Inefficient Harvesting: Harvesting losses are typically large due to the combined use of heavy felling and extraction machinery that cannot accommodate selective or environmentally careful logging techniques and the use of the stemwood method whereby trees are delimbed before they are removed from the forest. A conservative estimate suggests some 10% to 15% of commercially logged timber is lost at harvest sites. In one region, Primorsky Kray, it is estimated that as much as 50% of logged timber volume is wasted in the forest.

Inefficient Location of Processing Industry: Although European Russia accounts for only 40% of Russia's forests it accounts for more than 60% of its wood processing. Only seven of Russia's 25 pulp and paper mills, 14% of its plywood production capacity and 20% of its particle board capacity are in Siberia and the Far East. The tremendous costs of this inefficient arrangement were hidden under central planning, when prices were controlled and the costs of transporting wood to distant locations for processing were largely ignored. The elimination of subsidies and the emergence of a market economy has exposed the true costs of delivering wood to the west. Transporting harvested logs from the eastern forests to the western processing industry has become prohibitively expensive.

Inefficient Processing Industry: Most wood processing plants use obsolete technology and are poorly maintained. Outdated machinery in sawmills, plywood mills and pulp and paper mills severely handicaps the production of wood products for export.

Monopolies in the Processing Industry: One consequence of privatising the old state-owned industries has been to create large regional monopolies that appear to be able to influence both stumpage and output prices in the region.

Losses to Fire: In the first half of 1996, 1.2 million ha of Russian forest had been effected by fires, more than 70% of which were estimated to be from human causes. Considerable blame for this loss rests with harvesting practices which leave clear-cut areas with copious quantities of harvest residues, in which fires can grow large and hot, destroying adjacent, intact forest stands.

- b. *Log degradation*: poorly planned or inefficient logging and transport operations may result in felled logs being exposed to the elements for too long, causing logs to bow, stain or split.
- c. *Loss of logs*: Logging companies may, through poor practice lose felled timber to amongst other causes, fire, rafting and pontoon breakages, though there are proven techniques for minimising this risk.

Damage to Future Harvests

Despite the silvicultural restrictions that are often imposed on logging companies, poorly planned and destructive harvesting practices often cause considerable damage to the residual stand. Immature stems that would have grown through to form a second harvest may be damaged or areas of the forest may be irreparably degraded so that they will not support regrowth of commercial species. Some examples of such practices include:

- a. *Felling practices*: The quality of the residual stand can be markedly improved through careful felling practices. For example, in tropical forests, cutting the lianas that bind tree canopies together before a tree is harvested and practising directional felling techniques ensures fewer immature stems are damaged or destroyed.
- b. *Constructing extraction roads*: Proper planning can reduce the width and densities of extraction roads limiting the impact on the forest. As an example, the recommended practice is to construct extraction roads up to a year in advance of production to allow adequate weathering and soil settlement. Before production, a road roller should be employed to compact and seal the surface so as to allow rainwater runoff. In Cameroon, however, current practice is to build extraction roads shortly before production. Road rollers are not used, instead as much as 20 m of forest is cleared on each side of the road allowing the surface to be baked dry by the sun (a practice known as sun or fast drying).
- c. *Skidding Logs*: Skidding can be done with relatively little impact on the forest. Again, it is beneficial for lianas to be cut prior to skidding to detach the felled log from surrounding trees. Also, there is no need to clear paths for log skidders. Though path clearing is a common practice, a line of haul is usually easily found from the felling site to the main skidder path that does not involve removing trees. Again an example of destructive skidding practices can be drawn from Cameroon, where, over a 50 metre stretch of cleared path, 18 saplings of between 15cm and 29cm diameter had been physically uprooted.
- d. *Log Landings*: Some logging operations also create excessively large log storage sites in the forest and the soil of these tends to become compacted and sterile and does not support regrowth of commercial species.

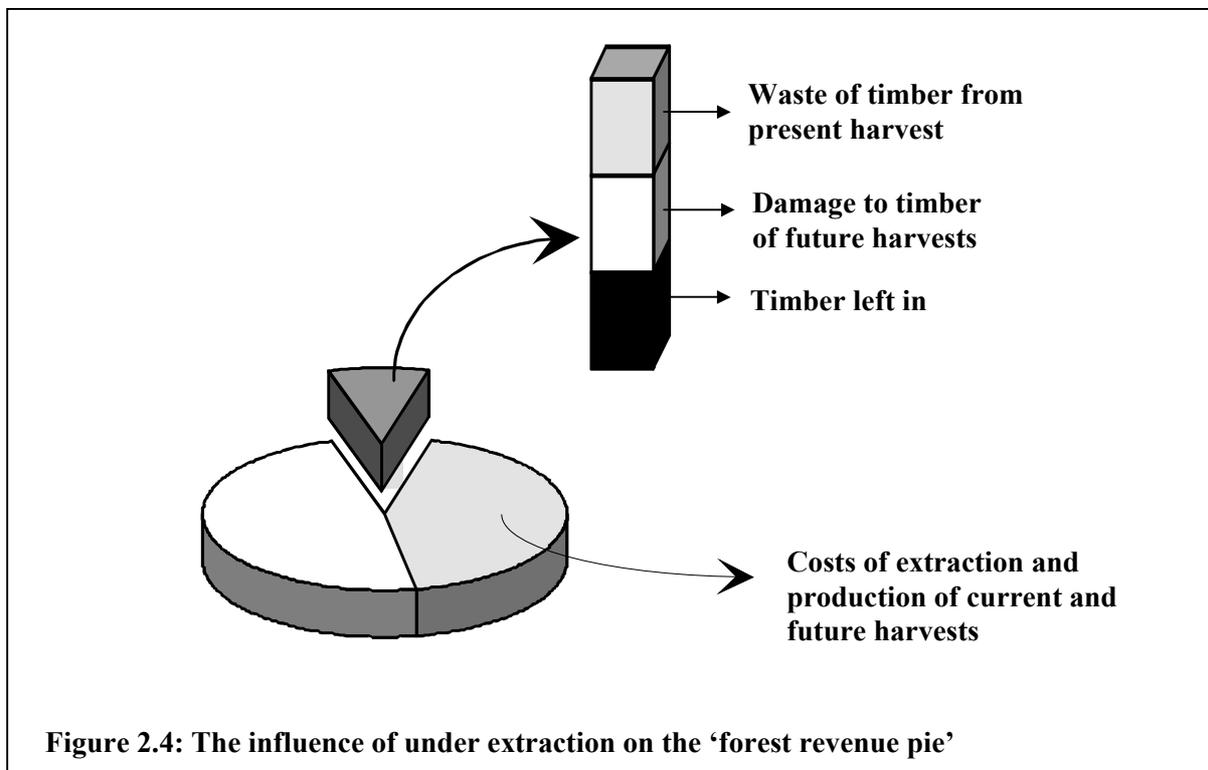
Timber Left in the Forest

Inefficiency on the part of the logging company may result in trees with positive stumpage values being left standing in the forest. This frequently happens when logging companies do not exploit all the merchantable species in a concession but concentrate on select, high value species. Bolivia example ????

3. Perverse Incentives

A third possible reason for merchantable timber being left standing in the forest by logging companies is if external distortions change the incentives they face. One such distortion may be introduced in the form of poorly designed forest fees (see *Box 3.2*) that make the harvesting of certain trees financially unprofitable for the logging company, that is they induce high-grading.

Overall, therefore, the volume of wood harvested from a concession may be below commercially optimal levels through restrictions imposed in the logging contract, through inefficiency on the part of the logging company, or through perverse or distorted incentives. The net result of these reductions in output is for some of the available rents to be dissipated either through wastage of the current harvest, damage to the timber of future harvests or through merchantable timber being left unharvested in the forest. This is illustrated in *Figure 2.4*.



2.5.2 Higher costs (incurred in extraction or processing)

Thinking back to our perfect world, we would expect competitive pressures to ensure that timber is extracted from the concession at the lowest possible cost to the logging company. *Cost minimisation*, however, is not always achieved in the real world. Some of these increased costs are imposed on the logging company by outside parties and some are the result of inefficiencies within the logging company itself.

1. Government Imposed Restrictions

Governments may frequently impose obligations on logging companies that are intended to enhance social welfare but may also result in raising harvesting costs. Some examples would include:

Silvicultural Restrictions

Governments may impose silvicultural restrictions that demand the use of low impact harvesting techniques (e.g. the pre-cutting of lianas and creepers, directional felling, pre-planned skidding routes). These increase the costs of harvesting for logging companies but ensure the long term returns from forestry to the national economy are higher.

Logging Volume Requirements

Often governments may impose a predetermined *annual allowable cut* (AAC). The AAC stipulates the maximum volume that a logging company may extract from a concession in any one year. Ideally the level is set so as to reflect the rate of regrowth in the forest and promote sustainable forestry. In certain cases the volume of timber stipulated by the AAC may be less than the rate of extraction that would allow the logging company to work at maximum efficiency.

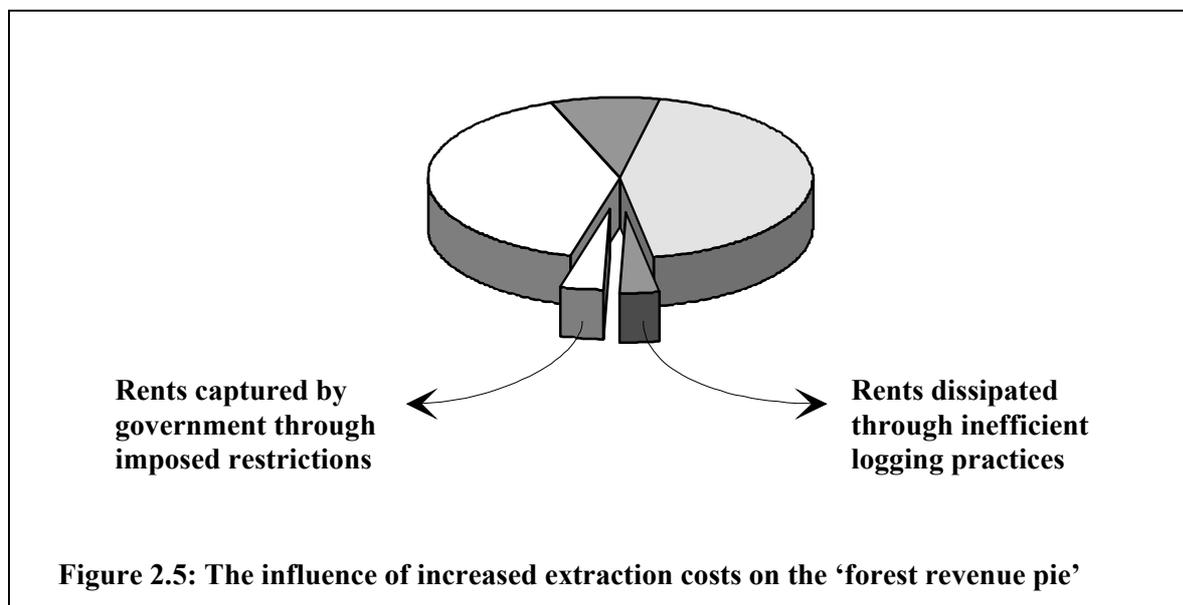
At the other extreme governments may impose *production or diligence commitments* on logging companies that require them to harvest a minimum volume of timber each year. Such production requirements impose costs in the form of inflexibility on logging companies. They cannot freely choose how much and when to harvest. Production requirements are frequently motivated by a desire to ensure that the productive assets of a nation are put to use, but may have other motivations. In the province of British Columbia in Canada, for example, production requirements are known as 'cut controls'. One of the stated motivations for imposing cut controls is to moderate instability in the forest sector, so as to increase employment security in logging communities.

The net effect of such government requirements is to increase the costs of harvesting. It is assumed, however, that resulting increases in the long term social welfare of the nation outweigh these imposed inefficiencies.

2.2 Logging Company Inefficiencies

Of course not all inefficiencies are the result of government restrictions. Logging companies that are free of competitive and profit-maximising pressures may indulge in extremely inefficient practices. Poorly trained workers, old and inefficient harvesting machinery, poor planning and organisation, overmanning ... the list of possible sources of inefficiency is endless.

Figure 2.5 illustrates how part of the 'forest rent pie' is dissipated through the increased costs of inefficient logging operations. Notice that the government imposed restrictions that we have discussed can in fact be illustrated as rents captured by the government. In effect, the quantity of rent that is not realised by the forest sector through these restrictions is at least compensated for by benefits enjoyed in other parts of the society.



2.5.3 Lower Prices

In the real world, not only may the costs of extracting timber be higher than could ideally be realised, but the prices attained for that timber may well be lower than those that would be set in an open, competitive economy. Since world markets tend to be relatively undistorted, the prices that can be realised for timber when sold at ports or borders (the so-called Free on Board or FOB price) is usually a good reflection of its true value.

As we discussed in *Chapter 1*, the market for timber involves the interaction of logging companies, domestic processing companies and exporters of raw timber (see *Figure 1.1*). A multitude of factors can create distortions in this market, three major causes (market structures, export restrictions and inefficiency in the processing industry) are discussed here.

3.1 Market Structure

One possible cause of the underpricing of timber is when prices are not set in a market at all. In centrally planned economies, the price of timber may not even remotely reflect the scarcity value of logs.

Where prices are determined freely, market 'power' may play a large part in determining the price of timber. The existence of dominant, possibly monopolistic, firms in the timber processing industry may result in a depression in the price of raw timber. In such cases, logging companies will be prepared to accept a price that at least covers its harvest and delivery costs (including a normal return). Any possible superprofits they might have realised will, instead, be captured by companies in the timber processing industry.

As described in *Box 2.2*, both these distortions have been witnessed in Russia in recent years (World Bank, 1996). The price of timber before liberalisation of markets in the early 1990's was well below world prices. By 1994, the average price of timber sold in the domestic market was still only \$14 per m³ compared to an export price of around \$58 per m³. Though the price of domestically sold timber is slowly converging on world prices (by 1995 it had risen to \$30 per m³), prices are still seriously distorted by the existence of large regional timber processing monopolies, the privatised successors of previous state-owned monopolies (e.g. Dallesprom in the far eastern Russian region of Khabarovsk Kray).

3.2 Export Restrictions

In an effort to encourage the domestic processing of timber many countries have imposed restrictions on the export of unprocessed timber. These restrictions take the

Box 2.3: The Log Export Ban in Costa Rica

On 7th May 1986, the government of Costa Rica imposed a log export ban (LEB) in an attempt to protect the domestic forest sector and promote a domestic timber processing industry. In September 1987, this was complemented by a sawnwood export ban. These two measures effectively isolated the Costa Rican domestic market from the world market and precipitated a substantial drop in the domestic price of sawlogs. The domestic prices for some varieties of logs can be as low as 30% of the world market price.

The depressed domestic price has discouraged the sustainable harvesting of timber, promoted inefficiency in the timber processing industry (log recovery is 46% compared to 55% in comparably advanced developing countries), reduced government revenues from rent collected from timber and, by reducing the relative returns to forestry, has intensified the pressure at the margin to remove forests in favour of agriculture or livestock.

A recent study has estimated the gains from the lifting of the LEB. The analysis suggests that domestic log prices will rise between 67% and 135 % and that the net gain to Costa Rica will be in the range of \$6.4 million and \$73.8 million per year. Though the increased domestic prices may stimulate additional harvest from old-growth forest, the negative environmental impacts are small when compared to the huge efficiency gains.

Source: ????

form of log export taxes, domestic processing requirements, export quotas and log export bans (LEBs) on some or all species. It is believed that restrictions on the export of logs can protect infant wood industries, enhance value-added in processing, generate more employment and increase government revenues. Whilst the issue is controversial, these policies tend to divert logs to the local market and depress domestic log prices below world market prices (see, for example, *Box 2.3*).

3.3 Inefficient Processing Industry

One reason the timber processing industry may not be prepared to pay world prices for raw timber is because they themselves do not realise the full value of the timber they use as an input. The conversion of raw logs into timber products may involve high levels of wastage and poor rates of recovery.

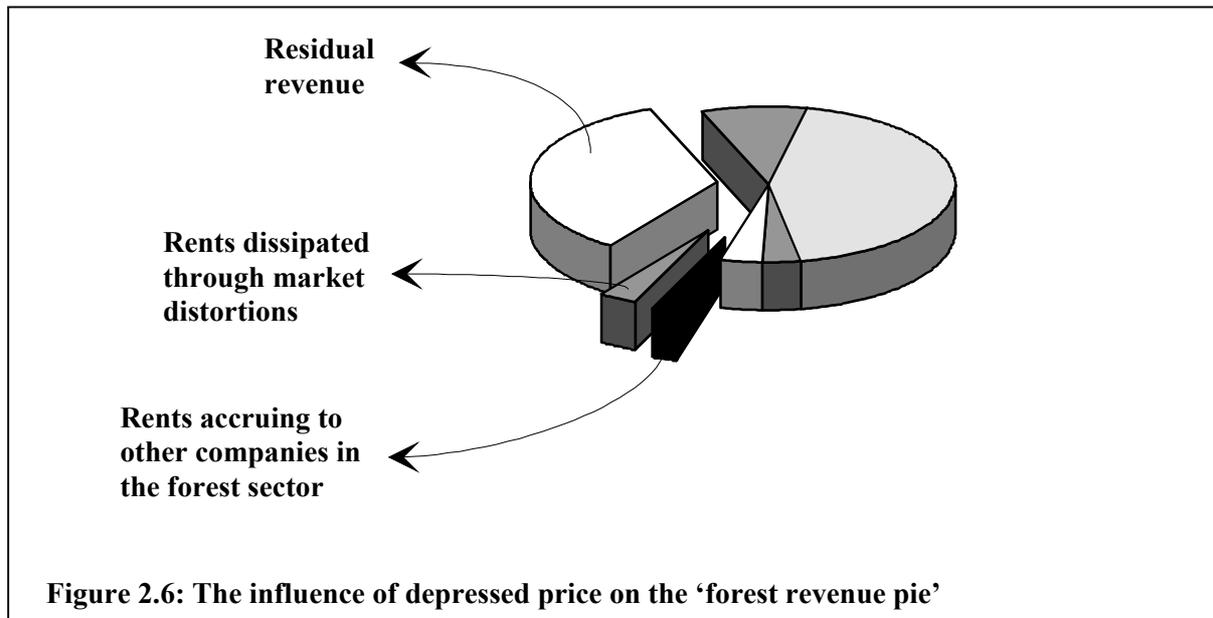
The causes of such inefficiency, a feature of the processing industry in many countries, are numerous. What is clear, however, is that inefficiency and depressed log prices work to exacerbate each other:

- Cheap logs encourage processors to use wood wastefully; the lack of any cost pressure discouraging investment in wood-saving and labour-saving processing technologies.
- Inefficiency reduces the revenues that processors realise from raw timber and depresses the prices they are prepared to pay.

Consequently, export restrictions and non-competitive market structures not only depress the price of raw logs but are also likely to encourage inefficiency in the processing industry. The rents from trees, that may have been captured by the

processing industry, may simply be dissipated in wastage and inefficiency (see, for example, *Box 2.3*).

Again, the existence of depressed prices for timber has the effect of reducing the size of the forest revenue pie. *Figure 2.6* illustrates how some of these rents are simply dissipated through inefficiency, whilst others end up in the hands of companies in the forest sector.



2.5.4 Rents Captured by Government

With all the restrictions, inefficiencies and distortions discussed, the rents that are actually realised in revenues by logging companies are somewhat smaller than the total available rents. In *Figure 2.6* these are illustrated by what has been labelled *residual revenue*.

The forest fees and taxes that governments employ in their attempts to capture this residual revenue are discussed in detail in the next chapter. Suffice it to mention here that these mechanisms are many and various, and may often have ramifications for the efficiency of the sector.

2.5.5 Superprofits; returns to other factors of production

What remains of the residual revenue, following the payment of forest fees and taxes, falls into the hands of the firms in the forest sector. What becomes of this rent? Basically, it gets spread between the other factors employed in the production of timber.

- For labour, this is often reflected in inordinately high wages for workers and management. Alternatively, it might be expressed through non-salary benefits such as unnecessary travel, lengthy vacations or generous stock options.
- For capital and enterprise, this manifests itself as superprofits. The firm may disperse these in the form of large dividends to the company owners, reinvest them or dissipate

them through indulging in extravagant overexpenditure (e.g. over-staffing, building monumental head offices or running luxury corporate aircraft), so-called 'x-inefficiency'.

In our ideal world, government fees and taxes would leave little in the way of forest rents for firms to capture as superprofits. Naturally, there are many reasons why this eventuality does not come to pass.

5.1 Poor Design and Collection of Forest Fees and Taxes

Possibly the most significant problem in the capture of rents by governments is in the design of the fees and taxes. A poorly designed system will, quite legally, allow logging companies to capture forest rents. We shall consider these issues in the next two chapters.

5.2 Forest Fee and Tax Avoidance

Even if governments manage to design a forest fee or tax that does not distort the behaviour of logging companies, then successfully sets the rates of this fee or tax at an appropriate level to capture the available rents, they may still have difficulties collecting payments that are due. Logging companies have many ways of avoiding fees and taxes

Illegal Logging

Where forest fees are not dependent on the quantity of timber extracted from a concession, logging companies may simply 'steal' trees from the forest. They may cut trees that are outside their concession area or log in parks and protected areas. They may ignore silvicultural restrictions; harvesting protected species, ignoring the AAC, felling trees on steep slopes or river banks or re-entering logged-over areas. In the extreme, they may simply steal logs from other loggers working in the vicinity.

Timber Smuggling

Often, going hand in hand with illegal logging is the practice of timber smuggling. Clearly, the clandestine movement of timber across international borders reduces the chances of illegal felling being detected. However, in an attempt to enjoy higher world prices for timber, even legally felled logs may be smuggled in defiance of log export bans or quota restrictions.

Smuggling can take on many forms. At one extreme logging companies may simply clandestinely transport logs over borders, often working at night when the chances of detection are lower. Less flagrantly, they may simply under-report the quantity and/or quality of timber exported to the authorities. Less blatant still, is the mild 'bending of rules' to avoid restrictions. In Indonesia, for example, the ban on rough sawn logs has been circumvented by minutely moulding the boards on one edge and then simply removing this when they reach their destination (TRAFFIC, 1992). Other examples are presented in *Box 2.4*.

Misgrading, Misclassifying and Under-Scaling Harvested Logs

In cases where the fee system relies on the quantity and or quality of the wood extracted, logging companies may indulge in the slightly less brazen practices of misgrading, misclassifying or under-scaling harvested logs. By falsely claiming logs

are of poorer quality, a lower valued species or of smaller volume, the logging company can reduce the levies due.

In many nations, forestry departments simply do not have the trained staff, vehicles and equipment necessary to enforce forest fee systems. Often they must merely accept the figures presented by logging companies, since the resources needed to monitor, measure and calculate the fees owed on timber removed from each concession are too excessive.

Box 2.4: Illegal Logging and Smuggling in South-East Asia

Illegal logging is a common practice in much of South-East Asia. A few examples include:

- *Indonesia* where the PT Barito Pacific company has been fined several times for illegal logging in concession areas belonging to rival companies as well as in protected areas in Kalimantan.
- *Cambodia* where many areas are being logged illegally under the auspices of the Khmer Rouge or the Cambodian army. Most output supplies rosewood and timber to Thailand (Global Witness, 1997).
- *Thailand* where massive problems with illegal logging exist in the Thai park system, especially since the imposition of the 1989 logging ban. In one case the board of directors of the Nam Cat Tien forest reserve allowed illegal logging and used the profits to set up their own fund.

Hand in hand with illegal logging comes the practice of illegal trade in timber. In Cambodia, Laos PDR, Myanmar, Thailand and Vietnam, abundant evidence exists of widespread illegal logging and smuggling of timber. The pattern of this illegal trade is complex, though in simple terms logs from Cambodia, Laos PDR, Myanmar and Vietnam, find their way to Thailand to feed the rapacious wood processing industry starved of its own legal supply of timber following the 1989 logging ban. Logs are thought to either cross directly into Thailand from its neighbours, though evidence also exists that illegally harvested logs from Cambodia are trans-shipped through Laos and Vietnam before reaching Thailand. Further evidence exists that timber logged illegally in Thailand itself is smuggled into Myanmar and Cambodia where it is subsequently re-exported back to Thailand as 'legitimate' timber.

As an indication of the size of the problem, consider Cambodia, where between January 1996 and April 1997 official timber revenues totaled \$14,021,346. Using an average stumpage value of \$74 per m³ estimated by the World Bank (1996), a minimum of \$116,646,830 of logs and sawn timber were illegally exported or sold within Cambodia with a further \$28,866,150 of timber contained in illegal stockpiles awaiting export and sale.

Sources: Brandon and Kishor (1994), Global Witness (1997)

Accounting Practices Used to Evade Taxation

A good review of some of the 'accounting' techniques employed by logging companies to avoid taxes can be found in Sizer and Rice (1995). Some of the more common practices include

- *Transfer Pricing*; which describes the practice of an exporting firm, selling timber to a colluding overseas firm (often part of the same group) at considerably reduced prices. The first firm avoids export taxes and the second firm is able to sell the logs on at full world prices, depositing the difference in the exporter's foreign bank account.

Governments have attempted to combat transfer pricing by ensuring the price of logs declared by companies tallies with the genuine FOB price or by simply posting

their own set of prices. These so-called ‘posted prices’ are much in evidence in West Africa where they are known as the ‘valeur mercuriale’.

- *Overstating depreciation costs of equipment*; is another common practice whereby logging companies import used machinery but report it as new. Since, depreciation costs are subtracted from taxable profits, the company reduces its tax bill by reporting the depreciation on the full cost of new machinery.
- *Over invoicing supplies and commissions from the parent company*; the logging company buys its equipment (machinery for transport and processing) and services (legal and technical) from other subsidiaries of the same parent company. By paying over the odds, the logging company reduces its taxable profits whilst passing revenues on to another member of the group.

Corrupting Officials

In many countries public employees receive very low salaries and are often demoralised and poorly motivated. The possibilities for corruption in such an atmosphere are rife.

Frequently officials inspecting logged volume are completely dependent on the logging company for transport and accommodation. Being isolated they are vulnerable to pressure, persuasion and bribery. As a result it is not surprising that logging companies find it easy to under-declare the quality and quantity of timber they extract or export.

Along similar lines small bribes will often help logging companies avoid much heftier punishments for ignoring silvicultural restrictions and practising poor forest management.

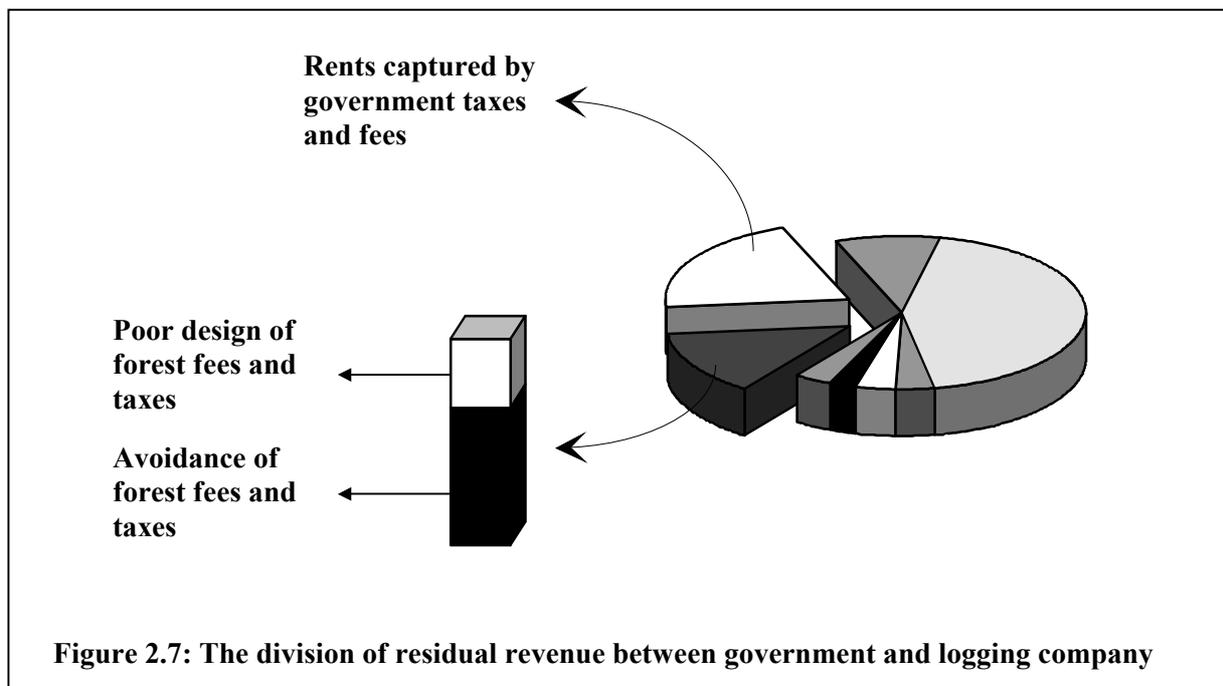


Figure 2.7: The division of residual revenue between government and logging company

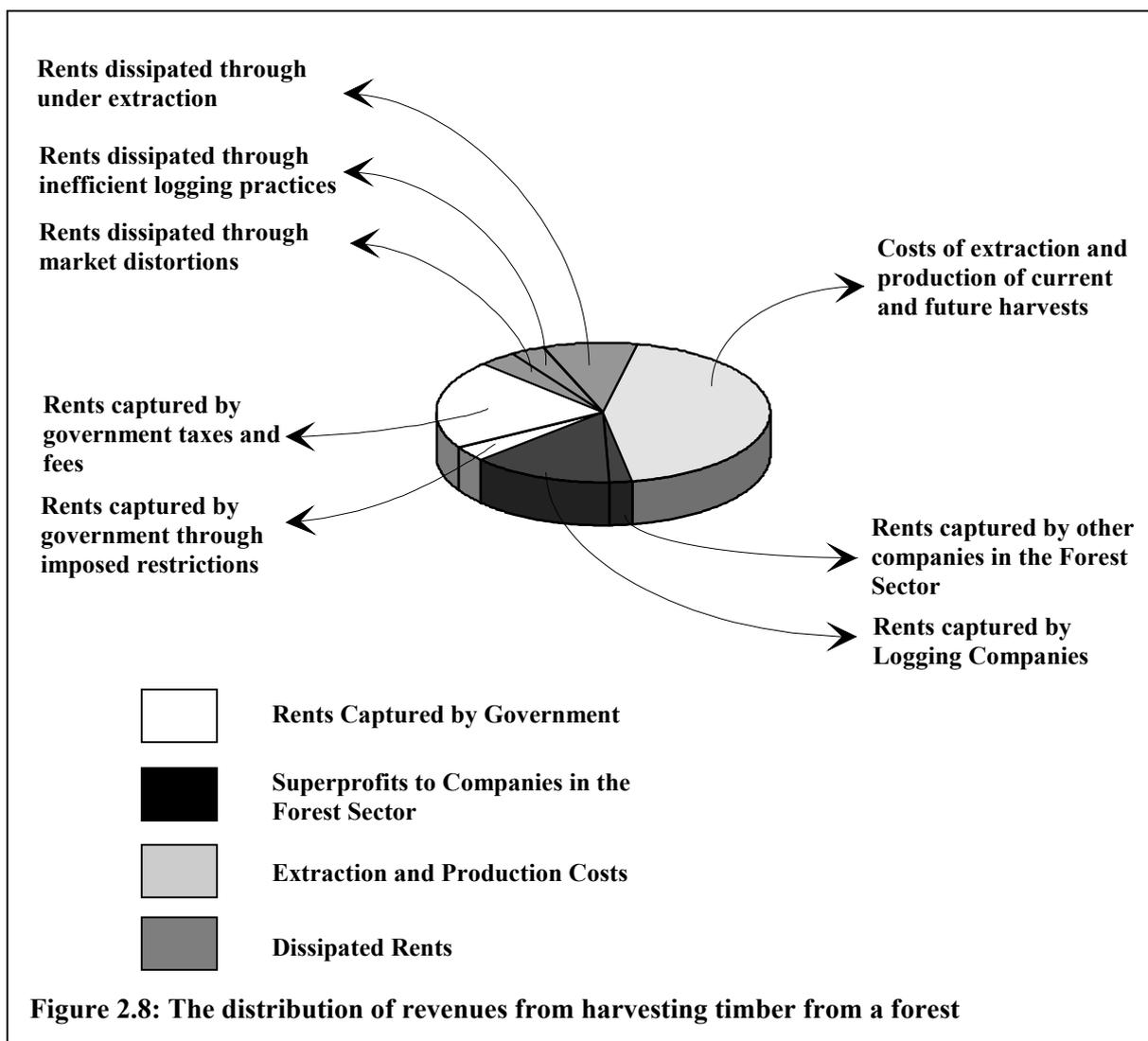
Thus, despite the fees and taxes imposed by governments, logging companies may find it possible to capture some of the forest rents as superprofits. As shown in *Figure 2.7*, this may be through poorly designed fee and tax systems or through the logging companies taking actions to avoid these fees and taxes. In the next chapter we shall go on to discuss in detail these forest fee and tax systems and provide some indication of how successful they might be in discouraging the sort of practices used by logging companies to avoid payment.

2.6 Summary

In this chapter we have examined the concepts of stumpage value and economic rent. Stumpage value was defined as the maximum amount a logging company would be willing to pay a forest owner for the rights to harvest timber from a concession and economic rent was defined as the maximum amount the forest owner might expect as returns for allowing timber from the forest to be harvested. It was argued that in certain circumstances the calculation of these two amounts may lead to slightly different quantities.

Picking up on the concept of rents available from harvesting timber, we looked at the issue of who should collect these rents; the logging company or the government. It was argued that in most circumstances, it would be appropriate for governments, as owners of the forest to capture forest rents.

In the final section we discussed what might happen to the available forest rents in the real world. Through processes that result in lower than optimal extraction of timber from the forest, higher than minimised costs in extracting this timber and lower than competitive, open-market prices when selling this timber, it was argued that forest rents could either end up in the hands of the companies of the forest sector, as returns to the government or simply be dissipated through wastage and inefficiency. The final outcome of these processes is illustrated in *Figure 2.8*.



3. COLLECTING THE RENT

3.1 Introduction

There are a number of good reasons why governments might want to collect the superprofits that can be made by logging and selling timber from forests, not least because they are entitled to this money as the owner of the resource. But how do they go about doing this?

Obviously, in some form or other, the companies that make up the forest sector (and who would otherwise divide the rents from forest timber between themselves as superprofits) have to make a payment to the government. This seems simple enough, but in designing exactly how these payments should be made a number of questions have to be answered. Amongst other things:

- Who exactly should make the payment; those that extract the timber, those that process it or those that sell the final timber products?
- When should the payment be made; before a company has realised its profits or after?
- Should the payment due be calculated according to the quantity of wood actually extracted, the quantity of wood that could be extracted, the size of the concession, the size of profits or from some other measure?
- How much should be paid?

Economists often call the whole package of details that define how a particular payment is made an *instrument*. Over the years many, many different instruments have been designed by governments to extract payments from the forest sector. In this chapter we take a look at these different instruments and discuss their relative merits and drawbacks.

Is making the forest sector pay for using the forest a good thing?

As shall be illustrated later, the only honest response to this question is “not unequivocally”. In *Chapter 2* it was argued that allowing companies in the forest sector to capture forest rents could lead to wasteful use of forest timber and to unnecessary deforestation and forest degradation. Ironically, it turns out that poorly designed instruments intended to capture forest rents may themselves promote inefficiency in the forest sector and encourage concessionaires to behave in ways that seriously harm the forest and its ability to recover after harvesting.

What then makes a good instrument?

There are a number of different criteria by which we might judge the effectiveness of a particular instrument. Key amongst these are:

- How effective is the instrument in capturing forest rents?
- What effect does the instrument have on the behaviour of companies in the forest sector and how might this influence the way in which they use the forest?
- How easy is it for the government to calculate and then collect the payments due them from a particular instrument?
- How easy is it for companies to avoid making some or all of the payment?

In general, we might note that the answer to these questions will be different for any particular situation. An instrument that is highly effective in one country might prove to be entirely ineffective in another.

Taxes or Fees?

When we think about governments demanding payments from companies, or for that matter individuals, we usually think in terms of *taxation*. Strictly speaking, however, charging for the right to harvest trees from forests is not a tax but a *fee*; a fee because the payment is part of a direct exchange - 'you pay us and we let you harvest our trees'.

Taxes, on the other hand, have a somewhat different motivation. Rather than being part of a direct exchange, taxes are the means by which governments raise revenue in order to carry out their general duties and to pursue their social and economic objectives. The companies and individuals that make their money by harvesting and processing timber are expected to pay taxes just like companies and individuals in any other sector of the economy. Of course, this does not mean we should ignore tax systems. Though not designed specifically for the purpose, government tax systems can be important instruments for capturing rents from the forest sector.

3.2 Types of Instrument

The distinction between *fees* and *taxes*, provides us with a first broad categorisation of instruments used to capture economic rent in the forest sector: those that are part of a country's general tax system (*government taxes*) and those that are designed specifically for the forest sector (*forest fees*).

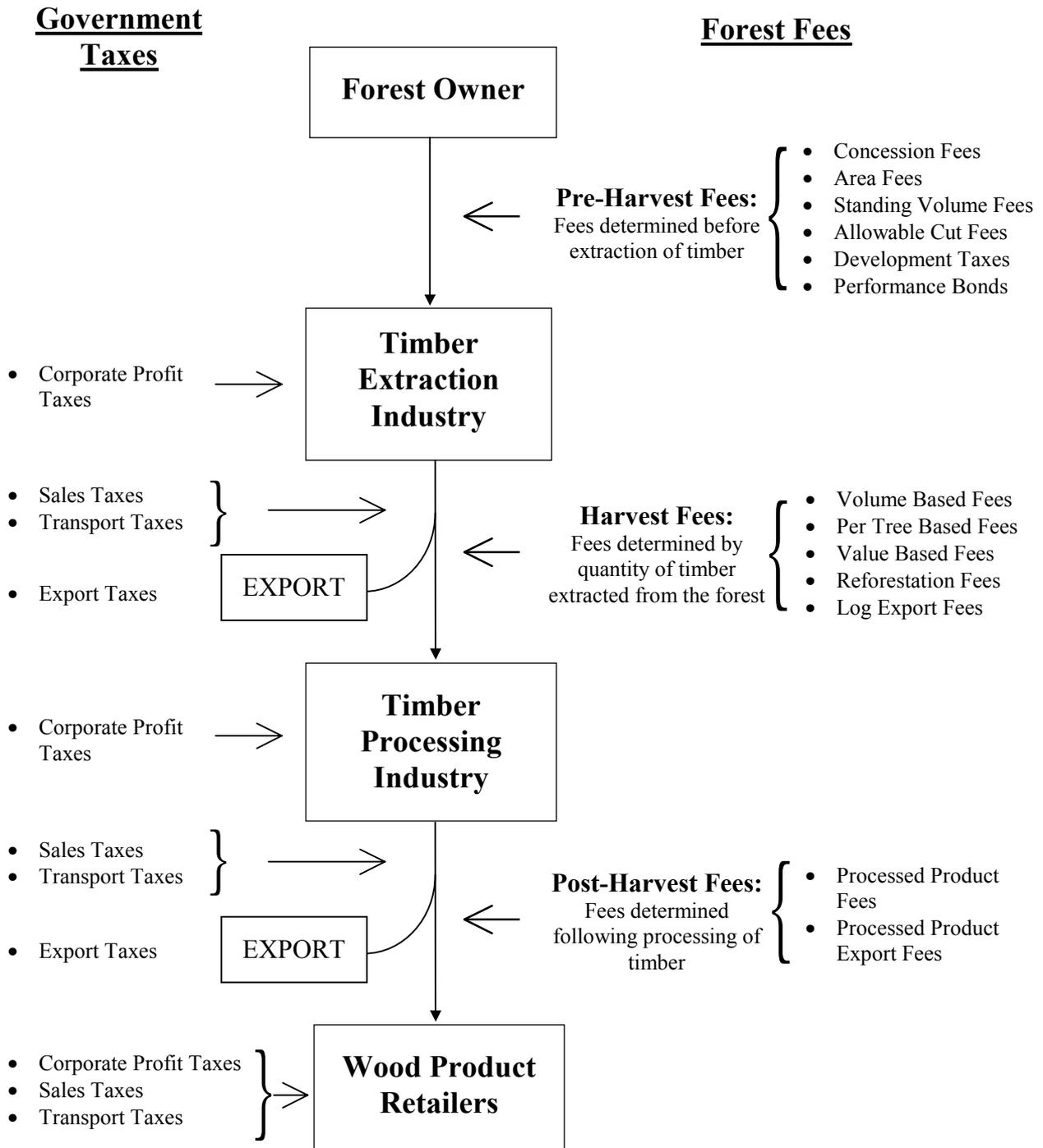
Figure 3.1 presents the simplified diagram of the forest sector introduced in *Chapter 1*. The arrows that join the boxes show the flows of timber through the sector. Governments can design instruments that impose fees and taxes on any of the major parties in the sector. In the diagram, those instruments best described as government taxes are listed in the left hand column and those best described as forest fees are listed in the right hand column.

As a general rule forest fees, since they are specifically designed to capture the stumpage value of the timber available in a concession, are based on the flow of that timber through the sector. One group of fees, those labeled *pre-harvest determined fees* in *Figure 3.1* are determined when the rights to timber in the concession are granted to a company in the timber extraction industry. A second identifiable group of forest fees are those that are determined according some measure of the quantity of timber extracted from the concession. These are labeled *harvest determined fees* in *Figure 3.1*. A third (and possibly the least commonly applied) division of forest fees, are *post-harvest determined fees*. These are fees that are imposed following processing of logs from the forest.

Theoretically speaking, it should be possible to design an instrument based on any of the flows of timber shown in the diagram that could capture the full stumpage value of trees in the forest. However, as was described in the previous chapter, the further from the forest an instrument is applied, the more potential there is for intermediaries to capture rents or dissipate them through inefficient behaviour.

Figure 3.1: Fees and taxes in the forest sector

Flow of timber through Forest Sector



3.3 Setting the Rate

The traditional method for establishing the actual level of payment associated with a particular instrument is for the rates to be set by the government; a process known as *administrative determination*.

Ideally the government would like to charge the companies in the forest sector the stumpage value of each tree in the forest. In this way they could ensure that every tree that had merchantable value would be harvested from the forest whilst ensuring that companies of the forest sector would be earning normal returns on their investment of capital ... and no more.

However, as we saw in the last chapter, calculating the exact stumpage value of a tree requires considerable information. At a very minimum, the government would have to estimate the costs of harvesting and transporting a log from the forest to the market, they would have to know the price a particular log would fetch in the market and also what constitutes a normal rate of return on the capital investment of the forest sector. To do this for each and every tree in the forest is clearly infeasible.

On top of this, governments seeking to calculate stumpage values remain dependent on forest sector companies to provide accurate data on the extraction costs and prices of timber. Unfortunately, revealing such information is not in these companies' best interests. They can ensure that charges are kept at a relatively low level by convincing the government that the harvesting and transportation of timber is more costly and the prices of timber lower than in reality they actually are. Across West Africa, for example, widespread under declaration of the price of exported timber has led to the establishment of the *valeur mercuriale* (Gray et al., 1991). The *valeur mercuriale* is a so-called *posted price*; government officials monitor the world timber market and publish a list of prices which are used to calculate charges rather than those declared by exporters of timber.

In practice, governments are forced to use a series of approximations to estimate stumpage values. Species of similar value are frequently lumped into groups assumed to command the same price, extraction costs are assumed equal for all trees and the forest lands are zoned with timber from each zone assumed to face the same transport costs. (See *Box 3.3* for an example of such calculations for a harvest fee levied in the Canadian Province of British Columbia).

A further major shortcoming of administratively determined rates for forest fees is that all too often they are set without regard to changing market conditions or to inflation. Fees cast in stone by government legislation may erode in real value terms at frightening rates. In the Philippines between 1980 and 1986, for example, the charge associated with a forest fee defined in the domestic currency, depreciated by as much as 18% per year. Even when expressed in U.S. dollars the real values of such fees would have declined by as much as 5% per year in the early 1980s and by as much as 22% in the 12 months prior to September 1990 (Gillis, ???).

For administratively determined fees to reflect inflation and changing market conditions, they must be adjusted annually or at least regularly to reflect changes in timber prices and general inflation.

In the final analysis the use of aggregate approximation, the incentives for companies to provide erroneous information and the need for constant adjustment, results in the calculated stumpage values used for charging being only a poor reflection of true stumpage values.

However, an alternative method of establishing the level of payments associated with a forest fee is available to governments - *competitive bidding*. As discussed in *Chapter 1*, governments are frequently faced with a choice between several logging companies hoping to win the rights to harvest from a particular concession. More and more often, governments are using auctions to choose between these potential concessionaires.

Auctions consist of the government specifying the particular type of forest fee that it intends to charge the eventual concessionaire. Logging companies are asked to bid on the associated level of payments they are prepared to make. The logging company that bids the highest wins the rights to harvest in the concession.

The power of competitive bidding is that it forces logging companies to estimate how much they believe the timber they could extract over the course of their tenure of the concession, is worth to them. The maximum they would be willing to pay to acquire the rights to harvest a concession is the difference between the revenue they would enjoy from selling the logs from the forest and the cost of extracting the timber (the latter including the opportunity cost of investing their capital in this enterprise and not some other sector of the economy). In effect the concessionaire's estimate of his maximum willingness to pay (MWTP) is his estimate of the economic rent available from selling the timber in the concession.

When the logging company comes to bid in the auction they must ensure that the sum total of all their expected payments to the government will be less than this maximum willingness to pay. A bid that resulted in total payments higher than this amount would mean that the logging company would not earn normal returns and would be better off employing its capital in other sectors of the economy.

Of course, in an attempt to capture some of the economic rents, the logging company could bid a payment level that resulted in total payments lower than their MWTP. However, the logging company knows that other companies will make similar estimates of the value of the forest. If the company decides to bid under their MWTP, then as likely as not, another company who has bid closer to their MWTP will win the contract. If the logging company is serious about winning the rights to harvest, his bid will have to reflect his estimate of the total stumpage value of the concession.

Provided sufficient competition exists between the potential concessionaires, and auctions can be designed so as to avoid any possible collusion between bidders, auctions are an excellent means of ensuring the payment level associated with a forest fee is at, or close to, an amount that reflects the true value of the forest.

Using competitive bidding to allocate concessions and determine forest fee payment levels is a very powerful tool. It ensures the concession is allocated to the logging company who values the forest highest, that is the company that is most productive and can extract timber the most efficiently. Also, it transfers the demands and uncertainties of calculating stumpage value to the potential concessionaires, who are better placed to make these calculations anyway.

Of course, the use of auctions to determine the level of payments associated with a forest fee is only really suitable for fees charged directly to concessionaires. Most frequently they have been used to set the payment level of an up-front or annual pre-harvest determined fees but they have also been successfully applied to harvest determined fees based on the level of payment per unit extracted (see *Box 3.1*).

Box 3.1: Auctions in Ghana, Costa Rica, British Columbia and Cameroon

a. Ghana

Forest concessions in Ghana up until 1992 were allocated administratively by the Minister of Lands and Forestry on the advice of the Timber Concessions Committee. In November 1992 a moratorium on further allocation of concessions was imposed, though a number of concessions seemed to have been allocated regardless (UNIDO, 1996). A major review of the 1962 Concession Act has resulted in a draft bill that proposes the introduction of a process of competitive bidding in concession allocation. The proposals define two steps to the allocation procedure:

- *Pre-tender qualification:* Applicants must have agreement by the chiefs or landowners that they will work with the applicant. All the costs of survey, investigations, plans, determination of boundaries and all sums payable by the applicant must have been paid. Further, he must provide income tax and social security clearance certificates, audited accounts for the past five years, a recent bankers certificate of creditworthiness and details of any contracted and outstanding loans, evidence of full payment of (past) royalties and any forest fees, as well as evidence of membership of a trade association relevant to forestry. Each applicant must also complete a five year and current year plan for forest harvesting. Based on this information, five suitable applicants are selected following evaluation criteria that judge the applicants technical capability, environmental commitment, financial reliability and social responsibility in operating the concession.
- *Competitive bidding:* The five chosen applicants are then required to present bids that state the amount they are willing to pay in an annual per hectare concession fee. The highest bidder is allocated the concession.

b. British Columbia, Canada

The Canadian Province of British Columbia defines three main types of concession. Two of these place responsibility for practising sustained yield management and for building roads and infrastructure in the hands of the concessionaire. The third major concession type, the *Timber Sales License (TSL)*, is designed for small scale operators. Concessionaires holding TSLs are excused from silvicultural responsibilities and road building, both of which are carried out by the state.

Using a relatively complex system, the government of British Columbia, calculates the stumpage fees payable on harvested timber. The calculations are the same irrespective of the type of concession. However, it is recognised that because those concessionaires with TSLs are excused certain costly responsibilities, the fees paid on TSL concessions will be too low.

Hence, a form of auction is used when allocating TSLs. The rights to timber in these concessions are sold competitively, with potential concessionaires offering a bonus bid that they are willing to pay in addition to the calculated stumpage rate. The logging company offering the highest bonus bid is awarded the concession. The bonus bid is designed to compensate the government for the silvicultural and road building duties that it will take on for the concessionaire. If the government believes the bonus bid will not cover road building and silviculture it has the option of imposing a development and/or silvicultural levy before the auction.

Bonus bids are usually invited on a 'per m³ of wood harvested' basis and are then combined with stumpage fees. The revenue from bonus bids is substantial. For example in 1993, total stumpage billed from TSLs was \$259 million and half of this (\$131 million) was attributable to bonus payments.

c. Cameroon

Two types of logging concession exist in Cameroon; large concessions (maximum 200,000 ha) and *ventes de coupe* small cutting rights of around 2,500 ha. The large concessions are restricted to Cameroonian companies and to those foreign companies that have already constructed a sawmill in the country. The *ventes de coupe* are for smaller companies or individuals, priority being given to Cameroonian nationals, though foreign companies can apply with the consent of the forestry authorities.

Both types of concession are allocated through a form of competitive auction. The allocation system follows a two-tier approach whereby applicants must submit two separate envelopes to the forestry authorities at the same time. In the first tier (based on the information in the first envelope), firms are pre-qualified according to whether they attain certain minimum technical and financial criteria. To avoid possible abuse of the system these criteria are defined in the Forestry Decree and are, where possible, quantifiable.

If the potential concessionaire meets the technical and financial criteria, the second tier competition for the award of concessions is based exclusively on price. The second envelope contains the bids for the concession on the basis of a unit price per hectare payable annually. The highest unit price offer wins the rights to harvest from the concession.

d. Costa Rica

Project Fundecor (Foundation for the Development of the Central Volcanic Range) was created in 1991 in an attempt to reduce the rate of forest degradation in the World Biosphere Reserve of the Central Volcanic Mountain Range Conservation Area and its surrounding buffer zone. Fundecor's approach has been to increase the attractiveness of forestry activities as compared to alternative forms of land use such as cattle ranching or agriculture. Since forest lands in Costa Rica are generally owned by private land holders, the implementation of any government forestry and agricultural program involves the participation of a large number of small parties. To increase the attractiveness of the forestry option to these small and medium sized farmers, Fundecor has provided a variety of services that include ensuring land tenure, as well as technical, marketing, and financial assistance.

Financial assistance is provided through a system of advanced payment for future sales of timber from plantations or natural forest management. For natural forest management, Fundecor pays US\$10 per ha per year in exchange for 6 m³ per ha of timber to be harvested at the end of the current cutting cycle (between 12 and 15 years). In addition, a key element of Fundecor's assistance has been to organise the large number of small forest owners so that they can realise a greater portion of the rents owing them from timber harvested from their land. This includes a system of selling standing timber in auctions in the Costa Rica Commodities Market (Bolsa de Productos Agropecuarios, Bolpro S.A.) In order to join the auctions, forest owners have to provide a package containing a management and a harvesting plan, as well as a government license to manage the forest. This package is put together by each forest owner with the assistance of Fundecor. It is expected that this system will evolve into some sort of future market for timber sales. Auctions have raised the amount received by farmers by nearly 100% compared to the informal system of direct negotiation with logging contractors.

3.4 The major types of instruments

Figure 3.1 presents a pictorial presentation of where in the flow of timber through the forest sector various instruments are applied. In this section we shall describe the major types of instrument shown in this Figure. Instruments are classified according to whether they are a government tax or a forest fee, with fees being further divided into pre-harvest determined, harvest determined and post-harvest determined categories.

In this section we shall also outline the advantages and disadvantages of these different instruments. Judging them according to the criteria laid out at the beginning of this chapter:

- How effective is the instrument in capturing forest rents?
- What effect does the instrument have on the behaviour of companies in the forest sector and how might this influence the way in which they use the forest?
- How easy is it for the government to calculate and then collect the payments due them from a particular instrument?
- How easy is it for companies to avoid making some or all of the payment?

The information in the following discussion is summarised in *Table 3.1* at the end of this section.

3.4.1 Forest Fees

Forest fees are those instruments that are designed by governments with the specific intent of charging the forest sector for its use of timber taken from forests.

As described above a convenient classification of forest fees groups them according to where they are imposed in the flow of timber through the forest sector; those that are determined before the harvesting of wood (*pre-harvest determined fees*), fees that are determined according to the amount of wood harvested (*harvest determined fees*) and those fees that are determined according to the amount of wood processed into timber products (*post-harvest determined fees*).

3.4.1.1 Pre-Harvest Determined Fees

Pre-harvest determined fees are paid by the chosen concessionaire to the forest owner entirely independent of any actual harvesting that may occur. In recent years a number of authors have recommended that countries adopt fees of this nature (e.g. Hyde and Sedjo, 1992; Gillis, ???; Grut et al, 1991) so it is worth spending a little time discussing their relative merits.

There are many features of pre-harvest fees that make them an attractive option for governments. First and foremost, they are extremely simple to collect. The level of fee is determined in the concession agreement and is paid up front and/or on an annual basis. The forest service doesn't need to invest time and money in sending out inspectors to establish the exact quantity of timber that a concessionaire extracts from the forest.

A second important characteristic of pre-harvest fees is that they provide strong incentives for the concessionaire to harvest all the merchantable timber in the concession. In effect, the concessionaire has paid for the timber in advance; it makes sense to cut all the stems

from which he can turn a profit and to protect the concession against illegal felling or invasion.

Similarly, the concessionaire can improve his profitability by harvesting efficiently. The more he reduces his costs of extraction (e.g. by investing in better harvesting equipment or training personnel to be more productive) and the more timber he recovers from the forest, the greater will be the rewards to his enterprise.

Economists would argue that motivating concessionaires to minimise their costs and increase their rates of recovery is a good thing since it reduces inefficiency and avoids wasting an economy's resources. At the same time, these very motivations may encourage behaviour that is not at all beneficial. In their efforts to increase returns from the forest, concessionaires may be tempted to ignore silvicultural restrictions imposed as part of the concession agreement. Without suitable monitoring by the forest service, concessionaires may fail to respect the restrictions usually imposed on harvesting trees on steep slopes, those bordering watercourses or those below a minimum size. In a similar way, concessionaires may be tempted to log illegally outside the boundaries of their concession.

One final advantage of pre-harvest fees worth mentioning, is that they discourage the purchase of rights to forest lands purely for speculative reasons. If fees are payable whether timber is felled or not, then holding on to forest land without realising any returns becomes a less attractive option. In effect, pre-harvest fees encourage forest land to be used by those who value it most highly.

One of the major drawbacks of pre-harvest determined fees is the uncertainty surrounding the actual rents that could potentially be available from extracting timber from a concession. A number of areas of uncertainty can be identified:

- Uncertainty concerning the *total quantity of merchantable timber* in the concession. In tropical forests the diversity of species and habitats makes it especially difficult to estimate the quantity and quality of timber that can be extracted from a particular concession. A fee determined prior to harvesting could seriously underestimate (or overestimate) the value of timber in the concession. One way to resolve this uncertainty is to carry out an inventory of the timber concession before it is sold. The costs of this exercise may well be offset by the value of the added information that can be used in establishing less uncertain payment levels.
- Uncertainty concerning the *future price of timber*. Should timber prices rise dramatically following the signing of the concession agreement then the already agreed fees would not reflect the full rent being realised from the forest. (Of course the reverse is also true). When concessions are allocated for many years uncertainty in future price trends may be of major concern.
- Uncertainty concerning the *costs of extraction*. It is difficult to judge how costly it will be to remove timber from the forest prior to the concession being opened up for exploitation. Certainly, governments are not always best placed to make these estimates. In the long run, consideration should also be given to technological changes that may reduce the costs of harvesting.

Whatever uncertainties exist, however, it is clear that in setting pre-harvest determined fees the forest owner runs the risk of misjudging the true value of the forest to the concessionaire.

One way round this problem is to shift the burden of estimating the value of the forest onto the concessionaires. The payment level of a pre-harvest determined fee can readily be established by competitive auction. The potential concessionaires it is assumed, will formulate their offers and adjust their bids to account for potential uncertainties. In theory at least, competitive bidding should ensure that forest owners capture a great deal of the available economic rent, and that the concession is allocated to the most productive and efficient extractor.

a. Concession Fees

A simple form of pre-harvest fee is the concession fee. Concession fees are payments levied for the entire concession either when the concessionaire is given the rights to harvest or on an annual basis. Unfortunately, a fee set high enough to capture the entire value of the concession in one go could prove too onerous for smaller companies. More usually these fees will involve an initial payment followed by subsequent annual payments.

Such fees lend themselves readily to competitive auction.

b. Area Fees

Area fees are those pre-harvest fees based on the size of the whole concession or on the annual logging area. The concessionaire is responsible for paying a per hectare fee.

Area fees set administratively often account for the accessibility and the forest type of the concession. Forests that are closer to markets and contain higher qualities or quantities of timber should, quite rightly, command higher payments.

Since concessionaires are paying on a per hectare basis, area fees promote smaller more manageable concessions in which better recovery of merchantable timber is encouraged. Likewise, concession holders will tend to want to unburden themselves of excess areas beyond their needs, including non-forest areas and forest areas of low productivity.

Again, area fees lend themselves readily to competitive auction.

c. Standing Volume Fees

Less frequently pre-harvest forest fees are based on an inventory of the volume of merchantable trees within the entire concession or the annual cutting area. The payment due is determined by multiplying the inventory merchantable volume of each species by a per m³ fee set administratively for each species. Using administratively set fees for this calculation makes it difficult to ensure that a standing volume fee reflects the concessionaires maximum willingness to pay for the rights to harvest from the concession.

However, fees of this type remove much of the uncertainty surrounding the true quantity and quality of stock that is available in the concession. Of course this comes at a price - carrying out an accurate inventory of the forest. In tropical moist forests, such inventories are not so easily accomplished given the great diversity of species, diameters and stocking.

d. Fees based on the Annual Allowable Cut

Frequently, the concession agreement will include details of an annual allowable cut (AAC) which stipulates the volume of wood that the concessionaire is allowed to

harvest. Another possible means of determining the level of a pre-harvest fee is by linking it to the size of the AAC. Such fees demand an inventory of standing volume to assess the AAC and also subsequent monitoring of actual harvesting to ensure the concessionaire does not exceed the AAC.

An AAC based fee can be set administratively in a similar manner to that used to determine a standing volume fee or can be set at competitive auction.

e. Performance Bonds

Performance bonds, as their name suggests, are not strictly speaking forest fees. In a number of countries governments have insisted that logging companies post a bond in advance of harvesting. The bond is repaid to the concessionaire if a post-harvesting inspection of logged over areas reveals that the logging company has complied with all the silvicultural stipulations defined in the concession contract.

In effect, if the logging company forfeits all or part of the bond, then this money can be seen as compensating the forest owner for that part of future rents which have been lost through logging practices that fail to ensure the availability of future harvests. As such the performance bond, if forfeited, acts as a rent capture mechanism.

Box 3.2: Performance Bonds in the Philippines

Following massive deforestation throughout the 1970s and 1980s the Philippine government instituted a package of reforms designed to stabilise the situation. A logging moratoria in selected parts of the country was enforced and expired concessions were not renewed. Also, the government introduced substantial increases in timber royalties. However, the forest returned from expired concessions to the government's forestry department, the Department of Environment and Natural Resources (DENR), continued to be degraded and destroyed especially by shifting agriculturists. In short the DENR had no way of effectively protecting the remaining forest.

Thus in 1991, the DENR introduced a new type of forest lease agreement, the Industrial Forest Management Agreement (IFMA). The IFMA represented an entirely new approach to forest concessions. Rather than simply leasing out forested land to logging companies the IFMA combined a variety of forested, degraded and deforested land into one concession. The private lessee was responsible for timber extraction, plantation establishment and forest protection and it was hoped would use the cash flow from the profitable parts of the lease area to subsidize both plantation establishment and protection activities.

IFMAs were to be awarded on the basis of the highest amount of guarantee bond the bidder was prepared to post. The Forest Guarantee Bond (FGB) is a returnable performance bond deposited with the Government. FGB has the following main features:

- it relies on competitive public bidding to allocate the lease and associated harvesting rights
- a reserve price of P100/cu m (US\$3,60), with a minimum value of P6,000/ha (US\$217) is set on each concession
- it encourages responsible long-term management by the leaseholder since non-depleting behaviour is rewarded by the return of the bond with accrued interest
- it provides a mechanism for the prompt penalization of the lessee in case of violation of the terms of agreement, a contrast to normal concession policy in which the most the government could do is cancel the license

The IFMA system contained many desirable features, including:

- It provided a clear, market-based indication of the profitability of forest management in a particular area, with sites commanding very low or no bond bids being indicative of insufficient prospects of profit under the terms of the IFMA. Such sites may then be regarded as unsuitable for private management and the government must directly subsidize their protection
- It also attempted to confine the government to regulating enforcement functions while entrusting the private sector with the actual tasks of managing and protecting the forest
- Since private ownership of forest areas is constitutionally prohibited, the IFMA was designed to create a situation approximating that in ordinary markets, where the owners of resources benefit from good stewardship and suffer the consequences of bad management in the form of capital loss.

Unfortunately, the scheme, whilst well intentioned, was not successful. The main drawbacks included:

- the maximum proportion of residual forest in the total area of IFMA was set at 50%, often resulting in irrational management unit boundaries
- in many cases the area-based reserve price was cases too high considering the condition of much of the residual forest
- a suitable monitoring system which would clearly define the grounds for reclaiming the bond was missing
- constitutional restrictions meant that IFMA were only awarded for 25 years, renewable for one additional term. This tenure restriction removed much of the incentive for multiperiod behaviour and unduly emphasised FGB's punitive function.
- the returns on industrial tree plantations, a predominant component of the early IFMAs, were not sufficient to stimulate the investment needed to bring large areas of degraded forest back into production.
- the requirement for forest lessees to post a guarantee bond was not accompanied by a waiver of forest charges on volume of timber extracted. Thus the bond "stick" comes with no "carrot" and the bond is (rightly) seen as reducing the cash flow available to forest managers to invest in long-term forest management. The cross-subsidization of forest protection and rehabilitation from current revenue, is thus placed in jeopardy.

Despite numerous attempts to reform the system reports of abuses of the system multiplied, leading DENR to suspend the scheme in 1995 while undertaking a review of its functioning.

f. Local development obligations

Logging often takes place in remote areas of a country, poor in social infrastructure. In some cases, the concession agreement contains obligations for the concessionaire to undertake certain local development activities (e.g. the provision of basic health facilities, establishment of schools, maintenance of roads not strictly connected with log production, etc.). Though quite different from the other pre-harvest fees discussed, local development obligations are conceptually similar since they are unrelated to the actual quantity of timber harvested by the concessionaire. (See Box 1 for an example of local development obligations in Papua New Guinea).

It is possible to argue that imposing development obligations on concessionaires is an efficient use of resources since these companies already have the logistic set up, personnel and machinery available in remote locations to undertake such projects.

However, remuneration of this kind is extremely difficult to quantify and frequently the investments reflect more upon the needs of the timber extractor than those of the local population.

3.4.1.2 Harvest Determined Fees

The second main category of forest fees are those determined by the quantity of timber harvested from a concession. In many respects fees of this nature attempt, with differing degrees of accuracy, to approximate the calculation of stumpage value presented in Chapter 2. For this reason harvest determined fees are often called *stumpage fees*. To avoid confusion between the terms stumpage value and stumpage fee it is probably clearer to adopt the term *royalty* when describing fees based on the quantity of timber harvested.⁸

Harvest-determined fees come in two types. Those that charge the same fee for every unit of output regardless of the cost of extraction and the value of the timber (a *uniform specific royalty*) and those that take account of costs and value (a *differentiated royalty*). The latter are clearly a better approximation to the stumpage value.

Basing payments on the amount of timber extracted from the forest removes much of the uncertainty over the quantity and quality of harvestable timber in a concession that confounds the setting of pre-harvest determined fees. The concessionaire is charged on each unit extracted so the quantity and quality of the timber in the forest is revealed to the forest owner as harvesting progresses.

Clearly, this results in a considerable disadvantage of harvest determined fees; the difficult process of calculating exactly how much timber has been harvested. As was highlighted in the previous chapter, there are many ways in which concessionaires can (and apparently do) avoid revealing all the timber they extract from the forest. The measuring and policing burdens imposed by relying on harvest determined fees may be particularly onerous for those countries with an understaffed and poorly funded forest service.

Unlike pre-harvest determined fees, fees calculated on the quantity of timber removed from the forest do not necessarily encourage concessionaires to use the forest in the most efficient manner. Concessionaires do not pay in advance for the timber in the forest but pay in arrears for the timber they remove. Those who practice poor or inefficient logging techniques, effectively avoid paying for merchantable timber that they leave in the forest.

1.2.b. Per-Tree based Fees

Probably the simplest harvest fee is that based on the number of trees extracted from a concession. In its most elementary form a fixed charge or a *uniform royalty* is imposed on each harvested stem. The simplicity of this instrument makes it highly appealing. The forest service simply needs to count the number of trees extracted, there is no need to estimate the volume of timber (scaling) nor identify the species.

Charging for each stem extracted has other benefits. For a start, it penalises the cutting of undersized trees since the concessionaire will be expected to pay the same charge for

⁸To be absolutely clear, *stumpage value* refers to the economic rent that could be earned by the most efficient logging company harvesting a tree and selling it at the prevailing, undistorted market price. A *stumpage fee*, on the other hand is a charge levied on the concessionaire by the forest owner in an attempt to capture this rent. Though ideally (from the forest owners point of view) the two will be identical this is extremely unlikely in practice.

a small stem as for a large one. This reinforces silvicultural systems that demand smaller trees be left uncut to provide a second cut in the future.

Per-tree fees provide a strong incentive to harvest efficiently. Having paid for the whole tree, the concessionaire will be inclined to recover as much timber from it as is economically merchantable.

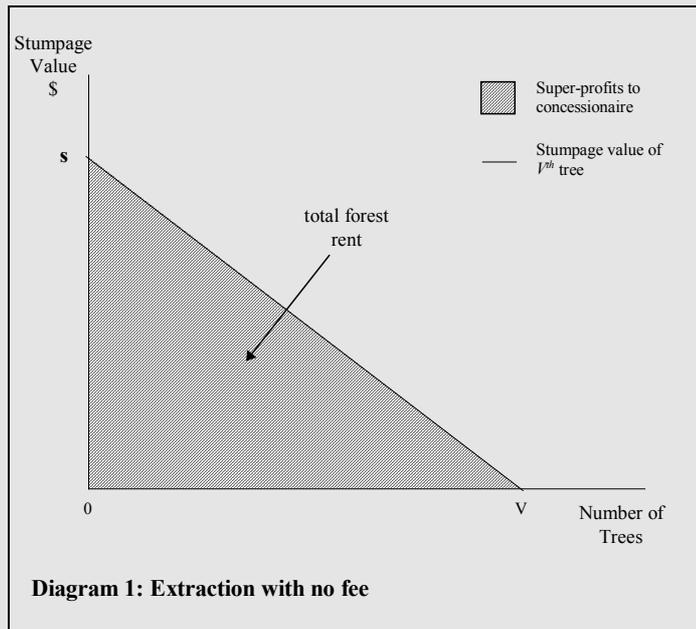
The fact that the forest service can calculate the number of trees felled simply by counting the stumps left in the forest is also beneficial. First, it is more difficult for concessionaires to avoid paying fees by simply smuggling away felled stems. Second, since the fee is charged on all trees felled, rather than just those removed from the forest it discourages the wasteful felling of trees that are not then used. Having paid for the entire tree the concessionaire is more likely to use whatever is merchantable.

The simplicity of per-tree charges is achieved at a price; poor rent capture. The fee can only approximate the true stumpage value of a harvested tree. Fees will overstate the stumpage value of some trees and understate the stumpage values of others. Such a system is clear encouragement to high-grade. (see Box 3.3). To partly mitigate these problems, it is possible to *differentiate per-tree royalties*. The fee due on any stem can be varied according to the species (reflecting differences in timber value) and/or by region of origin (reflecting differences in transport costs). Despite this, per-tree fees are at best a poor reflection of the real stumpage value of a harvested stem.

Box 3.3: Harvest-fees and their influence on high-grading and rent capture

The concessionaire's harvesting decision

Consider the problem faced by the concessionaire in deciding how much timber to extract from the forest. As a rule of thumb, over the course of his tenure of the concession, the concessionaire will attempt to log every tree that he thinks he can sell for more than its cost of harvest. As discussed in Chapter 2, the difference between the price timber earns for the concessionaire and the cost of extracting it from the forest is the *stumpage value*. Given the diversity of tree species, timber qualities and harvesting locations in any one forest, we would expect the trees in a concession to command stumpage values that ranged from large positive values to large negative values. If we could graph the stumpage value of every tree in the concession, ordering the trees from highest to lowest stumpage value, the result might look something like that shown in Diagram 1.

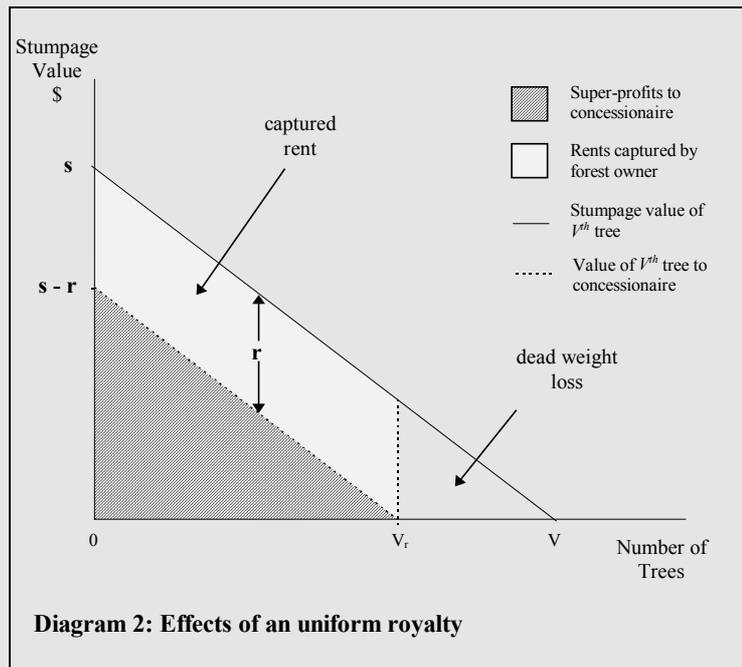


Since the concessionaire will only be interested in extracting those trees with a positive stumpage value, the total number of trees he would wish to harvest is shown by V . The sum of the stumpage values of all V trees amounts to the shaded area on the diagram; the *total forest rent* available from the concession.

A uniform royalty

What happens to the harvesting decisions of the concessionaire if the forest owner, in an attempt to capture some of the rent, imposes a *uniform royalty* of $\$r$? A uniform royalty is the simplest of all harvest-based fees and consists of a fixed charge levied on each unit extracted from the forest. Clearly from the point of view of the concessionaire, having to pay the forest owner $\$r$ for each unit extracted means that the stumpage values that he now observes are depicted by the dotted line in diagram 2.

Now only the first V_r trees have a positive value to the concessionaire, so he will reduce his extraction to this lower level. The concessionaire enjoys far less in the way of super-profits (the heavily shaded area in diagram 2) whilst the government raises revenues equivalent $\$r$ multiplied by V_r units (the lightly shaded area in diagram 2).



However, by imposing the uniform royalty, the government introduces a production distortion. Though the V_r^{th} to V^{th} trees in the concession command positive stumpage values the concessionaire is no longer motivated to harvest them and leaves them in the forest. Neither the concessionaire nor the forest owner realises the rents available on this disregarded timber. As illustrated in Diagram 2 the production distortion introduces a *deadweight loss*. In the context of timber harvesting, this loss is referred to as *high-grading* or *creaming* of the forest whereby the higher valued timber is removed and a degraded residual stand is left behind. High-grading whilst being economically inefficient also has environmental consequences:

- It encourages early re-entry into the logged over area, as trees with merchantable value are left standing. Re-entry is particularly damaging to forest regeneration.
- It encourages loggers to leave low value stems that have been felled in attempts to get at high value timber, to decay in the forest. This increases the possibility of pest attacks and jeopardises normal regeneration.
- Though the concessionaire will log fewer trees, there is little reason to believe that he will open up less forest in his efforts to seek out only the highest value trees in the forest.

A differentiated royalty

The negative impacts of a uniform royalty can be partly mitigated through the adoption of a *differentiated royalty* system. In an attempt to charge a fee that more closely relates to the true stumpage value of the tree, the $\$r$ charge per unit can be varied according to the species of tree (which influences the price it will fetch when sold) and its zone of origin (which relates to the cost of transporting the log to the market).

Such a system is illustrated in diagram 3. In this example the trees in the forest have been differentiated into three groupings. Those trees between O and V_3 are considered high value, those between V_3 and V_2 are considered medium value and those above V_2 are considered low value.

Trees in each group are subject to a uniform royalty; $\$r_1$ for trees in the low-valued group, $\$r_2$ for trees in the mid-valued group and $\$r_3$ for trees in the high-valued group.

as a leafless log at the side of the road is extremely difficult, complicated even further if the bark has been stripped or the log has been immersed in a muddy river. Complex systems of differentiated fees do exist, but are readily abused with logs being misclassified.

An innovative approach to setting volume based royalties is for them to be determined by competitive auction when the concession is allocated (see Box 3.1 for competitive setting of volume based royalties in the Canadian Province of British Columbia).

1.2.c. Value Based Fees

Another possible method of collecting rents by approximating stumpage value calculations is through the imposition of value based fees. Value based royalties tend to be calculated as a proportion of the price commanded by the timber and hence are frequently described as *ad valorem royalties*.

Since the value of timber may be taken as the market price (often the FOB) or an administratively determined price (such as the West African *valeur mercuriale*), the same difficulties in classifying species and measuring the volume of wood extracted afflict value- based royalties as afflict volume-based royalties. However, a major advantage of a fee calculated as a percentage of value, is that the real value of the collected fees does not depreciate with inflation and adjusts with changes in the prices of timber.

When the fee is calculated solely on the value of the timber it is likely to induce high-grading, but this will not be as severe as that induced by a uniform specific tree or volume based royalty.

Value-based royalties, as with volume-based royalties differentiated by species, encourage misclassification of timber. If timber can be declared as a lower valued species then the payable fees can be reduced.

Of course, a uniform value-based royalty only considers one factor that influences the economic rent available from harvested timber - the value of the wood. To compensate for this it is possible to change the tax base on which the *ad valorem* fee is calculated by adjusting the estimated value of timber according to its zone of origin.

Value based fees that are differentiated to account for the value of the timber and the costs of extraction are very close to approximating the calculations of stumpage value laid out in the previous chapter. Hence, if properly enforced and collected such a fee would collect much of the economic rent. Also, a differentiated *ad valorem* fee should provide little incentive to high-grade.

1.2.d. Reforestation Fees

A number of governments have introduced so-called reforestation fees that are payable by concessionaires according to the quantity of timber they harvest. Though similar in design to other harvest-determined fees they are conceptually different in that the setting of payment levels is not related to an approximation of the stumpage value of trees but to ensuring the collection of sufficient revenues to cover the costs of silvicultural treatments of logged-over forests.

The payment of reforestation fees amounts to a shifting of the obligation for sustainable management from the concessionaire to the owner. In some countries, if the

concessionaire is able to provide proof of reforestation efforts then these fees may well be refunded (e.g. Indonesia).

Reforestation fees can be thought to capture that part of the available long term rents from a forest that might otherwise be dissipated through lack of silvicultural activities (see Chapter 2). The use of fees to fund reforestation programmes is not particularly efficient for a number of reasons. First, there is no guarantee that collected monies will actually be channeled back into silvicultural treatments of logged over forest (as is the case in Indonesia, where reforestation fees have simply accumulated into a fund that is now thought to be in excess of \$1000 million). Second, it is relatively inefficient for the government to take responsibility for reforestation when logging companies already have the personnel, equipment and expertise in the field to carry out these tasks.

The effects of reforestation fees on a concessionaire's behaviour are dependent on how the fee is calculated. Thus a fee calculated as a fixed charge on volume will share the advantages and disadvantages of a uniform specific volume-based royalty.

1.2.e. Export Fees

Strictly speaking, export fees are no different from the other harvest-based fees discussed above except that rather than being charged on quantities of timber measured at or near the forest, they are charged on the quantity of timber that arrives at ports or borders destined for foreign markets. Indeed, export fees can be volume based, per-tree based or value based.

The benefits of export fees is that ports and border posts provide easily accessible locations at which the forest service can calculate the payments due. However, this does not entirely explain the prevalence of fees charged on exported timber. Often the key motivation of such fees is to discourage the export of unprocessed raw logs. If equivalent fees are not payable on logs that are processed by the domestic timber industry, then they serve as a major incentive to not export raw logs.

Since export fees are frequently motivated by this general government policy to promote domestic processing, they might better be known as *export taxes* (see below). Whilst the issue is controversial, the existence of export taxes tends to divert logs to the local market and depress domestic log prices below world market prices. Though having access to cheap logs undoubtedly encourages domestic timber processing, it also fosters inefficiency. Processors can remain competitive despite using inefficient machinery and having high levels of timber wastage during processing. Another deleterious outcome, is that logging companies are encouraged to high-grade the forest, since lower timber prices make it unprofitable to harvest previously merchantable timber.

Export fees are commonly levied at ad valorem rates based on the FOB prices of logs or on independently posted prices (the *valeur mercuriale* in West Africa). Such tax systems fail to reflect the true stumpage value of trees since they take no account of the extraction costs of the logs.

Alternatively, export fees can be calculated using differentiated rates that reflect both the value of the wood and the costs of extraction. For example, in Cameroon until recently, concessionaires paid an *ad valorem* export fee of 5% per m³ of timber extracted. The tax base was determined by taking into account, (1) the value of the log (higher value, higher tax base) which was set administratively and (2) the zone of origin

of the timber (to compensate for transport costs, logs coming from zones farther away from the port had a lower tax base than those coming from zones in close proximity to the port). Export fees that better approximate stumpage values are likely to capture more of the available rents on exported timber and introduce less distortions into the sector.

3.4.1.3 Post Harvest Fees

In some countries, forest fees are levied on the output of processed products (sawnwood, veneer, plywood or their subsequently processed products) instead of on logs. Charges on processed products are frequently advocated as a recourse against scaling and misclassification abuses and as a means of capturing rents on illegally harvested logs.

However, the shifting of fees from logs to processed products can generate incentives for greater waste. Since much of the total timber input may be lost in the conversion process, the calculation of payments due is done with use of a conversion factor. The conversion factor estimates the volume of raw log that is required to manufacture a one unit volume of final product. The problem is that this factor is based on a presumed average conversion rate. Companies that improve their efficiency and recover more processed products are penalised, whilst those that waste wood are subsidised.

Similar to export fees, post-harvest fees are frequently not motivated solely by a desire to capture rents but also to promote the home processing of wood products. By delaying the application of forest fees until after raw logs have been processed, governments are in effect providing the domestic processing industry with subsidised timber inputs. Again, it is not entirely clear whether this is beneficial to the economy as a whole. Domestic timber processors are likely to use logs more wastefully than they would if they were faced by the full price of their inputs of logs.

1.3.a. Fees Based on Processed Products

One form of post-harvest fee is to charge the timber processing industry directly for all output. Given the inefficiencies of such fees mentioned above it is dubious whether they are an effective instrument for capturing rent. However, fees charged directly to the processing industry may considerably reduce the informational burden faced by the forest service. In general, it is far easier to measure the output of the limited number of processing plants in a country than it is to monitor the harvest from the profusion of logging sites in the forest.

1.3.b. Processed Product Export Fees

Another processed product fee that might be imposed by governments is an export fee. Frequently these will be biased towards crude processing, such as sawnwood, as a means of encouraging the manufacture of more highly valued end products such as furniture. Fees levied on exported processed timber are so far removed from the value of standing timber in the forest that they can at best be considered ineffective instruments for capturing forest rents.

3.4.2 Government Taxes

Government taxes, as described above, are those payments made by the forest sector to the government which are not designed specifically to capture the rents available in the forest sector. Obviously, this lack of precision limits their effectiveness in capturing rents, but nonetheless they may play an important role in the set of instruments employed by a country to capture rents.

II.1. Export Taxes (*Processed products and logs*)

Most nations institute a set of taxes on exported goods and products as a means of raising government revenues. The forest sector, as with all other sectors, are likely to face these charges. Though frequently raw logs and crude processed timber products (such as sawnwood, veneer and plywood) are subject to *export fees* (see above) designed specifically to capture forest rents, the imposition of general *export taxes* on timber products may, inadvertently, capture some of the rents from the forest sector.

Export taxes are usually billed as an *ad valorem* charge based on the value of the exported product. Since this takes no account of the stumpage value of the timber used in the product, they tend to be distortionary and an ineffective mechanism for capturing the available economic rents.

II.2. Income and Profit Taxes

The rents that a government fails to collect through its imposition of forest fees will be captured by the companies of the forest sector. Rents captured by these companies should be reflected in high company profits and in inflated employee incomes (see Section 2.3.3). At least part of these excess earnings can be reclaimed through the imposition of corporate profit, dividend or income taxes and through individual income taxes.

These taxes tend to be *ad valorem* charges and are frequently differentiated such that higher marginal rates are charged on higher earnings. Since these taxes are designed specifically to capture earnings that are in excess of normal returns (see Chapter 2) they should be an effective method of capturing rents in the forest sector. Indeed, in a number of countries, taxes of this description are the major source of revenue deriving from the forest sector (e.g. Surinam; Rice and Sizer, 1995).

The major difficulty with relying on taxes on income and profit to capture rents is the existence of large scale tax avoidance. There are many, many ways in which profits and income can be hidden especially in countries where the accounting and auditing resources of the state are limited (see '*Accounting Practices Used to Evade Taxation*' in Section 2.5.5).

II.3. Other Government Taxes

Two other government taxes which the forest sector are likely to encounter are (II.3) *turnover taxes* or *value-added taxes* which are designed to tap revenues before they can be translated into company profits and (II.4) *transportation taxes* that are paid for the right to transport goods (including timber) around the country. Neither of these, in their own right, are likely to be an effective method for capturing rents, though they may play a role in a package of instruments designed to capture forest rents.

Table 3-1: Forest Fees and Government Taxes

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
<p>I. Forest Fees:</p> <p>Forest fees are <i>user charges</i> that are paid by the concessionaire to the forest owner in exchange for access to the timber resource. They are sometimes referred to as <i>requited</i> payments.</p>			
<p>I.1. Pre-Harvest Determined Fees:</p> <p>Payments that are determined prior to, and independent of, harvesting of the timber from a concession.</p>	<p>Advantages:</p> <ul style="list-style-type: none"> • Tend to be simple to collect since they are defined in the concession agreement and are paid up front or in monthly or annual instalments • Encourage intensive use of the forest with high recovery rates and exploitation of all valuable species of tree. • Having paid for exclusive access to the concession area, concessionaires are motivated to protect their concession against illegal felling or invasion • Create no incentives to high-grade • Do not require the complex and often abused process of measuring the quantity and quality of timber harvested by the logging company • Discourage speculation in forest land as fees are paid regardless of harvest <p>Disadvantages:</p> <ul style="list-style-type: none"> • Mostly require an inventory of the forest to establish the quantity and quality of timber • Without reliable information on the quantity and quality of timber in the forest pre-harvest determined fees may under- or over-price the value of a concession • Concessionaires may be tempted to log trees that are protected for silvicultural reasons since any increase in harvest from the concession will increase the concessionaire's profits • Similarly, concessionaires may be encouraged to illegally log timber from areas outside their concession or buy cheap timber from neighbouring communities and pass it off as having been harvested from the concession 		
<p>I.1.a. Concession Fee</p>	<p>Administrative Concession Fee</p>	<p>Description:</p> <ul style="list-style-type: none"> • Charged for the whole concession • Fee determined administratively, perhaps with reference to the estimated stumpage value of the standing volume in the concession <p>Variations:</p> <ul style="list-style-type: none"> • Payment may be one off or on an annual basis • Annual fees can be linked to inflation and to changes in exchange rates 	<p>As per all pre-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Extremely simple to administer and collect • Minimal effort required from forest service in monitoring harvesting <p>Disadvantages:</p> <ul style="list-style-type: none"> • Difficult to ensure fee reflects the maximum willingness to pay of the logging company thereby capturing all the available forest rents • Fees not index linked may decline in value due to inflation and changes in exchange rates, which encourages delaying payments

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
			<ul style="list-style-type: none"> Requires a forest inventory to establish the value of concession If the inventory is carried out by the concessionaire, there are strong incentives to under report the quality and quantity of stems
	Competitive Concession Fee	<p>Description:</p> <ul style="list-style-type: none"> Fee charged for the whole concession Fee determined at competitive auction <p>Variations:</p> <ul style="list-style-type: none"> Payment may be one off or on an annual basis Annual fees can be linked to inflation and to changes in exchange rates 	<p>As per all pre-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Competitive auction encourages concessionaires to reveal their maximum willingness to pay for access to the forest Competitive auction more likely to allocate the concession to efficient companies who value access to the timber the most Risks of accurate valuation are shifted to the potential concessionaires, so that the information needs of the government are significantly reduced A forest inventory is not essential though information from an inventory could be of great benefit in setting a reserve price at auction <p>Disadvantages:</p> <ul style="list-style-type: none"> Requires enough potential concessionaires to ensure competition at auction Requires the design of auction rules and apparatus that reduce opportunities for collusion or abuse May encourage overbidding to win the rights to harvest on the presumption that costs can be kept down by avoiding forest management requirements stipulated in the concession contract
I.1.b. Area Fee	Administrative Area Fee	<p>Description:</p> <ul style="list-style-type: none"> Fee charged on a per-hectare basis Fee set administratively <p>Variations:</p> <ul style="list-style-type: none"> Fee will usually be differentiated according to the concession's accessibility and the stand quality. Payment may be for the annual logging area or on the whole concession Payment may be one off or on an annual basis 	<p>As per administrative concession fee plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Encourages smaller, more manageable concessions Encourages concessionaires to give up areas of non-productive forest

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
	Competitive Area Fee	<p>Description:</p> <ul style="list-style-type: none"> • Fee charged on a per-hectare basis • Fee set at competitive auction <p>Variations:</p> <ul style="list-style-type: none"> • Payment may be for the annual logging area or on the whole concession • Payment may be one off or on an annual basis 	<p>As per competitive concession fee plus</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Encourages smaller, more manageable concessions • Encourages concessionaires to give up areas of non-productive forest
I.1.c. Standing Volume Fees		<p>Description:</p> <ul style="list-style-type: none"> • An inventory of the annual cutting area is undertaken to determine the volume of merchantable trees of each species. • Fees are calculated by multiplying the inventory merchantable volume of each species by a per m³ fee. • Per m³ fee usually set administratively 	<p>As per all pre-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Removes all uncertainty over the true quantity and quality of stems in the concession • Fee takes account of differences in stand density and species composition in the annual cutting area • Having paid for the trees, there are strong incentives for the concessionaire to harvest all timber of value <p>Disadvantages:</p> <ul style="list-style-type: none"> • Difficult to ensure fee reflects the maximum willingness to pay of the logging company thereby capturing all the available forest rents • Very difficult to obtain a reliable inventory • If the inventory is carried out by the concessionaire, there are strong incentives to under report the quantity and quality of timber in the forest • Encourages over-harvesting since timber harvested over and above the inventory stated volume is effectively free
I.1.d. 'Annual Allowable Cut' Based Fee		<p>Description:</p> <ul style="list-style-type: none"> • Fee charged on a maximum volume of wood to be extracted each year from a concession • The volume is usually determined by what is considered the sustainable harvest from that area of forest • May be set administratively or at competitive auction 	<p>As per all pre-harvest determined fees plus:</p> <p>Disadvantages:</p> <ul style="list-style-type: none"> • Requires inventory of forest area to determine annual allowable cut • Requires continual monitoring of harvesting to ensure concessionaire does not exceed the AAC
I.1.e. Local Development Taxes		<p>Description:</p> <ul style="list-style-type: none"> • Investments in local infrastructure, such as schools, roads and clinics in areas under the control of the concessionaire • Usually written into the contract of the log extractor 	<p>Advantages:</p> <ul style="list-style-type: none"> • Log extractors already have large amounts of equipment and personnel in often remote regions. In terms of efficiency it may prove better to employ these resources in developing local infrastructure rather than bringing in other resources from outside the area.

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
			<p>Disadvantages:</p> <ul style="list-style-type: none"> • Investments more likely to reflect the needs of the timber extractor than those of the local community • Probably better to extract more from concessionaires in rental collection and ensure public expenditure programs effectively allocate resources to social development needs
<p>I.2. Harvest Determined Fees:</p> <p>Payments that are determined during harvesting, according to the quantity of timber extracted from a concession. Commonly referred to as <i>Stumpage Fees</i> or <i>Royalties</i>.</p> <p>Advantages:</p> <ul style="list-style-type: none"> • The concessionaire is charged on each unit extracted so the quantity and quality of the timber in the forest is revealed to the forest owner as harvesting progresses. Thus, there is none of the uncertainty over the quantity and quality of harvestable timber in a concession that confounds the setting of pre-harvest determined fees. • Carefully calculated harvest-determined fees should closely reflect stumpage values and, providing they are successfully collected, should capture much of the economic rent. <p>Disadvantages:</p> <ul style="list-style-type: none"> • Costly and complex to classify and quantify the amount of timber harvested. The measuring and policing burdens imposed by relying on harvest determined fees may be particularly onerous for those countries with an understaffed and poorly funded forest service. • Fees based on quantity extracted may encourage inefficiency since the concessionaire is not penalised for leaving harvestable timber in the forest . • Similarly, inefficient use of forest land may be encouraged since concessionaires have no incentives to reduce the size of their concessions. • Fees based on quantity must be regularly revised to reflect changes in the value of timber, inflation and currency fluctuations. • Fees based on quantity may lead to timber extractors rushing to extract timber for fear that presently favourable royalty rates might increase. 			

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
I.2.a. Tree-Based Fee	Uniform Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> Levied on each tree harvested regardless of value, costs of extraction, transportation and marketing. Payments are usually determined by counting the trees harvested at collection sites such as log ponds or roadsides. 	<p>As per all pre-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Very simple, can be verified by counting stumps No need for scaling Penalises the felling of undersized logs Discourages the felling of smaller trees, as will pay the same fee for these. Promotes efficiency by encouraging the concessionaire to use all the merchantable wood from a felled tree If charged on all felled trees will discourage wasteful felling. <p>Disadvantages:</p> <ul style="list-style-type: none"> Only a poor approximation of the true stumpage value of a felled tree If the harvest is not measured at the stump, tree-based fees may encourage wasteful forest management practices since concessionaires will only remove the 'best' logs from the forest discarding damaged or poor quality stems. If the number of harvested trees is tallied at collection points, it is possible for concessionaires to pass off 2 or 3 trees as the logs from one tree Encourages high-grading as the fee payable on a lower-valued, yet still merchantable stem, is the same as that on a high-valued stem
	Differentiated Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> Levied on each tree extracted, the exact charge being determined by the species and/or the location from which the stem was harvested. 	<p>As per a uniform specific tree-based royalty plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Better approximation of stumpage value than a uniform specific royalty Less likely to result in high-grading than a uniform specific royalty <p>Disadvantages:</p> <ul style="list-style-type: none"> May encourage mis-grading of timber with timber being deliberately classified into lower grades

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
I.2.b. Volume-Based Fee	Uniform Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> Levied on each m³ of timber harvested regardless of value, costs of extraction, transportation and marketing. Payments are determined by “scaling” the extracted timber either at the stump or at collection sites such as log ponds or roadsides. <p>Variations:</p> <ul style="list-style-type: none"> Fees may be supplemented by competitively bid ‘bonus payments’ See Box 3.1 on British Columbia. 	<p>As per all pre-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> If fees are set at correct levels then is a good approximation of stumpage value, therefore, collects much of the economic rent <p>Disadvantages:</p> <ul style="list-style-type: none"> Administrative and institutional problems make scaling extremely difficult. Often impractical since forest inspection and control is frequently insufficient. May encourage mis-scaling of timber with timber being deliberately underweighed to avoid payments May encourage mis-grading of timber with timber being deliberately classified into lower grades Likely to encourage high-grading
	Differentiated Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> Levied on each cubic metre extracted the exact charge determined by the species and/or the location from which the stem was harvested <p>Variations:</p> <ul style="list-style-type: none"> Fees may be supplemented by competitively bid ‘bonus payments’ See Box 3.1 on British Columbia. 	<p>As per a uniform specific volume-based royalty plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> If fees are set at correct levels then is an excellent approximation of stumpage value, therefore, collects much of the economic rent Less likely to result in high-grading than a uniform specific royalty
I.2.c. Value-Based Fee	Uniform Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> An <i>ad valorem</i> charge based on the value of timber The base price on which the charge is calculated can be the market or FOB price or some administratively determined value. These prices will obviously vary with species. 	<p>As per a uniform specific volume-based royalty plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Since the fee is calculated as a percentage of value, the real value of the collected fees does not depreciate with inflation and adjusts with changes in the prices of timber. <p>Disadvantages:</p> <ul style="list-style-type: none"> May induce high-grading but this will not be as extreme as that induced by an uniform specific royalty

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
I.2.d. Reforestation Fee	Differentiated Specific Royalty	<p>Description:</p> <ul style="list-style-type: none"> An <i>ad valorem</i> charge based on the value of timber but differentiated by location of origin. <p>Variations:</p> <ul style="list-style-type: none"> The base price may be varied by location of origin on which a fixed <i>ad valorem</i> fee is charged The base price is not varied but the percentage charge is changed according location of origin <p>Description:</p> <ul style="list-style-type: none"> Not strictly a forest fee for rights to harvest the current crop, but can be viewed as a payment for the production of a second harvest Fees that are very similar to stumpage fees in that they are calculated according to the quantity of wood extracted from the concession. The calculation of reforestation fees is based on estimates of the cost of reforesting logged over land <p>Variations:</p> <ul style="list-style-type: none"> May take any form but frequently charged as a volume-based royalty 	<p>As per a differentiated volume-based royalty plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> Since the fee is calculated as a percentage of value, the real value of the collected fees does not depreciate with inflation and adjusts with changes in the prices of timber. If fees are set at correct levels then is an excellent approximation of stumpage value, therefore, collects much of the economic rent Does not induce high-grading <p>Advantages:</p> <ul style="list-style-type: none"> Provides funds to rehabilitate logged over forest and thus maximise the revenues from a second harvest. <p>Disadvantages:</p> <ul style="list-style-type: none"> There is no guarantee that collected moneys will actually be channelled back into silvicultural treatments of logged over forest Relatively inefficient for the government to take responsibility for reforestation when logging companies already have the personnel, equipment and expertise in the field to carry out these tasks.
I.2.e. Log Export Fee		<p>Description:</p> <ul style="list-style-type: none"> Fee based on the quantity of timber exported Possibly thought of as a government tax since export taxes are often motivated by a desire to encourage the domestic processing of timber <p>Variations:</p> <ul style="list-style-type: none"> May take any form but frequently charged as an <i>ad valorem</i> royalty 	<p>Advantages:</p> <ul style="list-style-type: none"> Easier to measure quantity and quality of logs at ports or borders than in the forest Revenues easier to collect. Permission to export can be denied until the tax has been paid Encourages the domestic processing of timber <p>Disadvantages:</p> <ul style="list-style-type: none"> Does not capture the rent that is derived from selling logs or processed timber products within the country Export taxes may depress the price of logs in the domestic market thereby encouraging inefficiency in the domestic processing of timber Low domestic log prices induce high-grading of the forest

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
<p>I.2. Post-Harvest Determined Fees:</p> <p>Payments that are determined after logs have been processed i.e. levied on the output of processed products (sawnwood, veneer, plywood or their subsequently processed products) instead of on logs. Since much of the total timber input may be lost in processing, the calculation of payments due is done with use of a conversion factor. The conversion factor estimates the volume of raw log that is required to manufacture a one unit volume of the final product</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Easy to measure quantity of products manufactured or exported • Avoids problems with scaling and misclassification abuses • Ensures that fees are paid on logs that have been illegally harvested. • May encourage the domestic processing industry since delaying the application of forest fees until after raw logs have been processed effectively provides the domestic processing industry with subsidised timber inputs. <p>Disadvantages:</p> <ul style="list-style-type: none"> • Since conversion factors tend to be relatively inaccurate post-harvest fees are inefficient at capturing economic rent • Since fees are not paid until after processing their is ample opportunity for rents to be captured by private companies or simply dissipated before any attempts are made to capture them • The shifting of fees from logs to processed products can generate incentives for greater waste. The conversion factor is based on a presumed average conversion rate. Companies that improve their efficiency and recover more processed products are penalised, whilst those that waste wood are subsidised. 			
<p>I.3.a. Processed Product Fee</p>		<p>Description:</p> <ul style="list-style-type: none"> • Fees are charged on the output of processed products from domestic timber processing industries. • Rates are determined using a conversion factor that estimates the quantity of raw timber input required to produce a unit of processed product output. • Possibly thought of as a government tax since processed product taxes are often motivated by a desire to encourage the domestic processing of timber by reducing the input price of logs 	<p>As per all post-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Far easier to measure the output of the limited number of processing plants in a country than it is to monitor the harvest from the profusion of logging sites in the forest • Financially assists home processing industry <p>Disadvantages:</p> <ul style="list-style-type: none"> • At best a poor mechanism for capturing forest rents
<p>I.3.b. Processed Product Export Fee</p>		<p>Description:</p> <ul style="list-style-type: none"> • Fees are charged on processed products that are exported from the country • Rates are determined using a conversion factor that estimates the quantity of raw timber input required to produce a unit of 	<p>As per all post-harvest determined fees plus:</p> <p>Advantages:</p> <ul style="list-style-type: none"> • Far easier to measure processed products due for export than it is to monitor the harvest from the profusion of logging sites in the forest • Financially assists home processing industry and may encourage a

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
		<p>processed product output</p> <ul style="list-style-type: none"> Possibly thought of as a government tax since processed product export taxes are often applied only to primary processed timber products (such as sawnwood, veneer and plywood) in attempt to encourage a domestic secondary processing industry manufacturing high-value products 	<p>secondary processing industry if applied selectively to solely primary processed products</p> <p>Disadvantages:</p> <ul style="list-style-type: none"> Fees levied on exported processed timber are so far removed from the value of standing timber in the forest that they can at best be considered ineffective instruments for capturing forest rents
<p>II. Government Taxes:</p> <p>Government Taxes are payments that are not directly related to the use of the forest resource. They are payments whose objective is to raise revenue for government policy objectives not specifically to capture the rents found in the forest sector. They are sometimes referred to as <i>unrequited</i> payments.</p> <p>Advantages:</p> <ul style="list-style-type: none"> Reasonably easy to collect as they form part of the normal tax raising procedures of government finance departments and do not require the institution of legislation and fee collecting mechanisms specifically for the forest sector <p>Disadvantages:</p> <ul style="list-style-type: none"> Since government taxes are not specifically designed to reflect the stumpage value of harvested timber, they are usually inefficient mechanisms for capturing available forest rents Frequently large companies, especially multi-national corporations, operating in developing countries find it relatively easy to avoid the payment of certain government taxes (see '<i>Accounting Practices Used to Evade Taxation</i>' in Section 2.5.5.). 			
II.1. Export Taxes		<p>Description:</p> <ul style="list-style-type: none"> A set of usually <i>ad valorem</i> charges, billed on exported forest sector products as a means of raising general revenue for government. 	<p>Advantages:</p> <ul style="list-style-type: none"> Simple to administer and collect <p>Disadvantages:</p> <ul style="list-style-type: none"> Ineffective method for approximating stumpage value Induces high-grading and introduces distortions into the forest sector
II.2. Income and Profit Taxes	Corporate Profit or Dividend Taxes	<p>Description:</p> <ul style="list-style-type: none"> The forest rents captured by companies in the forest sector should be reflected in the profits returned by these companies and the dividends paid out to their share holders Corporate Profit and Dividend Taxes are usually <i>ad valorem</i> charges based on a company's estimated profits or on the company's dividend payouts. 	<p>Advantages:</p> <ul style="list-style-type: none"> If profits and dividends are correctly reported then should be an effective means of capturing the rents in the forest sector <p>Disadvantages:</p> <ul style="list-style-type: none"> Creates powerful incentives for forest sector companies to hide their profits either through under-reporting their revenues or by exaggerating their costs.

Type of Charge	Charge	Description & Variations	Advantages & Disadvantages
	Corporate Income Taxes	<p>Variations:</p> <ul style="list-style-type: none"> Usually an <i>ad valorem</i> charge which frequently has increasing marginal rates for higher profits <p>Description:</p> <ul style="list-style-type: none"> Tax charged on the incomes or revenues of companies in the forest sector <p>Variations:</p> <ul style="list-style-type: none"> Usually an <i>ad valorem</i> charge which frequently has increasing marginal rates for higher profits 	<p>Disadvantages:</p> <ul style="list-style-type: none"> Since is not based on profits, corporate income taxes are less likely to reflect the rents captured by the company and are, therefore, likely to be more distortionary and less effective at capturing forest rents than a profit tax. Creates powerful incentives for logging companies to under-report their revenues.
	Personal Income Taxes	<p>Description:</p> <ul style="list-style-type: none"> Tax charged on the earnings of workers in the forest sector <p>Variations:</p> <ul style="list-style-type: none"> Usually an <i>ad valorem</i> charge which frequently has increasing marginal rates for higher profits 	<p>Advantages:</p> <ul style="list-style-type: none"> Individual's are usually less able to under-report their incomes than corporations <p>Disadvantages:</p> <ul style="list-style-type: none"> The rates of personal income taxes are unlikely to reflect the earnings above normal returns that individual's enjoy in the forest sector due to the existence of forest rents Personal income taxes, therefore, tend to be distortionary and are unlikely to be an effective means of capturing rents
II.3. Transportation Taxes		<p>Description:</p> <ul style="list-style-type: none"> Tax charged on the transportation of harvested logs. Usually measured in terms of truck loads <p>Variations:</p> <ul style="list-style-type: none"> May be charged as a tax for carrying timber across regional boundaries within a country as a means of raising revenues for local government 	<p>Advantages:</p> <ul style="list-style-type: none"> Simple to administer and collect <p>Disadvantages:</p> <ul style="list-style-type: none"> Ineffective method for approximating stumpage value and therefore likely to be an ineffective means of capturing rents
II.4. Sales Taxes		<p>Description:</p> <ul style="list-style-type: none"> Taxes charged on sales of timber <p>Variations:</p> <ul style="list-style-type: none"> Often charged as a value-added tax (VAT) that taxes the extra value added to timber products as they are transformed as they move through the forest sector 	<p>Disadvantages:</p> <ul style="list-style-type: none"> More likely to be employed as a means of capturing rents that are derived from the processing of timber than from the existence of forest rents (see section 2.4.1)

3.4.3 Which Fees and Taxes Should Governments Employ to Capture Forest Rents?

The various countries of the world employ one or a selection of the fees and taxes described in the previous section in an attempt to capture rents from the forest sector. Information on which fees and taxes are employed in which countries is included in Table 3.3 at the end of this section.

Judging which particular instrument would be most effectively employed in any particular country to capture forest rents will depend on the nature of both the instrument and the institutional capacity of the forest service in that country. Some of the key characteristics of the different instruments have been summarised in Table 3.2.

In this section we will assess these instruments and make some recommendations as to which should be employed to create an effective forest fee and tax system.

3.4.3.1 One or Many?

As can be seen in Table 3.3, very few countries rely on just one instrument to capture forest rents. In fact in some countries concessionaires face a mind-boggling array of fees and taxes. Such systems often require reams of paperwork, long delays and in the end merely encourage concessionaires to bypass official channels either by straight evasion or, as is all too common, by unofficial payments. Grut et al. (1991) report an IIED (1988) study that identified 53 procedures required before a log could be exported from the former Zaire. Another example of an excessively complex tax and fee system is described in Box 3.4 for Ghana.

Not only are such complex tax systems anathema to the companies of the forest sector but they also make it extremely difficult for governments to judge whether they are being successful in capturing the available rents.

One clear policy guideline is that the system of forest fees and taxes should be transparent to the forest sector. The array of fees and taxes employed in some countries should be rationalised so that a few, clearly targeted instruments can be employed to capture forest rents.

3.4.3.2 Profit and Income Taxes

In many other sectors of the economy governments employ systems of *profit and income taxes* to capture economic rents made by private companies. If these taxes only exact that part of companies' incomes that is truly superprofit, then they should be a perfect mechanism for capturing rents. In theory, therefore, the use of such taxes should not introduce any distortions into forest sector harvesting or processing decisions. Of course if the rates are set too high then they are likely to influence companies' decisions as to whether to undertake logging or timber processing investments.

In an ideal world the government would be able to rely entirely on profit and income taxes to capture rents in the forest sector, however, the possibilities for avoiding payments and/or dissipating rents through inefficiency make this somewhat inadvisable (see '*Accounting Practices Used to Evade Taxation*' in Section 2.5.5).

Though income and profit taxes will likely form part of any set of instruments used to capture forest rents, it would seem unwise to rely on these mechanisms especially in countries where the accounting and auditing resources of the state are limited.

Box 3.4: Multiplicity of Charges in Ghana

Many countries in the world attempt to collect forest rents through extremely complex and convoluted taxation systems. A report by UNIDO (1996) identified the various charges that timber harvesters and exporters faced as of August 1995 in Ghana. These are listed below.

For Extraction:

<i>Royalty</i>	C4,769 per m ³ (average)*
<i>Concession Rent</i>	C1,000 per ha per year
<i>Farmer Compensation Payments</i>	Variable
<i>Property Mark/Silvicultural Fee</i>	C50,000 per concession
<i>Concession Preparation Fee</i>	C500,000
<i>Retailer Registration Fee</i>	C5,000 per year
<i>Sale of Log Measurement Certificates</i>	C200 per log
<i>Pre Felling Inspection</i>	C30,000 per day
<i>Conveyance Certificate</i>	C10,000 per truck load

For Export:

<i>Export Promotion Council Registration Fee</i>	C30,000 per year
<i>Ghana Chamber of Commerce Export Document Fee</i>	C5,000 per consignment
<i>Ghana Shipper's Council Registration Fee</i>	C120,000 per year
<i>Association of Ghana Timber Industries Export Levy</i>	1% of Export Value
<i>Timber Export Development Board Export Levy</i>	2% of FOB
<i>Forest Products Inspection Bureau Exporter Registration Fee</i>	C30,000 per year
<i>Export Levy</i>	2% of FOB

*Charges are quoted in Cedis with an exchange rate of C1,000 = \$0.81 in 1995

The taxation system also had a number of other problems. First, the volume-based royalty was set administratively in the local currency. Royalty rates are only infrequently reviewed, a problem compounded by the considerable depreciation of the local currency over the previous years. Second, the logistic difficulties of scaling and grading timber to impose a volume-based royalty meant that it was impractical to impose the per m³ rate directly. Instead, fees were actually charged on a per-tree basis using an estimate of the mean volume per tree. Unfortunately, the mean volumes used in these calculations were considerable underestimates. Indeed, for a number of species the mean volumes used in royalty calculations were less than the volume of the minimum felling limit of the tree. It has been estimated that using more realistic mean volume figures would result in a 50% increase in royalty payments (FIMP, 1994).

Table 3-2: Forest Fees and Taxes, Strengths and Weaknesses

Type of Charge	Charge	Requires a Forest Inventory	Requires Grading &/or Sealing of Harvested timber	May Induce High-Grading	May induce inefficiency in the processing sector	Charge rates must be regularly reassessed	Simplicity of payment calculations and collection	Possibilities for payment evasion by forest sector
I. Forest Fees:								
I.1. Pre-Harvest Fees:								
I.1.a. Concession Fee	Administrative Concession Fee	✓	✗	✗	✗	✗	High	Low
	Competitive Concession Fee	✓/✗	✗	✗	✗	✗	High	Low
I.1.b. Area Fee	Administrative Area Fee	✓	✗	✗	✗	✗	High	Low
	Competitive Area Fee	✓/✗	✗	✗	✗	✗	High	Low
I.1.c. Standing Volume Fees		✓	✗	✗	✗	✗	Med	Low
I.1.d. AAC based Fee		✓	✗	✗	✗	✗	Med	Low
I.2. Harvest Fees:								
I.2.a. Tree-Based Fee	Uniform Specific Royalty	✗	✗	✓	✗	✓	Med	Low/Med
	Differentiated Specific Royalty	✗	✗	✓/✗	✗	✓	Med/Low	Low/Med
I.2.b. Volume-Based Fee	Uniform Specific Royalty	✗	✓	✓	✗	✓	Med/Low	Low/Med

Type of Charge	Charge	Requires a Forest Inventory	Requires Grading &/or Scaling of Harvested timber	May Induce High-Grading	May induce inefficiency in the processing sector	Charge rates must be regularly reassessed	Simplicity of payment calculations and collection	Possibilities for payment evasion by forest sector
	Differentiated Specific Royalty	x	✓	✓/x	x	✓	Low	Med
I.2.c. Value-Based Fee	Uniform Specific Royalty	x	✓	✓	x	x	Med/Low	Low/Med
	Differentiated Specific Royalty	x	✓	✓/x	x	x	Low	Med
I.2.e. Log Export Fee		x	✓	✓	x	✓/x	Med	Low/Med
I.2. Post-Harvest								
I.3.a. Processed Product Fee		x	x	✓	✓	✓	Med	Low/Med
I.3.b. Processed Product Export Fee		x	x	✓	✓	✓	Med	Low/Med
II. Government Taxes:								
II.1. Export Taxes		x	✓	✓	✓	✓/x	Med	Low/Med
II.2. Income and Profit Taxes	Corporate Profit or Dividend Taxes	x	x	✓/x	x	x	Med	High
	Corporate Income Taxes	x	x	✓/x	x	x	Med	High
	Personal Income Taxes	x	x	✓/x	x	x	Med	Med

3.4.3.3 Fees and Taxes that encourage the domestic timber processing industry

A number of the fees and taxes discussed in the previous section have been employed by governments not only as a means of capturing forest rents but also as a mechanism for encouraging the domestic timber processing industry. Amongst these would be included, *export fees and taxes*, and *processed good fees and export fees*. In general, the use of instruments of this nature introduces a distortion into the forest sector by depressing the price of domestic timber below the world market price. Though this might indeed encourage the domestic processing industry, it also has other major ramifications, including:

- Lower prices for timber make forest management for timber a less attractive option and may encourage forest owners to convert forest lands to alternative uses such as agriculture.
- Logging companies faced with depressed timber prices will be inclined to high-grade the forest, leaving timber unfelled that it would have been profitable to harvest at world market prices
- The domestic processing industry, able to purchase relatively cheap timber, is encouraged to use it wastefully

From an economic point of view fees and taxes of this description are an inappropriate tool for nurturing an infant domestic processing industry. Overall they tend to shelter inefficiency and encourage deforestation. More effective would be for governments to employ other instruments to capture forest rents and use the revenues to directly subsidise the processing industry without distorting the signals that are received through input prices.

The use of *export fees and taxes*, and *processed good fees and export fees* to collect rents and encourage a domestic processing industry is inadvisable.

3.4.3.4 Collecting Rents from the Present Harvest

Though harvest-determined fees (royalties) have been those most commonly enforced in the countries of the world, their effectiveness is somewhat debatable. Amongst their major drawbacks we might include (and see Table 3.2):

- If the forest service is unable to monitor harvesting close to the forest then there are ample opportunities for logging companies to avoid payments by not declaring or smuggling harvested timber.
- Unless the forest service has adequate resources and personnel the grading, classifying and scaling of timber, required for many harvest based fees, can be easily abused to avoid payments.
- Many harvest-determined fees, especially *uniform specific royalties*, induce inefficiency through high-grading.
- *Tree-based royalties* and *volume-based royalties* must be regularly reassessed to account for changes in the price of timber and inflation.

In short, harvest-based fees will only be truly effective instruments where forest services have the ability to closely monitor extraction. Even then, the use of a *differentiated value-based royalty* is clearly favourable since it is less prone to inducing high-grading and automatically adjusts to inflation and changes in the price of timber.

Given these limitations many observers have recommended the use of pre-harvest determined fees. The simplicity of these fees is undeniably attractive; the charge levels are set in the concession agreement removing the necessity to monitor and measure harvesting (though see next section on *Silvicultural Restrictions and Future Harvests*) and making them extremely easy to collect and enforce. Also, the fact that they are determined prior to the concessionaire entering the forest means they have no distortionary effect on harvesting decisions and, indeed, encourage the efficient exploitation of all merchantable timber in the concession.

Of the different types of pre-harvest fees, it is probably best to use *area fees* since these provide the added incentive for logging companies to demand smaller and more manageable concessions.

One final, and highly desirable, feature of using a pre-harvest fee is that the charge rate can be readily set at competitive auction. In theory the use of competitive pressures should induce logging companies to reveal their maximum willingness to pay for the rights to harvest timber from the concession. At the same time, competition should ensure that the most efficient logging company wins the rights to harvest from the forest.

Of course pre-harvest fees are not without their drawbacks. Whether the charge rate is determined administratively by the government or through competitive auction, both forest owner and logging company need to have an idea of the quality and quantity of timber in the concession. In an ideal world the forest service would carry out a forest inventory that would give a good indication of the value of the concession. If such information does not exist or if the forest service does not have the resources to carry out a comprehensive inventory, then the true value of the concession will be uncertain. To compound this, logging companies preparing bids will also be uncertain over the possible costs of extraction and the future price of timber.

In the presence of uncertainty, both the government and the logging company will be concerned that bids will under- or over-value the concession. In such a situation pre-harvest determined fees, on their own, may be inappropriate and it would be advisable to share some of the risks of under- or over- estimation between the two parties.

One good solution is to employ a harvest determined fee (preferably a *differentiated value-based royalty*) as well as an *area fee*. Such a system would result in a proportion of a logging companies' payments being fixed in advance whilst a second part would be related directly to the quality and quantity of timber extracted from the concession. Thus, a balance mechanism is built into the fee system whereby an underestimation of the true value of timber in the concession will be compensated by increased payments in royalties from the concessionaire.

A first-best system of fees would likely follow this model, combining a competitively set *area based fee* with a *differentiated value-based royalty* the rate of which is known to the potential concessionaires in advance of the concession auction. When the value of the forest is poorly known the government can increase the royalty rates and rely more heavily on this mechanism to collect rents and, conversely, can reduce rates when a thorough inventory of the forest exists.

The effectiveness of such a system may be limited by at least two issues:

Competition: If insufficient interest exists amongst logging companies then it may be difficult to guarantee competition in the auction of harvesting rights, though, theoretically speaking, a well designed auction requires no more than two bidders to ensure potential concessionaires express their maximum willingness to pay. If lack of competition or the possibility of collusion between bidders is an insurmountable problem, then the forest service may be forced to set *area fees* administratively. If this can be done with reference to prices set in auctions for concessions in similar areas of forest, then this should not be too much of a problem. If this is not possible then the efficacy of the area fee may be compromised.

Strength of the Forest Service: In certain countries, the effectiveness of the royalty payment may be compromised by the forest service lacking the funds, personnel and equipment to effectively grade and scale harvested timber close to the forest. In such a case it may be possible to carry out these tasks further from the harvest site, such as at the sawmill gate, where the logistical requirements for the forest service are less intense but there are far greater opportunities for logging companies to avoid payments by not declaring or smuggling harvested logs. If even this is not possible then the forest service may have to rely on a simpler harvest based fee. If scaling is a problem then royalties can be based on an estimated average volume of timber in a harvested stem of each species of tree (similar to a system employed in Ghana, see Box 3.4). If both scaling and grading are a problem then the forest service may have to settle for a *tree-based fee*.

Of course, the more dissimilar the forest fee and tax system is from the first best solution, the more likely it is that distortions will be introduced into the sector and that forest rents will remain uncaptured or simply be dissipated.

In the final analysis, the solution to these problems will be to increase the funding, personnel and training of the forest service so that it can meet the demands made of it. In the long run such investments will likely pay for themselves by increasing the overall revenues generated in the forest sector.

3.4.3.5 *Silvicultural Restrictions and Future Harvests*

In the previous section we looked at the best set of instruments to employ in order to ensure that the rents from the present harvest were captured by the government. Casting our minds back to the discussion in Chapter 2, the total potential rents from a concession do not only include those from the current harvest but those that might be realised from a subsequent harvest (see Figure 2.2). One of the other tasks facing the forest service is to ensure that these future rents are not dissipated by the actions of the logging company. Indeed, it often makes much sense in terms of economic efficiency to employ the logging company to undertake the silvicultural activities, such as replanting or thinning, that will actually enhance these future harvests.

Most concession agreements will contain stipulations concerning the silvicultural responsibilities expected of a logging company in a concession (see Box 2.1 for an example from Indonesia). To check that logging companies have complied with these stipulations, logged over areas must be inspected after harvesting and replanting. Again, it is imperative that the forest service has the resources itself, or alternatively the funds to employ an outside contractor, to achieve this task.

One final element of the system of fees and taxes employed to capture forest rents should be an instrument used to protect the potential of future rents. The best instrument to achieve this task is a *performance bond* (see section 3.4.1.1 above). Since the bond is not related to the current level of harvesting it should not distort present harvesting decisions except in motivating the logging company to comply with the silvicultural responsibilities assigned to it in the concession contract.

3.4.3.6 *Conclusions*

In an ideal world, where the forest service is adequately staffed and funded, the best system of forest fees should rely heavily on a *competitively determined area fee*. Dependent on the degree of uncertainty concerning the true quantity and quality of merchantable timber in the concession, along with uncertainty over the costs of extracting timber and its future price, the area fee should be supplemented by a *differentiated value-based fee* whose rate is revealed to potential concessionaires prior to the auction. The higher the degree of uncertainty, the less the system should rely on the area fee.

On top of these instruments, it is recommended that logging companies are forced to post a *performance bond* before being allowed to harvest from the concession. The bond would be returned to the logging company with accrued interest over the course of their tenure, providing that the silvicultural responsibilities agreed to in the concession contract had been fulfilled.

Table 3-3: Forest fees and taxes in the countries of the world

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
Belize	Pre-Harvest 1. Cutting Permit Fee - Annual Fee	NK	1. Volume Based Royalty - Differentiated by species	\$21,94 per m ³ for Mahogany and Cedar \$2.10 to \$9.30 per m ³ for other timber			1. Road Fee 2. Corporate Tax	NK 35%	World Bank (1996)
Bolivia	1. Area Fee - Annual Fee - Set at minimum rate for existing concessions - Set at auction for new concessions - Minimum adjusted for changes in timber prices	Minimum \$1 per ha per year					1. Corporate Tax	40%	BOLFOR (1997)
Brazil			1. Volume Based Royalty - Uniform Specific Royalty - Ostensibly a Reforestation Tax	\$3 per m ³	1. Export Taxes - Exported volume - based Port Tax - Exported volume- based Cargo Tax - Ad valorem Export Tax	\$12 per m ³ \$12 per m ³ 6% (of official min. price)	1. Transport Tax - Paid to move goods between states 2. Income Tax - Finsocial Tax - PIS Tax 3. Corporate Tax	12% (of timber value) 2% (of official min. price) 0.65% (of official min. price) 30%	Tarifa (1997, pers. comm.)

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest	Rate	Harvest	Rate	Post Harvest	Rate	Tax	Rate	Source
Cambodia			1. Volume Based Fee - Differentiated by species	Grade 1: \$20 per m ³ Grade 2: \$14 per m ³ Grade 3: \$11 per m ³					World Bank (1996)
Cameroon	1. Area Fee - Annual Fee - Set at auction	Minimum \$2.83 per ha per year (1,500 FCFA)	1. Value Based Fee - based on FOB price	2.5%	1. Export Tax - based on FOB price - Progressive surtax on value of non-transformed timber over legal max of 30% of exported volume	17.5% (logs) 12.5% (sawnwood) 31-40%: \$15 per m ³ 41-50%: \$19 per m ³ >50%: \$28 per m ³	1. Corporate Tax	38.5%	Day & Brunner (1997) World Bank (1997)
Canada, British Columbia	1. AAC Based Fee - Annual Fee - Set administratively - Different for different types of harvesting license	Tree Farm License: \$0.45 per m ³ Forest License: \$0.25 per m ³ Timber Sale License: \$0.10 per m ³	1. Volume Based Fee - Differentiated by species and location - Set administratively 2. Volume Based Fee - 'Bonus' payment set at auction for Timber Sales Licenses - Paid as well as the base royalty	Coast Avg. \$24.47 per m ³ Interior Avg. \$25.84 per m ³ Set at auction (approx. twice base royalty)			1. Corporate Tax	29.12%	Schwindt & Heaps (1996) B.C. Forest Service (1996)

Country	Forest Fees:	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
Central African Republic	Pre-Harvest 1. Area Fee - Annual Fee - Set administratively 2. Area Fee - One off Fee - Charged on harvesting from public forest land 3. Concession Fee - One off Fee - Negotiated for each concession	1. Value Based Fee - Based on 'valeur mercuriale', set at 1/4 of FOB price	\$0.24 per ha per year \$170 to \$500 per ha per year Negotiated	1. Export Taxes - Export Tax percentage of valeur mercurial - Reforestation Tax set on volume of exported timber with a valeur mercuriale over CFAF 15,000 per m ³	20% (logs) 10% (sawnwood & plywood) 10%			Grut et al. (1991) World Bank (1997, pers comm.)
People's Republic of the Congo	1. AAC Based Fee - Payable on total estimated VMA (max annual vol) - Based on species-specific FOB - 25% payable in advance of logging - Set competitively (2. Area Based Fee - Provided for in draft of new forest law 1997)		NK	1. Export Taxes - Percentage of FOB, location-, species- & grade-specific	NK	1. Social Infrastructure Obligations 2. Turnover Tax	NK NK	Ruzicka & Costa (1997)
Costa Rica	1. Allowable Cut (AC)					1. Transportation	NK	Lutz et al.

Country	Forest Fees:	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	<p>Pre-Harvest</p> <ul style="list-style-type: none"> - Set administratively <p>50 FCFA per ha Reallocation 25 FCFA per ha</p> <p>2. Area Fee</p> <ul style="list-style-type: none"> - Annual fee <p>10 FCFA per ha per year</p> <p>3. Local Development Tax</p> <ul style="list-style-type: none"> - Area based fee 400,000 FCFA per - Intended for reinvestment and civil works to benefit local community 2,500 ha permit 	<ul style="list-style-type: none"> - Set administratively - Charged on the volume of wood declared by logging company 						currently under renegotiation, Topa (1997)
Equatorial Guinea	<p>1. Area Fee</p> <ul style="list-style-type: none"> - Annual Fee 600 FCFA per ha per year - Administratively determined through some negotiated agreements at 20 - 250 FCFA per ha per year <p>2. Area Fee</p> <ul style="list-style-type: none"> - Differentiated by zone - Other details not known <p>Zone A: 1% Zone B: .6% Zone C: .4%</p>	<p>1. Value Based Fee</p> <ul style="list-style-type: none"> - Based on 'valeur mercuriale' 	2%	<p>1. Export Taxes</p> <ul style="list-style-type: none"> - Fixed tax - Percentage of valeur mercurial 	<p>325 FCFA per m³</p> <p>14% (logs) 9% (processed products)</p>			<p>Grut et al. (1991)</p> <p>World Bank (1997, pers comm.)</p>
Estonia	<p>1. Concession Fee</p> <ul style="list-style-type: none"> - One off Fee - Set at auction 		<p>Set at auction</p> <p>Avg. price \$20.87 per m³</p>					<p>METLA (1997)</p> <p>Carrol (1996)</p>

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest	Rate	Harvest	Rate	Post Harvest	Rate	Tax	Rate	
Finland	1. Standing Volume Fee - Charged on price of standing volume - Most important instrument	\$25 per m ³					1. Corporate Tax	28%	Ruzicka and Costa (1997)
Gabon	1. Area Fee - Differentiated into four zones according to remoteness from port 2. Expected Sales Fee - Ad valorem fee - Differentiated by zone and hardship of exploitation - Based on expected gross sales	4 to 20 FCFA per ha 2.5% to 12%	1. Value Based Fee - Based on taxable value 2. Value Based Fee - Based on taxable value - Only on exported logs	3.5% 5%	1. Export Taxes - Percentage of FOB price	Logs: 15% Products: 5%	1. Corporate Tax	45%	Grut et al. (1991) World Bank (1997, pers comm.)
Ghana	1. Area Fee - Annual Fee - For entire concession 2. Area Fee - Annual Fee - For area being harvested - Silvicultural costs	\$0.81 per ha per year \$0.02 per ha per year	1. Tree Based Fee - Differentiated by 42 different species - Set administratively - Quoted in per m ³ and translated into an avg. charge per tree using a measure of avg tree vol.	Avg charge \$3.85 per m ³			1. Corporate Tax	35%	Touche Ross (1995)
Guyana	1. Area Fee - Determined in concession agreement	Avg. \$0.0014 per ha	1. Volume Based Fee - Differentiated by species and product (e.g. logs, sawnwood)	\$0.24 to \$0.77 per m ³	1. Export Taxes - Charged on FOB price of all exported timber products - Extra tax on FOB	2% 0.01% (sawn)	1. Corporate Tax (Some large concessions have been given a 5 year tax break)	45%	Sizer (1996) As of 1996 Forest Fee rates under review

Country	Forest Fees:		Rate	Harvest	Rate	Post Harvest	Government Taxes:		Source
	Pre-Harvest	Rate					Tax	Rate	
Honduras	1. Standing Volume Fee - Stumpage prices determined at auction - Reference stumpage price for auction set according to distance to road, stand quality and density	Set at auction Minimum \$19 per m ³				of greenheart timber			Gray and Hagerby (1997)
Indonesia	1. Area Fee - One off Fee - Varies by province	\$4 per ha, \$7.50 per ha or \$10 per ha	1. Volume Based Fee - Differentiated by species and product - Administratively set at 6% of avg. log prices - Levied in Indonesian Rupiah 2. Reforestation Fee - For Reforestation Fund - Differentiated by species and region - Set administratively - Levied in US Dollars	\$7 to \$12 per m ³ depending on species \$13 to \$16 per m ³	1. Export Taxes - For sawnwood and logs - For logs replaced Log Export Ban	Set at such high rates that no logs and very little sawnwood is exported legally	1. Corporate Tax - Varies by province 2. Area Tax - Annual Tax - Land and improvement tax charged on all forest land classes, concessions fall into the lowest class	4%, 11% or 13% NK	Gray (1996)
Kenya			1. Volume Based Fee - Most important instrument	\$25 per m ³			1. Corporate Tax	35%	Ruzicka and Costa (1997)
Malaysia Peninsular	1. Area Fee - Annual fee called a 'premium' - Set administratively - Differentiated by	From M\$150 per ha per year to	1. Volume Based Fee - Differentiated by species group - Different in different states	Avg. Fees M\$8 per m ³ to M\$16 per m ³	1. Processed Product Export Tax - Volume based tax - Different for different products	Plywood: M\$40 per m ³ Laminated Timber:	1. Corporate Tax	30%	Forestry Department, Peninsular Malaysia (1995)

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest forest type and stand density - Different for different States in PM - Auctions may be used to determine a 'tendered premium' above fixed premium	M\$1500 per ha per year From around M\$2500 per ha to M\$5000 per ha	Harvest 2. Volume Based Fee - Silvicultural Cess	according to state M\$2.80 per m ³	- For sawnwood differentiated by species and whether kiln or air dried	M\$80 per m ³ Veneer: M\$250 per m ³ Sawnwood : M\$40 per m ³ to M\$250 per m ³	Tax	Rate	
Malaysia - Sarawak			1. Volume Based Fee - Uniform Specific Royalty - Higher rates on Exported timber	Domestic Processing: M\$10 per m ³ Exported: M\$50 per m ³			1. Corporate Tax	30%	World Bank (1991)
Malaysia - Sabah			1. Volume Based Fee - Differentiated by species group - Higher rates on Exported timber - Calculated according to residual value principal to reflect rental value	E.g. Red Meranti: Domestic: M\$10 per m ³ Exported: M\$50 per m ³	1. Export Taxes - Ad Valorem tax	2.8%	1. Corporate Tax	30%	World Bank (1991)
Nicaragua	1. Area Fee - One off Fee 2. Area Fee - Annual Fee	\$1.11 per km ² \$.70 per km ²	1. Volume Based Fee - Differentiated by species - Stumpage Fee 2. Volume Based Fee - Uniform Specific	\$6 to \$25 per m ³ \$2.33 per m ³	1. Sales Tax - Ad Valorem tax - Assessed on Sale Value	2%	1. Corporate Tax	30%	Gray and Hägerby (1997)

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest						Tax		
			Royalty - Exploitation Tax (3. Volume Based Fee - Uniform Charge - Not strictly a rent capture fee as paid for marking service provided by Ministry of Environmental and Natural Resources)	(\$3.33 per m ³)					
Nigeria -Cross River State			1. Volume Based Fee - Most important instrument	\$15 to \$30 per m ³			1. Corporate Tax	30%	Ruzicka and Costa (1997)
Papua New Guinea			1. Volume Based Fee - Fixed Royalty differentiated on FOB - Plus Ad Valorem royalty charged on value in excess of \$367 per m ³ - Charge paid to Clans that own forests	\$14.6 per m ³ on timber valued below \$165 per m ³ Up To \$33.8 per m ³ on timber valued between \$277 & \$367 per m ³ Timber valued over \$367 per m ³ incurs charge of 7.5% of excess value	1. Export Taxes - Ad Valorem tax - Assessed on FOB - Marginal Tax Rate increases with Price	15% on value of m ³ below \$165 Up To 70% on value of m ³ over \$367			(1997)

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest	Rate					Tax	Rate	
Russia			1. Volume Based Fee - Set at Competitive Auction - Minimum Stumpage Fee determined by Federal Government	Set at Auction			1. Other Local, Regional and Federal Taxes	NK	World Bank (1997)
Senegal			1. Tree Based Fee - Differentiated by species - Most important instrument	\$40 to \$60 per tree			1. Corporate Tax	35%	Ruzicka and Costa (1997)
Solomon Islands			1. Value Based Fee - Landowner Royalty	Exported Logs: 17.5% Domestic Logs: 7.5%	1. Export Taxes - Charged on FOB price - Includes a Reforestation Levy	27.5%			World Bank (1995)
Suriname	1. Area Fee - Annual Fee - Determined in concession agreement	\$0.02 per ha per year	1. Tree Based Fee - Differentiated by species	Between \$0.005 & \$0.02 per log	1. Export Taxes - Charged on FOB price - FOB price set in 1992 well below world market prices	5% to 10% of FOB	1. Income Tax - Charged on Revenues 2. Dividend Tax - Charged on estimated profits	40% 10%	Sizer and Rice (1995)
Vanuatu			1. Volume Based Fee - Differentiated by	High Value	1. Export Taxes - Charged on FOB	Logs:			World Bank (1995)

Country	Forest Fees:	Rate	Harvest	Rate	Post Harvest	Rate	Government Taxes:	Rate	Source
	Pre-Harvest		<ul style="list-style-type: none"> species - Landowner Royalty 	<ul style="list-style-type: none"> Species: \$10.69 / m³ Med. Value Species: \$8.23 per m³ Mixed Utility Species: \$4.94 per m³ 10% 	<ul style="list-style-type: none"> price - Differentiated by forest product type 	<ul style="list-style-type: none"> 15% + \$10.69 / m³ Sawntimber: 5% to 10% Veneer: 3% 			(1995)
Venezuela	<ul style="list-style-type: none"> 1. Concession Fee - One off Fee - Set at auction 	Set at auction ???	<ul style="list-style-type: none"> 2. Volume Based Fee - Percentage of Landowner Royalty - Reforestation Levy to Department of Forestry 	NK					
Western Samoa			<ul style="list-style-type: none"> 1. Volume Based Fee - Uniform Specific Royalty 	\$3 per m ³					World Bank (1995)

3.5 Geographical and Temporal Patterns in the Application of Forest Fees and Taxes

Table 3.3 provides a reasonably comprehensive list of the main features of the fee and tax systems applied in the timber producing countries of the world (current at the date of the source shown in the table). In this section we shall attempt to put this information into a little more context, picking out the regional and temporal patterns in the application of forest fees and taxes.

South and Central America:

In South and Central America there has been considerable reform in forest revenue systems over the last few years.

In Bolivia, the revenue system had previously relied on two harvest determined fees; a *value-based royalty* set at 11% of the value of sawed wood and a *volume-based fee* paid on harvested timber. The new Bolivian forest law of 1996 has abolished these and introduced a *area fee* set at auction.

This move from harvest determined fees to pre-harvest determined fees set at auction has been witnessed in a number of other countries in the region. In Venezuela, for example, concessions are allocated through auction in which potential concessionaires bid on the level of a one-off *concession fee*. Similarly, in Honduras, concessions are allocated on the basis of bids on a stumpage price per m³ for the *standing volume* in the concession. In certain areas of Costa Rica, the government has introduced reforms designed to ensure competitive pressures are at force in the allotment of harvesting rights to logging companies (see Box 3.1).

Even the Brazilian government, which for various reasons had previously displayed very little interest in forest fee and tax systems, has recently attempted to auction off the rights to concessions in the Tapajos region based on bids for a *uniform specific volume based royalty*.

The picture is not that rosy all over Central and South America. The countries of the Guyanan shield still maintain very poor forest revenue systems. In Guyana itself, the level of fees is far too low and reliant on a *differentiated volume-based fee*. Similarly Suriname maintains an *area fee* and *tree-based fee* at negligible charge rates and relies on an *export tax* to collect rents despite the fact that very little timber is actually exported.

Africa:

Though many of the forest revenue systems of Africa remain firmly based in the harvest determined fee tradition (e.g. Equatorial Guinea, Senegal, Nigeria, Ghana), the process of change has begun to take hold here as well.

In Cameroon, for example, the forest revenue system was revised in 1996 (see *Example 1* in Section 4.2.2) with the introduction of an auction system based on an *area fee* to allocate new concessions. In line with the recommendations outlined above, the area fee is supported by a *value-based fee*.

Similarly, a new forest law drafted in 1997 is looking to establish an area based fee as an instrument for collecting forest rents in the People's Republic of Congo. Though as yet incomplete, Cote D'Ivoire is also in the process of revising its forest law. And Ghana, having introduced reforms to strengthen the capacity of its forest service to collect forest

fees (see Section 4.2.3), is also moving towards a system of competitive auctions to allocate concessions according to bids offered for an *area fee* (see Box 3.1).

Southeast Asia:

The outlook does not appear to be so positive in Southeast Asia. The two largest producers of timber, Indonesia and Malaysia still enforce log export bans or punitively high export taxes on unprocessed timber (see Section 4.3.2 Example 4 for Indonesia and Section 4.3.3 Example 7 for Malaysia) to inhibit log exports. Both remain dependent on *volume-based royalties* as the key instrument for capturing rents, except for perhaps Peninsular Malaysia where an area fee has been of growing importance. Over the years 1991 to 1995 the percentage of total forest revenues generated by the area fee in Peninsular Malaysia rose from 44% to 57%, with a declining proportion, 35% down to 24%, coming from royalties.

Interestingly, as this paper was being compiled, the economic crisis that has devastated many Asian economies since late 1997 has, at last, forced the Indonesian government to change its forest policies. The government of Indonesia has signed a 'letter of intent' with the IMF that outlines the conditions that must be fulfilled for the country to continue to receive IMF funds. The conditions effecting the forest sector include;

- A reduction in log export taxes to a maximum of 10% ad valorem in March, 1998
- Increase charge rates on the *volume-based royalties* presently employed to capture forest rents
- Create new forest fees to improve forest rent capture
- Introduce a system of competitive auctions to allocate new concessions

The nature of these changes would appear to be a major step in the right direction to improve the power of the government to collect forest rents. How these reforms and the ramifications of the whole economic crisis will influence forests in the region is still unclear

Information from the Indochina area is scant though, until the recent logging moratorium, Cambodia employed a *differentiated volume based royalty* as it's principal instrument for capturing rents.

There are some signs of change in the region. As of 1995 Cambodia had stopped all logging pending implementation of a new forest policy, though the author has no information on the exact form this will take. Similarly, an on-going battle is raging in Papua New Guinea as the World Bank attempts to encourage changes in the forest fee and taxation system against the wishes of a powerful forest sector lobby. These changes will still rely on a *volume-based fee* and an *export fee*, but set at much higher rates than previous charges.

Northern Countries:

Canada and Russia are two of the largest timber producers in the world. Compared to Russia the capacity of Canada's forests services to administer and collect forest fees and taxes is considerable. Though relying on a harvest determined fee, the forest service in the Province of British Columbia is certainly strong enough to make this an effective rent capture mechanism. Even here, auctions have been introduced to improve rent capture on some types of concessions (see Box 3.1) and in the last ten years the harvest determined royalty has been twice revised upwards to better reflect stumpage values.

In Russia, on the other hand, the chaos that has surrounded the transition to a market economy has left the forest service considerably weakened. Again the process of reform is underway (see *Example 5*, Section 4.3.2). On January 22nd 1997, a new forest code was adopted. This saw the abandonment of both the allocative distribution of concessions and the negotiated setting of royalty charges. Instead, concession agreements will now be concluded on the basis of tenders at auction. Potential concessionaires bid on the basis of the royalty they are prepared to pay.

The rapid growth in the forest sector over the last thirty years had resulted in forest fee and tax systems that have tended to be unplanned and lack structure. In recent years the pressure for reform has been growing. In Southeast Asia, the pace of this reform is accelerating as more evidence accumulates concerning the size of the forest rents that remain uncaptured by government. In the next Chapter we shall go on to look at the evidence of the widespread existence of uncaptured rents.

3.6 Summary

[TO BE COMPLETED]

4. RENT CAPTURE

4.1 Introduction

The discussion in Chapter 2 outlined the ways in which forest rents, rather than being captured by the government, may end up in the hands of the companies of the forest sector as superprofits or can be lost altogether through wastage and inefficiency. In this chapter we shall investigate the extent to which governments are successful in capturing economic rents.

First, in Section 4.2, we look at how an indication of the existence of uncaptured rents can be found when governments change forest policies or when logging companies are forced to reveal their true willingness to pay for harvesting rights through competitive pressures. And then, in Section 4.3, we shall review how researchers can directly estimate the rents that are not being captured by governments through case studies. Both these sections are illustrated through case examples.

The Chapter concludes with Table 4.16 which summarises many of the studies that have reviewed indications of uncaptured rents or directly estimated them through case studies.

4.2 Indications of Uncaptured Rent

In many cases it is extremely difficult to determine the exact level of available forest rents and deduce from this the how successful governments are in capturing them. However, if the government is failing to capture all the forest rents then we would expect that improvements in the fee and tax system or in the ability of the forest service to collect payments would increase the revenues coming to government from the forest sector without influencing the output of the sector. In a similar vein, indications of uncaptured forest rents can be seen when logging companies, driven by competitive pressures, reveal they are willing to pay more for the rights to harvest from a concession than the amount they are presently being asked to pay in fees and taxes.

These indications of uncollected rents, whilst not fully revealing the extent of superprofits or rent dissipation in the forest sector, give us clear guidance on how policies might be changed to improve the success of governments' in capturing forest rents.

4.2.1 Increases in Forest Fee and Tax Rates

One common cause of low rent capture is that governments set forest fee and tax rates at too low a level. In such circumstances the upward revision of fee and tax rates should result in expansion of the revenues collected by government.

Of course, if taxes and fees already appropriate the majority of available rents, increasing rates will merely result in certain trees in the forest becoming unprofitable to harvest. In this case we would expect to see harvested volume to fall. Consequently, increasing fees and taxes may actually result in a reduction in the total revenues collected by government.

Example: Canada, Stumpage Fee Revision 1994

The most important forest fee faced by concessionaires in the Canadian Province of British Columbia is the stumpage fee, a *differentiated volume based royalty*. The level of payment associated with this royalty is known as the stumpage rate. Stumpage rates are periodically adjusted according to changes in a ‘lumber index’ that tracks the prices of Canadian timber.

In May 1994, the government decided that the relationship between the lumber index and stumpage charges had not taken account of a structural change in the lumber market that had led to persistently higher timber prices. As a result, the relationship between the lumber index and stumpage rates was revised and average stumpage rates were increased substantially.

Table 4.1 illustrates the effect that this revision in stumpage rates had on revenues from stumpage charges levied on major license holders. Stumpage rates were nearly doubled, rising from an average \$13.75 in 1993/94 to \$24.96 in 1994/95. Despite this massive increase, there is little evidence for a contraction in the quantity of wood harvested in the following two years.

The revision in rates led to a 120% increase in revenues. On this evidence, it is reasonable to conclude that stumpage rates had been previously far too low.

Table 4-1: Effects of royalty revisions on harvesting rates and revenue collection in British Columbia

	1993/94	1994/95	1995/96
<i>Weighted Average Stumpage (\$ per m³)</i>	\$13.75	\$24.96	\$23.03
<i>Volume Logged ('000 m³)</i>	52,106	50,237	52,023
<i>Revenue from Stumpage Fees (\$'000)</i>	\$684,528	\$1,488,995	\$1,322,687
<i>Average Revenue (\$ per m³)</i>	\$13.14	\$29.64	\$25.43

4.2.2 Revisions in Forest Fee and Taxation Systems

In chapter 3, we looked in detail at the range of options that were available to governments and forest owners in collecting forest rents. In many contexts it was clear that certain mechanisms may be more effective than others in achieving reasonable levels of rent capture.

One indication of the success of governments in capturing forest rents will be to see how revenues have changed following revisions in the system of forest fees and taxes faced by logging companies.

Example 1: Cameroon, Forest Fee reforms 1995/96

The forestry taxation system in Cameroon was outlined in the 1981 Forestry Law and the 1983 Forestry Decree. These prescribed a number of fees and taxes designed to capture forest rents. Amongst these were;

- An *area based fee* which amounted to 98 FCFA per ha per year
- An *differentiated ad valorem royalty* set at 5% of an administratively determined log price (the *valeur mercuriale*) which distinguished timber value according to species and zone of origin
- An *export tax* set at a flat rate, 20% of the *valeur mercuriale* of exported timber. No export tax was payable on processed wood in an attempt to encourage the domestic timber processing industry.

In many ways, the original system of fees and taxes was inadequate.

- the area fee was insignificant, amounting to a little over \$0.30 per ha per year
- the *valeur mercuriale* tended to undervalue true log worth
- the mechanism for collecting the royalty charges was easily corruptible by loggers underdeclaring the number of logs harvested or manipulating their zone of origin
- the heavy reliance on an export tax only introduced distortions into the sector.

Hence, the introduction of a new forest law was made a condition of the Structural Adjustment Loan made by the World Bank to the Government of Cameroon in 1989. It was not until the end of 1993, however, that a draft was finally completed and, after a number of revisions, finally became law in August 1995.

The new forest law introduced a mechanism of competitive bidding for concessions (see Box 3.1) based on a unit price per ha of the concession. For concessions already allocated, the area tax was significantly increased to 300 FCFA per ha per year and the tax base used to calculate royalties and export taxes was increased and rationalised.

In May 1996, the first auction of 112 small concession areas resulted in bids of between 1,000 and 3,000 FCFA per ha per year, a figure much higher than the reservation price which had been set at 300 FCFA per ha per year or the previously charged level of 98 FCFA per ha per year. This was followed in March 1997 with the auction of 26 large concessions covering 6 million ha of production forest (one quarter of Cameroon's total). 190 bids were received, offering area taxes from 400 to 4,500 FCFA per ha per year. As a result, the minimum area tax was raised to 1,500 FCFA per ha per year in July 1997.

In the long run, the surface unit price, complemented by the stumpage tax and normal taxation for corporations will be the main mechanism for capturing rent, with the distortionary export tax being removed.

The reforms in the forest fee and tax system have proved highly successful. Revenues to the government have risen to about 25 billion FCFA in 1995/96 from 6 billion FCFA collected under the old system two years earlier.

Again, this fourfold increase in government revenues provides a clear indication that rents were previously going uncollected by the government. Also, it supports the

recommendation of the previous chapter that a *competitively determined area fee* can form the keystone of a successful forest fee and tax system.

Example 2: Costa Rica, Forest Fee Reforms 1996

Much of Costa Rica's forest land is privately owned. Forest owners wishing to sell timber on their land enter into an agreement with a logging company. A permit is purchased from the General Directorate of Forestry (DGF) that authorises a certain maximum harvest and a contract is agreed between the forest owner and the logging company.

This contract states a so-called 'gross price' for timber. The gross price is calculated by multiplying the value of timber to be harvested by the maximum harvestable volume stated in the DGF permit. Timber values on the stump depend on;

- The species of wood (on average \$18.50 per m³ for softwoods such as ceibo to \$55.20 per m³ for hardwoods such as pochote).
- The distance to the sawmill
- The topography of the farm.

From this a 'net price' is calculated by subtracting the logging company's harvesting costs from the gross price. These costs may be as high as 50% of the gross price. The net price is what is owed by the logging company to the forest owner.

The costs that are deducted by the logging company include access-road construction, legal fees, permit fees, the fees for a professional forester employed to determine a mandatory forest management plan, plus taxes owing to the government (Lutz et al. 1993).

The 1969 forestry law introduced a *differentiated specific royalty* chargeable at different rates on three classes of wood:

- Class A at 6.36 colones per m³
- Class B at 4.24 colones per m³
- Class C at 3.00 colones per m³

Not until 1986 was this system revised. The new forestry law moved away from the *specific royalties* and established an *ad valorem value-based fee* on the gross value of the timber authorised to be cut in the DGF permit. In 1992 this was set at 188 Colones per m³ (around \$1.44 per m³).

The revision in the forest tax structure succeeded in raising forest revenues from \$76,500 in 1985 to \$1,470,000 in 1987, a 15-fold increase in real terms (Peuker, 1992).

Again, this case study supports the contention of the previous Chapter that a *value based fee* is a better mechanism for collecting rents than a *volume based fee*. However, what is unclear in this example is whether the forest fee revisions actually reduced the rents captured by the logging companies or merely meant that they passed these increased taxes directly on to forest owners.

4.2.3 Revisions in Revenue Collection Methods

The discussion in Chapter 2 made clear that apart from poorly designed fee and taxation systems rent capture is influenced by the degree to which logging companies are able to avoid these fees and taxes. Illegal logging, timber smuggling, misgrading, misclassifying and underscaling harvested wood and avoiding forest fees through non-payment or illicit accountancy practices may all contribute to reduced revenue collection for governments.

Where governments have revised their methods to improve the rate of payment of fees and taxes on harvested timber, we would expect the increase in revenues to give some indication of the extent to which logging companies have been avoiding charges.

Example: Ghana Policy Reforms 1994/95

As discussed in Box 1.1, much of Ghana's forest land is owned by traditional authorities, though over three-quarters has been gazetted into reserves that are managed and controlled by the Forestry Department on behalf of these landowners.

In the three years between, 1989 and 1991 'off-reserve' harvesting remained fairly stable at a round 0.23 million m³ per year. Over the next three years this rose dramatically, until by 1994 off-reserve harvesting stood at 1.56 million m³ per year. On top of this, illegal logging in these areas was estimated in 1994 at 0.2 million m³ per year (UNIDO, 1996), whilst anecdotal evidence suggested that forest fee evasion was widespread.

To counter these trends the Government of Ghana made a series of policy changes between 1994 and 1995. First, in 1994 the Forestry Department was given responsibility for the control of off-reserve felling of trees and revenue collection. It developed a set of procedures that were implemented in August 1995. These procedures were designed to curb illegal logging in off-reserve concessions and effected all parts of the felling cycle. They involved the Forestry Department in:

- Pre-felling inspections of concessions
- Calculation of felling quotas for these concessions
- Issuing of felling permits
- Post-felling inspections
- Issuing of a Conveyance Certificate permitting the transport of harvested timber following a satisfactory post-felling inspection

The Conveyance Certificate was also introduced for timber harvested on-reserve.

A second set of measures were introduced to reduce forest fee evasion. These measures included:

- the linking of the bi-annual renewal of the property mark (rights to the concession) to the payment of royalties
- the right to ask for payment of 30% of royalties in advance

Other measures introduced in 1995 were designed to reduce the total harvest of wood, this included a log export ban and a reduction in the AAC from 1.2 million m³ per year (a figure that had been exceeded for the previous four years) to 1 million m³ per year.

Table 4.2 illustrates how these measures influenced the capture of forest rents by the Forestry Department.

Table 4-2: Effects of forest fee collection reforms on harvesting rates and revenue collection in Ghana

Year	1993		1994				1995			
	On or Reserve	Off On & Off	First Half		Second Half		First Half		Second Half	
On			Off	On	Off	On	Off	On	Off	
<i>Revenue (Mill. Cedis)</i>	1,038	1,106	115	808	419	1,645	1,293	2,544	2,176	
<i>Total (Mill. Cedis)</i>	1,038	1,221		1,227		2,938		4,720		
<i>Other (Mill. Cedis)</i>	682		814					5,570		
<i>Year Total (Mill. Cedis)</i>	1,720		3,262					13,228		
<i>Volume Logged (mill. m³)</i>	1.68		1.68					0.98		
<i>Revenue per m³ (Cedis per m³)</i>	1,023		1,942					13,497		

Source: Adapted from Gronow (1996)

The major rise in off-reserve revenues between the first and second half of 1994 (115 million cedis to 419 million cedis) is due to the transfer of revenue collection from the Lands Commission to the Forestry Department, a trend that continues into the first half of 1995.

When the August 1995 measures designed to limit illegal logging and increase revenue capture were introduced, a further massive increase in revenue capture is clearly discernible. Off-reserve revenues increased by 70% and even on-reserve revenues increased by 50%.

The degree to which the measures have increased revenue capture is most clearly illustrated in the 13 fold expansion in the revenue collected per m³ of wood harvested. Plainly, increasing the ability of the forest service to collect the fees and taxes already in place in a country will have a significant influence on the level of forest rent capture.

4.2.4 Market based sales of forest

One other possible indication of the availability of rents in the forest sector arises when concessions, already subject to the full set of forest fees and taxes, are put up for sale. If the forest fees and taxes were already extracting all the rents, then purchasing the right to harvest would have little value. No logging company would be willing to pay for the privilege of operating a concession that only yielded normal returns. The company would be better off engaging in endeavours that also generated normal returns but did not involve an initial payment.

Example 1: Canadian forest auctions and sales

As described in Box 3.1, the Province of British Columbia in Canada, employs a number of different types of concession license. Unlike the other licenses, *Timber Sales*

Licenses are sold at competitive auction. These auctions involve logging companies offering a ‘bonus bid’; an amount they are prepared to pay in stumpage fees up and above the mandatory stumpage fees paid by all license holders. These bonus bids tend to be quite substantial. In 1993, for example, of the \$259 million paid in stumpage bills by holders of Timber Sales Licenses, over half, \$131 million, came from bonus payments.

The size of the bonus bids would appear to provide strong evidence of undercharging for the rights to harvest the forest resource under the other license agreements. However, Timber Sales Licenses also differ from the other types of license in that they exempt the logging company from silvicultural responsibilities for the concession. To what extent the bonus bids reflect the availability of rents rather than the reduced costs of operating without silvicultural obligations, is difficult to assess. However, further evidence from market based transactions also points to undercharging. When harvesting licenses are exchanged privately, it transpires that they frequently command significant prices. If the government was already capturing the rental value of the forest through its system of forest fees and taxes it would be unlikely that these sales would command any price.

Example 2: Malaysian forest auctions

Peninsular Malaysia imposes two forest fees; a species differentiated royalty and a once-off area fee known as a fixed premium. In a similar way to that described in Canada, the Malaysian government occasionally sells the rights to harvest at competitive auction. These auctions involve logging companies offering bids in the form of an extra or tendered premium.

Table 4-3: Comparison of standard and actual payments on tendered concessions in Peninsular Malaysia

Concession	Standard Payment (Royalty, Fixed Premium)	Actual Payment (Royalty, Fixed Premium + Tendered Premium)	Standard Payment as % of Actual Payment
<i>Concession 1</i>	<i>M\$3,116</i>	<i>M\$13,519</i>	<i>23%</i>
<i>Concession 2</i>	<i>M\$2,178</i>	<i>M\$10,826</i>	<i>20%</i>
<i>Concession 3</i>	<i>M\$3,103</i>	<i>M\$9,914</i>	<i>31%</i>
<i>Total</i>	<i>M\$8,397</i>	<i>M\$34,259</i>	<i>24.5%</i>

As shown in Table 4.3, three concessions tendered in one state in 1989 and logged in the same year, generated revenues of M\$13,519, M\$10,826 and M\$9,914 per ha from the combined payments of royalties, fixed premiums and tendered premiums. Had only the royalties and fixed premiums been assessed, revenue would only have been M\$3,116, M\$2,178 and M\$3,103 per ha respectively.

The fact that concessionaires are willing to pay large sums up and above the standard charges, indicates the existence of additional rent. If the additional revenue is assumed to equal this remaining rent, then rent capture under the standard charges would appear to average only 24.5% of that which is available.

The two examples presented here have both supported the contention that using competitive auctions to establish payment rates can significantly improve the extent of government rent capture.

4.2.5 Conclusions

The case studies presented here provide clear evidence that in a number of countries the forest sector had been enjoying windfall profits. Further studies that provide ‘indications of uncaptured rents’ are provided in Table 4.16 at the end of this Chapter.

The studies indicate that the use of competitive auctions may be a highly successful mechanism for increasing the level of rent capture. Also, to a certain extent, the Cameroonian and Costa Rican examples support the use of *area fees* and *value-based fees* in preference to other possible instruments.

4.3 Estimations of Uncaptured Rents

The indications of uncaptured rents described in the previous examples suggest that in a number of countries much could be done to improve levels of rent capture. Unfortunately, these are mere indications and give no insight into the total available rents. Without information of this nature, governments wishing to change their forest fee and taxation systems run the risk of over-burdening the sector, reducing its competitiveness and introducing unnecessary distortions.

In the final analysis, calculating available forest rents is simply a matter of case study estimation. A number of such case studies have been carried out in recent years.

As was discussed in Chapter 2, governments can fail to capture rents for a number of reasons. Most obviously, forest rents can end up as windfall profits in the forest sector because forest fees and taxes are too low and/or because companies are avoiding paying the government what is due. Alternatively, rents may be dissipated. Such dissipation can result from a number of causes (see Sections 2.5.1, 2.5.2 and 2.5.3). Three important causes of forest rent dissipation are under-extraction of timber from the forest, inefficient logging practices that waste harvested timber, and market distortions that effect the price of timber and influence the behaviour of companies in the forest sector.

The quantity of information required by researchers to estimate available rents is usually fairly overwhelming and it is unusual for studies to make estimates of rents lost from all possible causes. Often they will concentrate on only one aspect of the government's failure to capture rents, most frequently identifying that portion of rent that goes uncaptured through poor fee and tax design.

In a similar vein, researchers can calculate the rents that are lost to the government on a variety of scales. Case studies may focus on the available rents from one individual concession for one year through to estimating the present value of the future flow of rents available from an entire country. Naturally, the wider the net is cast the more assumptions and generalisations are required.

In this section, we review a few of these studies, others are summarised in Table 4.16 at the end of this Chapter. The case studies summarised below are presented in the matrix illustrated in Table 4.4. The matrix presents the scale at which the study was conducted down the left hand column and the aspects of uncaptured rent that were investigated across the top.

Table 4-4: Matrix showing case examples of rent capture studies

	Superprofits		Dissipated Rents		
	Low Forest Fees and Taxes	Avoidance of Forest Fees and Taxes	Under Extraction	Inefficient Logging	Market Distortions
<i>Per m³ (Stumpage Value)</i>	<i>Example 1: Nicaragua</i>				
<i>Concession(s) per year</i>	<i>Example 2: Suriname Example 3: Bolivia</i>	<i>Example 2: Suriname</i>	<i>Example 3: Bolivia</i>		
<i>Entire Country per year</i>	<i>Example 4: Indonesia Example 5: Russia</i>	<i>Example 4: Indonesia</i>	<i>Example 5: Russia</i>	<i>Example 5: Russia</i>	<i>Example 6: Costa Rica</i>
<i>Entire Country series of years</i>	<i>Example 7: Malaysia</i>	<i>Example 7: Malaysia</i>			<i>Example 7: Malaysia</i>
<i>Entire Country present value of future production</i>	<i>Example 8: Cambodia</i>	<i>Example 8: Cambodia</i>	<i>Example 8: Cambodia</i>		<i>Example 8: Cambodia</i>

4.3.1 Small Scale Studies

At the smallest scale researchers have focused their attention on estimating stumpage values for one or a small number of concessions. Studies of this nature are able to collect fairly detailed information on the costs of logging operations such that estimates of stumpage values may be reasonably accurate. Results are often reported as a value per m³ of harvested wood that can be compared with the fees and taxes payable on the same volume (see *Example 1: Nicaragua*) or more frequently this value is multiplied up by the level of production to give an estimate of the uncollected rents from a concession over an entire year (see *Example 2: Suriname* and *Example 3: Bolivia*).

Example 1: Nicaragua

This case study from Nicaragua (Gray and Hagerby, 1997) represents a small scale analysis of the extent to which proposed forest fees and taxes would capture the available forest rents. The study estimated the stumpage value of exploitable species and compared this to estimates of the forest fees currently payable on each m³ of timber extracted. The focus of the study is, therefore, on the low level of fees and taxes and does not estimate rents that might be lost through dissipation.

In recent years, the government of Nicaragua have allocated two concessions to foreign logging companies. The first concession agreement, signed in 1995, was with a Spanish logging company, Profosa, but this was canceled a year later for non-compliance with the

terms of the agreement. The second concession agreement, was with a Korean company, Sol Del Caribe S.A. (Solcarsa), that was signed in 1996.

The two concession agreements outlined a series of fees and taxes payable by the logging companies that include a small initial area-based fee, a yearly area-based fee and a volume based royalty, the latter accounting for the majority of fees paid (see Table 4.5). Using data on the AAC, Gray and Hagerby (1997), were able to convert area based fees into a per m³ figure that suggested logging companies would pay between \$11.70 and \$30.70 per m³ of timber extracted.

Table 4-5: Forest fees in Nicaragua

	Area Based (\$ per m ³)	Volume Based (\$ per m ³)
<i>Initial Contract Fee (\$1.10 per km²)</i>	<i>\$0.0016</i> <i>(over 30 years extraction)</i>	
<i>Annual Area Fee (\$0.70 per km²)</i>	<i>\$0.036</i>	
<i>Exploitation Tax</i>		<i>\$2.33</i>
<i>Marking Service Provided by Government</i>		<i>\$3.33</i>
<i>Stumpage Fee</i>		<i>\$6 - \$25</i>
<i>Total</i>	<i>\$0.038</i>	<i>\$11.66 - \$30.66</i> <i>(depending on species)</i>
<i>Total of Combined Area and Volume Based Fees</i>	<i>\$11.70 - \$30.70</i>	

Using data from informal surveys of sawmills, lumber exporters and logging operations, estimates of the FOB export prices for Mahogany and other valuable woods, plus the logging, transport and processing costs of timber were collected. Having made allowances for normal profits, Gray and Hagerby estimate that the stumpage value of Mahogany and other valuable woods was in the range of \$101 to \$178 per m³.

Given the levels of forest fees and taxes, it would appear that for these timbers, the forest industry in Nicaragua is able to capture between 70% and 94% of the stumpage value in superprofits.

Example 2: Suriname

On a similar scale to the previous example, Rice and Sizer (1995) undertook a case study in Suriname that looked at the rents available from one concession. The study sort to show how much of the forest rents from the concession might be captured through the current system of forest fees and taxes and, going one step further than the Nicaragua study, estimated how much would *actually* be captured given the likelihood of tax and fee avoidance.

Up until 1995, 2.4 million ha of Suriname's forests had been allocated to around 150 local concessionaires, mostly in the accessible regions of the country. Total annual extraction from these concessions amounted to around 0.11 million m³ per year.

The forest fee and tax system raises almost no revenue for the government of Suriname from these concessions. The fees and taxes payable by concessionaires are listed in Table

4.6. Both the area fee and the per tree royalty have been eroded by inflation to almost nothing. Even if these fees were rigorously enforced and collected, they would still only gross \$100,000 per year, without including the costs of collection.

The majority of government revenues are raised through an export tax, despite the fact that less than 5% of harvested timber is exported. Even this is barely effective. The tax is based on an FOB price for timber that was fixed in local currency below market prices in 1992 following negotiations between the Ministry of Finance and the private sector. The ravages of inflation have since reduced the real value of the FOB prices and in 1995 they were less than half of world prices.

Table 4-6: Forest fees and taxes in Suriname

Fee/Tax	Rate
<i>Area Fee</i>	<i>\$0.02 per ha per year</i>
<i>Per Tree Royalty</i>	<i>\$0.005 to \$0.02 per log</i>
<i>Export Taxes</i>	<i>5% to 10% FOB</i>
<i>Corporate Income Tax</i>	<i>40% of net revenue</i>
<i>Corporate Dividend Tax</i>	<i>10%</i>

In 1995, at least five foreign logging companies were seeking forest concessions in Suriname. Three of the proposed concessions would be for huge areas over 1 million ha each lasting 25 years and extendible for another 25 years.

Rice and Sizer (1995) investigated the possible revenues from one such concession. The concession was to be granted to Berjaya Timber Industries Suriname N.V. a wholly owned subsidiary of a large Malaysian conglomerate called Berjaya Group Berhad.

Taking current export prices for timber products they calculated the annual stumpage value of the entire concession by deducting the costs of harvesting, as listed in the Berjaya investment plan, and incorporating a normal return of 30% on average yearly investment. For this one concession this amounted to \$13.76 million per year.

Given the present system of forest taxes and fees and those outlined in the draft concession agreement, Rice and Sizer estimate that the government could potentially collect \$8.79 million in revenues from the concession or some 60% of available rents. Of course, this is a hypothetical exercise, it makes at least two large assumptions. First, that taxes and fees are assessed using the true world prices and, second, that Berjaya does not evade payment of taxes and fees. Relaxing this latter assumption by factoring in a 20% over-reporting of costs and 20% under-reporting of revenues, reduces government rent capture to \$2.02 million per year (see Table 4.7).

Table 4-7: Possible rent capture under different scenarios in the Berjaya concession in Suriname

	Complete Tax and Fee Collection (\$ million)	Moderate Tax and Fee Avoidance (\$ million)
<i>Available Rents</i>	<i>\$13.76</i>	<i>\$13.76</i>
<i>Captured by Government</i>	<i>\$8.79</i>	<i>\$2.02</i>
<i>Captured by Berjaya</i>	<i>\$4.97</i>	<i>\$11.74</i>
<i>Percentage of Rents Capture</i>	<i>64%</i>	<i>15%</i>

Extrapolating these results to all three of the large proposed concessions indicates that the government could be foregoing as much as \$50 million per year given the same assumptions concerning tax and fee evasion. Rice and Sizer report that this is sufficient to eliminate the government's entire budget deficit.

The estimates of available rent do not take account of rents dissipated through inefficiency in harvesting or processing, nor do they allow for illegal logging a practice currently thought to account for 30% of timber harvested in Suriname.

Example 3: Bolivia

Like the Nicaragua and Suriname studies this case study from Bolivia (Nittler, 1997) focuses on the rents available from a small number of concessions. Unlike the previous examples the focus of this study was to identify the forest rents that are dissipated through lack of exploitation of all commercial species.

The Chimanes forest in Bolivia presently contains concessions operated by six different private companies each with 20 year concessions. The forest contains between 66 and 92 species per ha of which 7 have commercial timber value. The most valuable of these species, Mara, at present accounts for more than 95% of the total volume cut from the concessions.

The study attempted to estimate the windfall profits (accounting for the current forest fees and a normal return on capital of 30%) available to the concessionaires from the exploitation of the different species. Using detailed estimates of logging operation costs they calculated that, for Mara, the concessionaires were enjoying superprofits of upto \$77.41 per m³, a return on capital of around 64%. Clearly this species was highly profitable and the current system of forest fees was failing to capture the available rents.

The possible windfall profits on the six other commercially valuable species were also investigated. Three of these, it transpired, would return negative profits and were, therefore, uneconomical to harvest. The three remaining species - Cedro, Roble and Vertolago - had positive profits, with that for Cedro estimated at \$29.69 per m³. Despite these positive returns the concessionaires, in effect, ignore these species preferring to open up unlogged areas of forest to exploit new stands of Mara, than to harvest Cedro, Roble and Vertolago from those areas already cleared of Mara.

The cause of this inefficient 'mining' of the forest lay in the large windfall profits available from Mara exploitation. It became clear from the research that, despite the additional fixed costs of opening up new areas of forest, the profits from exploiting new stands of Mara are considerably higher than those that can be realised from harvesting the other species from logged over areas.

The researchers concluded that a change in the forest fee system based on an increased *value based royalty* on the different species would considerably improve the capture of forest rents. By reducing the profitability of exploiting Mara and increasing the profitability of harvesting the other commercial species, the new system would remove the incentives for mining the forest. It was estimated that such a system would increase the rents captured by the government from the Chimanes forest concessions, from their present level of \$178,500 per year to \$336,784 per year.

4.3.2 Medium Scale Studies

On a larger scale, many studies have sought to identify the potential forest rents that are lost to governments each year for an *entire country*. The informational requirements of studies at this scale, force researchers to make more sweeping generalisations concerning the costs of logging operations in the different productive forests of the country.

Though a number of such studies have continued to focus solely on the issue of low forest fees and taxes (see *Example 4: Indonesia*), many have also been interested in assessing how inefficiency in the timber extraction industry (see *Example 5: Russia*) or distortions in timber markets (see *Example 6: Costa Rica*) have been responsible for the wastage of forest rents.

Example 4: Indonesia

A case study from Indonesia investigated annual rent capture at the national level. It took into account the low level of forest fees and the high level of fee and tax evasion but the study does not investigate the effect of the many market distortions in the country and the likely influence these may have on the level of available rents.

Indonesia has some 110 million ha of closed canopy forest, representing 10% of the world's remaining tropical rainforest. By 1993, over 60 million ha of this had been allocated out into 585 forest concessions with a notional output of 26.6 million m³ of timber per year. These concessions provide timber for 385 mills capable of processing 41.5 million m³ of timber per year.

Timber and wood processing are a critical part of the Indonesian economy accounting for some 7% of GDP. Indonesia is now the world's largest producer of tropical hardwood plywood, earnings from which represent 66% of the total from the sector. The value of forest sector output has risen fourfold since 1980, reaching some \$9 billion in 1994, \$6 billion of which was exported.

There are a number of indications that forest rents, in Indonesia, are being lost to inefficiency or captured as super profits by the companies in the sector;

1. *Market Structure:* Logging concessions and milling capacity have become concentrated into the hands of a relatively small number of powerful, diversified companies. Only twenty groups control two-thirds of all concessions, of these ten control half and five major groups own one third of all concessions in the country.
2. *Illegal Logging:* Log production from Indonesia is claimed to be around 25 million m³ per year, though estimates based on the observed output of plywood and sawn timber would suggest that nearer 36 to 40 million m³ are cut in reality.
3. *Domestic Processing:* A log export ban and exceptionally high taxes on sawn timber (to curtail the export of barely sawn logs) have been imposed to encourage the domestic processing industry. The consequences of these measures include the reduction of log

prices to around 55% of world prices and the encouragement of a technically inefficient home processing industry. It is estimated that 3 million m³ (around 10% of present annual production) of timber is wasted through inefficiency in Indonesian plywood mills.

4. *Logging Damage*: Poor logging practices waste an estimated 8 million m³ annually (around 25% of present annual production).

The present system of rent capture relies heavily on a royalty, combined with a reforestation levy. Table 4.8 presents the fees and taxes that would be payable in the different provinces for a typical log priced at \$100 m³.

Table 4-8: Forest fees and taxes in the Provinces of Indonesia

Province	Royalty (\$ per m ³)	Reforestation Levy (\$ per m ³)	Timber Transport License and Scaling Fees (\$ per m ³)	Standard Corporation Tax (\$ per m ³)
<i>Kalimantan & Maluku</i>	10	16	1	11
<i>Sumatra & Sulawesi</i>	10	16	1	13
<i>Irian Jaya & NTB</i>	6	16	1	4

Source: Whiteman (1996)

Recent studies have tried to quantify the extent to which low fees, and the inefficiencies described above result in excess profits being captured by the companies of the forest sector.

Using data on the costs of production of typical concessions and processors in the main timber producing provinces of Indonesia, it is estimated that the excess profit on each log extracted legally (after allowing for a real return of 15% on capital) is some \$25 per m³. On the assumption that the returns to illegal logging are at least as great as those to legal logging the super profit in the forest sector is some \$1 billion per year.

Given this enormous uncaptured rent, Whiteman (1996) suggests that at a log price of \$100 per m³ and a plywood export price of \$450 m³, the potential increases in royalties are substantial (see Table 4.9).

Table 4-9: Present and possible royalty charges in the Provinces of Indonesia

Province	Present Royalty (\$ per m ³)	Possible Royalty (\$ per m ³)
<i>Kalimantan & Maluku</i>	10	45
<i>Sumatra & Sulawesi</i>	10	40
<i>Irian Jaya & NTB</i>	6	23.5

The estimates of available rents given here take no account of inefficiencies in the sector. The \$1 billion figure does not account for the estimated 11 million m³ of timber that is wasted each year through inefficient logging and processing.

Example 5: Russia

Like the Indonesian example, this case study from Russia (World Bank, 1996) focuses on forest rents at the national scale. The study attempts to estimate the potential rents given the considerable inefficiencies and under production presently plaguing the Russian forest sector.

The Russia forest sector has been severely disrupted by the political and economic upheavals of recent years. Since the break up of the Soviet Union, roundwood harvesting levels have fallen dramatically from 375 million m³ per year between 1989-91 to 115 million m³ in 1995. Roundwood production in 1996 was projected to be around 110 million m³. The terrible inefficiencies that persist in the sector were discussed in Box 2.2.

The Russian forest sector faces a multiplicity of fees and taxes as outlined in Table 4.10.

Table 4-10: Forest fees and taxes in Russia

Fee or Tax	Charge Rate	Comments
<i>Royalty</i>	<i>In general < \$1 per m³</i> <i>E.g. Khabarovsk Kray, 1994</i> <i>Spruce: \$0.91 per m³</i> <i>Birch: \$0.23 per m³</i> <i>At auction in far east, royalty as high as \$9.85 per m³.</i>	<i>Determined through one-on-one negotiations between territorial officials and logging companies.</i> <i>Quality and distance from the market are not generally considered.</i> <i>Charged only on removed timber</i>
<i>Land Use Tax</i>	<i>5% of Stumpage Value</i>	
<i>Timber Lease Charges</i>	<i>40% of Annual Royalty</i>	<i>Charged on long term leases</i>
<i>Enterprise Profit Tax</i>	<i>13% federal</i> <i>22% territorial</i>	<i>Levied at the beginning of each quarter on estimated gross profits</i>
<i>Value Added Tax</i>	<i>20%</i>	<i>Levied on fuel, spare parts and equipment.</i>
<i>Payroll Tax</i>	<i>40% of payroll costs</i>	<i>Assessments for social and medical insurance, unemployment and pension reserves.</i>
<i>Municipal taxes</i>	<i>3% of gross revenues</i>	<i>Levied on gross revenues, for education, police, housing maintenance, sanitation, highways etc.</i>

On January 22nd 1997, a new forest code was adopted. This saw the abandonment of both the allocative distribution of concessions and the negotiated setting of royalty charges. Instead, concession agreements will now be concluded on the basis of tenders at auction. Potential concessionaires bid on the basis of the royalty they are prepared to pay (*the forest lease charge*). A *minimum stumpage charge*, predetermined by the federal authorities, is deducted from this with the proceeds distributed between federal and regional budgets. What is left over is channelled directly to the local Forest Management Districts to fund inspection, protection and regeneration efforts. The system has already been implemented

in far eastern regions of Russia where the forest lease charge has increased royalty payments upto ten fold.

The World Bank (1996) have made some estimates of the potential annual rental value of the forest. Given the most conservative scenario in which production remains at current levels (110 million m³ per year) and inefficiency in the sector reduces output and increases harvesting costs (\$20 per m³), the estimated available rents are in the order of \$900 million a year.

By way of comparison, the eradication of inefficiency in the sector (reducing harvesting costs to \$10 per m³), the expansion of production to the maximum possible sustainable level (300 million m³ per year), and collection of royalties at the rates suggested by the far eastern auctions (\$10 per m³) would result in an estimate for the total potential rent available of some \$5,483 million per year.

Present rent capture appears to be relatively low. Anecdotal evidence suggest that a large portion of timber industry earnings remain out of reach of the federal government. Logging companies with access to export markets are exempt from VAT on export production and through intentional downgrading and underscaling, log exporters are able to under-report revenues from sales.

Total federal tax payments from the forest sector in the first 9 months of 1994 amounted to \$184 million. An equal amount should have been collected at the local level to cover social, housing, infrastructure and related expenditures. Stumpage revenues to local governments for the entire year are estimated at \$40 million. Thus, at most, the total rents captured by the local, regional and federal governments probably amounted to around \$500 million in 1994.

Table 4-11: Rent capture in Russia, 1994

	Present Rent Capture (\$ million)	Available Rents (\$ million)	Percentage of Rents Captured
<i>Present Situation</i>	500	900	55%
<i>Best Case Scenario</i>	500	5,483	9%

As shown in Table 4.11, the Russian government currently collects around half of the rents being realised in the forest sector. Given the low current levels of production and the high levels of inefficiency it is likely that, at present, they are actually failing to collect around \$5 billion of revenues from the sector each year.

Example 6: Costa Rica

Again on the national scale, this case study from Costa Rica (Kishor and Constantino, 1996) sought to estimate the influence on the economy of the market distortions brought about by the country's log export ban (LEB).

On 7th May 1986, the government of Costa Rica imposed a LEB in an attempt to protect the domestic forest sector and promote a domestic timber processing industry. In September 1987, this was complimented by a sawnwood export ban. These two measures effectively isolated the Costa Rican domestic market from the world market and

precipitated a substantial drop in the domestic price of sawlogs. The domestic prices for some varieties of logs can be as low as 30% of the world market price.

The depressed domestic price has discouraged the sustainable harvesting of timber, promoted inefficiency in the timber processing industry (log recovery is 46% compared to 55% in comparably advanced developing countries), reduced government revenues from rent collected from timber and, by reducing the relative returns to forestry, has intensified the pressure at the margin to remove forests in favour of agriculture or livestock.

Kishor and Constantino (1996) estimated the gains to the Costa Rican economy of lifting the LEB. The analysis suggests that domestic log prices will rise between 67% and 135 % and that the net gain to Costa Rica will be in the range of \$6.4 million and \$73.8 million per year.

Though the increased domestic prices may stimulate additional harvest from old-growth forest, the negative environmental impacts are small when compared to the huge efficiency gains.

4.3.3 Large Scale Studies

Large scale studies estimate the loss of rents to a country over a number of years. Those that do this retrospectively (see *Example 7: Malaysia*) use the annual levels of harvesting over those years to estimate what has already been lost to the government in uncaptured rents. Alternatively, studies can attempt to forecast the rates of forest rent capture into the future under different production levels and forest fee and tax systems (see *Example 8: Cambodia*).

Example 7: Malaysia

A case study undertaken by the World Bank (1991) sought to estimate the rents that the Malaysian government had failed to collect through low forest fees combined with widespread fee avoidance in the entire country over a number of years.

Malaysia is a federation of 13 states. 11 states are part of Peninsular Malaysia whilst the other two, Sabah and Sarawak, are sparsely populated states on the island of Borneo. Each state formulates forest policy independently.

Of a land mass of 32.9 million ha, around 18.5 million ha are forested whilst 10 million ha have been designated as productive forests. Table 4.12 shows how forest land and production are distributed between the peninsular and the two main islands.

Table 4-12: Forest sector statistics of the Provinces of Malaysia

	Forest (million ha)	Productive Forest (million ha)	Timber Production 1989/90 (million m ³)	Log Value 1990 (\$M million)	Revenue 1989 (\$M million)
<i>Peninsular Malaysia</i>	5.5	2.8	11	2	267
<i>Sabah</i>	4.2	3	10	2	912
<i>Sarawak</i>	8.8	4.2	18	3	652
<i>Total</i>	18.5	10	39	7	1,831

The different states in Malaysia employ a variety of fees and taxes to capture economic rent. The basic charge is a royalty assessed on harvested logs and differentiated by species and grade in most states. Exports of logs have been banned from Peninsular Malaysia since 1985 and are discouraged in Sabah and Sarawak by charging considerably higher royalties on exported timber.

A second major charge is a one-time area fee known as a premium. In certain states in Peninsular Malaysia, most notably Pahang, concessionaires pay an extra, 'tendered premium' determined at auction. Also, all logging contractors and exporters are subject to a corporate income tax of 35%.

As an illustration Table 4.13 presents the charges payable on Red Meranti timber in five Malaysian States.

Table 4-13: Forest fees and taxes payable on Red Meranti in 1989

	Royalty (M\$ per m ³)	Silviculture (M\$ per m ³)	Premium (M\$ per ha)	Premium (M\$ per m ³)	Duty (M\$ per m ³)	Total (M\$ per m ³)
<i>Sabah:</i> <i>(Exported)</i>	21.27 (139.75)	-	-	-	-	21.27 (139.75)
<i>Sarawak:</i> <i>(Exported)</i>	10 (50)	-	-	-	(5)	10 (55)
<i>Pahang</i>	16	2.50	1000	22.22	-	40.72
<i>Johor</i>	12	2.80	740	16.44	-	31.24
<i>Kelantan</i>	8	2.80	150	3.33	-	14.13

The World Bank (1991) carried out a study to estimate the extent to which rents had been successfully captured by these fees and taxes over the period 1966 to 1989. The calculations were done based on two different sets of prices. The first were FOB unit prices for exported logs and the quoted domestic log prices. The second were adjusted upwards from these values to what were considered better indicators of the market value of Malaysian logs. The volume of harvested timber was taken from records over the 24 year period and adjusted upwards to account for widespread underinvoicing.

Finally, logging costs were based on published data and interviews conducted with various logging companies. In 1989, these were estimated to average M\$70 m³ in Peninsular Malaysia, M\$85 m³ in Sabah and M\$100 m³ in Sarawak. The estimates of rent capture are shown in Table 4.14 expressed in 1989 M\$.

Table 4-14: Rent Capture in Malaysia 1966 to 1989

	Captured Rents (M\$ billion)	Available Rents (M\$ billion)	Percentage of Available Rents Captured	Adjusted Available Rents (M\$ billion)	Percentage of Adjusted Available Rents Captured
<i>Sabah</i>	14.2	22.1	64%	30.5	53%
<i>Sarawak</i>	4.8	7.0	69%	13.8	35%
<i>Peninsular Malaysia</i>	4.4	19.5	23%	29.2	15%
<i>Total:</i>	23.5	48.6	48%	73.5	31%

Using the base assumption concerning log prices both Sabah and Sarawak appear to be reasonably effective in capturing the available forest rents (collecting 64% and 69% respectively). However, under the more realistic log price scenario the percentage of adjusted available rents falls considerably so that Sabah succeeded in capturing only 53% of available rents between 1966 and 1989, whilst Sarawak was even less successful capturing only 35%.

Worst of all is the situation in Peninsular Malaysia. Here, government fees and taxes manage to collect only 23% (15% under the adjusted prices) of the available revenues. Furthermore, the imposition of a log export ban in Peninsular Malaysia since 1985 has been responsible for depressing domestic timber prices below their world market equivalents. The World Bank estimate that a further M\$480 million in rents were lost to the government from the reduced revenues and harvesting resulting from lower domestic prices.

Example 8: Cambodia

A case study undertaken by the World Bank (1996) in Cambodia has taken a wider perspective than even the Malaysian study. The work for Cambodia attempted to estimate the present value of the flow of future potential rents available from forests. This present value was estimated under a number of scenarios including one which might be considered the 'best case' in which market distortions are removed, harvesting is expanded to all productive forests and maintained at sustainable levels, forest fees are set at ideal rates and forest fee avoidance is eradicated.

There are an estimated 11 million ha of forest lands in Cambodia (60% of land area). Of this an estimated 5.6 million ha has substantial commercial potential. By 1996, the Royal Government of Cambodia (RGC) has entered into some 30 concession agreements (mostly with foreign based companies) covering 6.3 million ha, nearly the entirety of Cambodia's productive forest.

Significant areas of Cambodia's forests lie beyond the effective control of the RGC though this has not stopped concessions being allocated in these areas. Hence, massive illegal logging operations exist in Cambodia, the revenues from which almost entirely bypass the national budget (see Box 2.4).

Concessions are allocated and the concession agreements determined through negotiation between prospective concessionaires and senior Government policy makers. Though the concession agreements ostensibly require forests to be harvested sustainably, the permissible harvesting rates and a lack of adequate supervision mean that in practice timber companies have carte blanche to cut as fast as they can, ignoring responsible management practices.

The fees and taxes payable by concessionaires are set administratively in the negotiation of the concession contract and are not linked directly to inflation or changing prices. A survey of recent concession arrangements reveals an average royalty payment of \$14 per m³ which does not compare favourably to an estimated average stumpage value of \$74 per m³. To make matters worse, seven recently allocated concessions have also been granted exemptions on export and profit taxes.

In 1995, all logging was banned pending implementation of a new forest policy and a ban on logs exports was reinstated.

The World Bank (1996) considered rent capture under three scenarios:

1. No Change:

- Log export ban and logging ban continue resulting in no legal timber harvesting
- Widespread illegal logging continues. One third of illegally harvested timber is recovered by the RGC and sold at auction.

In this scenario the only revenue the RGC will realise from the sector is from confiscated illegally harvested timber. The scenario represents the current state of affairs in Cambodia.

2. Implementation of planned concession policy:

- The logging ban is lifted and harvesting begins in all allocated concessions resulting in the entirety of Cambodia's productive forests being exploited for timber.
- harvesting is authorised at the intensive rate of 50 m³ per ha, as proposed in the draft management plans. Under such heavy exploitation it is unlikely that there will be sufficient regeneration to support a second harvest and hence this scenario terminates after the 30th year.
- The average royalty is \$14 per m³ as defined in the concession agreements, with certain companies enjoying exemptions on profit and export taxes.
- Illegal logging and forest fee and tax evasion are eliminated

This is essentially a 'smash and grab' exploitation of the forest scenario in which all productive forests are logged intensively and rapidly.

3. Sustainable Forestry

- The logging ban is lifted and harvesting begins in all allocated concessions resulting in the entirety of Cambodia's productive forests being exploited for timber.
- Market distortions are removed through the removal of the log export ban and the elimination of requirements for domestic processing.
- The forest fee and tax system is revised to include auction-determined royalties that allow 90% recovery of the estimated average full rent of \$74 per m³.
- Illegal logging and forest fee and tax evasion are eliminated
- Harvesting is maintained at sustainable levels allowing a 30 year harvesting cycle to be maintained.

Table 4.15 shows estimated annual levels of rent capture and the present value of this stream of revenues.

Table 4-15: Rent capture under different scenarios in Cambodia

Scenario	Average Annual Rent Capture (\$ million)	Present Value of Revenues (\$ million)	Percentage of Maximum Rental Value
<i>No Change</i>	\$45.5	\$350.6	40%
<i>Current Proposed System</i>	\$74.1	\$588.4	66%
<i>Sustainable Forestry</i>	\$101.0	\$797.9	90%

The analysis suggests that the maximum present value of revenues from timber harvesting that could be enjoyed by the RGC, is \$886.6 million. The results show that at present the RGC is collecting no more than 40% of this. If the currently proposed concession agreements are all ratified then the RGC might expect to realise 66% of its potential revenues.

4.3.4 Conclusions

All the studies presented as examples in this section estimate that governments are failing to capture a substantial part of the available forest rents. Indeed, the comprehensive list of rent capture studies provided in Table 4.16 suggests that this is the pattern in most timber producing nations.

As far as the author is aware, only one study carried out in Guyana and reported by Sizer (1996) has concluded that logging companies might not be enjoying even normal operating profits.

Table 4-16: Rent Capture in the Countries of the World

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Causes of Indication of Rent Loss	Potential Available Rents from Harvest ^b	Current Available Rents from Harvest ^a	Rents Captured by Government and/or Land Owner	Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
				US\$ million over time period (unless stated)	US\$ million over time period (unless stated)	US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)	
Belize ^c	1996	Entire Country	Fee Evasion on Mahogany and Cedar		\$0.92 Royalty charged on Mahogany and Cedar	\$0.46 Avg. revenue per m ³ of timber harvested	50%	World Bank (1996)
Bolivia ^d	1995 and 1996	Entire Country	Low Fees (New forest fees introduced 1996) Fee Evasion Under Extraction	At least \$11		\$2 (1995) \$6.5 (1996)	At most 18% (1995) At most 59% (1996)	Kaimowitz (1997, pers.com.) Nittler (1997, pers.com.)
Bolivia - Chimanes Forest	1997	Several Concessions	Low Fees Under Extraction	\$0.34		\$0.18	53%	Nittler (1997)
Cambodia	1992	Entire Country	Illegal Logging	Current Cut: \$238 to \$317 Sustainable Cut: \$45 to \$100	\$170 to \$227		(71% of potential rent actually available due to illegal logging)	Brandon and Kishor (1994)
Cambodia	Present Value of Future Rents	Entire Country	Low Fees Fee Evasion Under Extraction Inefficiency (LEB removed)	\$886.6		\$350.6	40%	World Bank (1996)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest	Current Available Rents from Harvest	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Cambodia	Jan 1996 to Apr 1997	Entire Country	Fee Evasion (Illegal Logging)	US\$ million over time period (unless stated)	US\$ million over time period (unless stated)	\$14	US\$ per m ³ harvested (unless stated)	9%	Global Witness (1997) World Bank (1996)
Cameroon	1994 to 1996	Change in Government Revenues	Low Fees (change to auction)			\$10.8 to \$47.22		22%	World Bank (1996)
Canada, British Columbia	1993/94 to 1994/95	Change in Government Revenues	Low Fees (increase in royalties)			\$684 to \$1,488		46%	Schwindt & Heaps (1996)
People's Republic of the Congo	1991	Entire Country	Low Fees (Volume Based Royalty)					20%	Grut, Gray & Egli (1991)
People's Republic of the Congo	1996	Entire Country	Low Fees Under Production Inefficient Transport Network Inefficient Logging	\$30.7	\$16.4	\$11		36%	SGS Forestry (1996)
Costa Rica	1996	Entire Country per year	Remove market distortions (LEB removed)		Between \$6.4 and \$73.8 above present realised rents	Increase of between \$27 and \$88			Kishor and Constantino (1996)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest	Current Available Rents from Harvest	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Costa Rica	1986 to 1988	Change in Government Revenues	Low Fees (Change in Fee Rates)	US\$ million over time period (unless stated)	US\$ million over time period (unless stated)	\$0.076 to \$1.47	\$0.07 to \$2.23	5%	Peuker (1992)
Costa Rica	1997	Change in Forest Owner Revenues	Low Fees (change to auction)				\$9.25 to \$27.6	50%	Ruzicka & Costa (1997)
Fiji	1994	Entire Country	Low Fees					Approx. 40%	World Bank (1995)
Ghana	1988	Government Revenues	Fee Evasion		\$3	\$0.5		17%	World Bank (1988b)
Ghana	1993 to 1995	Change in Government Revenues	Fee Evasion (Change in fee collection procedures)			Expressed in Total Revenue: \$10.7 to \$81.8	Expressed in per m ³ : \$6.35 to \$83.83	13% 7%	Gronow (1996)
Indonesia	1979-82	Entire Country	Low Fees	\$4,954	\$4,409	\$1,644		33.2%	Repetto & Gillis (1988)
Indonesia	1988	per m ³	Low Fees		\$103.40 per m ³		\$8	8%	Barber et al. (1994)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest US\$ million over time period (unless stated)	Current Available Rents from Harvest US\$ million over time period (unless stated)	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Indonesia	1989	per m ³	Low Fees		\$99.24 per m ³		\$12	12%	Barber et al. (1994)
Indonesia	1990	per m ³	Low Fees		\$94.66 per m ³		\$16	17%	Barber et al. (1994)
Indonesia	1990	Entire Country	Low Fees	\$2,850		\$416		17%	Barber et al. (1994)
Indonesia	1992	per m ³	Low Fees		\$21 per m ³		\$17.60	16%	Assoc of Indonesian Forest Concession Holders (1992)
Indonesia - Avg. of 5 provinces	1992	per m ³	Low Fees					51%	Tim Dep-Hut (1992)
Indonesia - Riau Province	1992	per m ³	Low Fees		\$48 per m ³		\$14.90	31%	Sutopo and Darusman (1994)
Indonesia	1993	per m ³	Low Fees		\$40-45 per m ³		\$11.25-\$14	25-35%	Reid Collins (1994)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest US\$ million over time period (unless stated)	Current Available Rents from Harvest US\$ million over time period (unless stated)	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Indonesia	1990	per m ³	Low Fees					29% for major species under average logging conditions 22% for valuable species on accessible land 75% for low value species on remote and inaccessible land	Gray and Hadi (1990)
Indonesia	1992	per m ³	Low Fees		\$45-62 per m ³		\$11.80-\$14.80	19-33%	Jaakko Poyry Consultants (1992)
Indonesia	1992	per m ³	Low Fees					17%	WAHLI - Indonesian Env't NGO (1992)
Lao PDR	1992	Entire Country	Illegal Logging	Current Cut: \$40 to \$53 Sustainable Cut: \$46 to \$100	\$86 to \$113			(46% of potential rent actually available due to illegal logging)	Brandon and Kishor (1994)
Malaysia - Sabah	1979-82	Entire State (1980 prices)			M\$5,100	M\$4,300		83%	Gillis (1990)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest US\$ million over time period (unless stated)	Current Available Rents from Harvest US\$ million over time period (unless stated)	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Malaysia - Sabah	1966-85	Entire State (1980 prices)		M\$17,720	M\$16,990	M\$8,190		46.2%	Vincent (1990)
Malaysia - Sarawak	1966-85	Entire State (1980 prices)		M\$7,290	M\$7,260	M\$1,340		18.4%	Vincent (1990)
Malaysia - Peninsular	1966-85	Entire State (1980 prices)		M\$11,030	M\$11,000	M\$2,410		21.8%	Vincent (1990)
Malaysia - Sabah	1966-89	Entire State (1989 prices)	Low Fees Fee Evasion		M\$30,500	M\$22,100		53%	World Bank (1991)
Malaysia - Sarawak	1966-89	Entire State (1989 prices)	Low Fees Fee Evasion		M\$13,800	M\$7,000		35%	World Bank (1991)
Malaysia - Peninsular	1966-89	Entire State (1989 prices)	Low Fees Fee Evasion		M\$29,200	M\$19,500		15%	World Bank (1991)
Malaysia - Peninsular	1989	3 concessions put up for auction	Low Fees			M\$8,397 (Normal Fees) to M\$34,359 (At Auction)		24.5%	World Bank (1991)

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest	Current Available Rents from Harvest	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Malaysia - Peninsular	1973-89	Entire State	Inefficiency (LEB)	M\$1,480	M\$1,000 (reduced rents due to LEB)			(67% of potential rent actually available due to LEB)	World Bank (1991)
Myanmar	1992	Entire Country	Illegal Logging	Current Cut: \$820 to \$1,151 Sustainable Cut: \$300 to \$800	\$616 to \$820			(75% of potential rent actually available due to illegal logging)	Brandon and Kishor (1994)
Nicaragua	1997	Entire Country	Low Fees on Precious Woods		\$101 to \$178 per m ³		\$11.70 to \$30.70	6% to 30%	Gray and Hägerby (1997)
Philippines	1979-82	Entire State	Fee Evasion	\$1,505	\$1,033	\$171		%11.4	Repetto and Gillis (1988)
Philippines	1972-82	Entire State	Fee Evasion		\$1,500	\$140		9%	World Bank (1988c)
Papua New Guinea	1992	Entire Country	Low Fees					Exported Logs: 47% Domestically Consumed Logs: 36.4%	World Bank Analysis 1994

Country, Province or Region	Time Period over which Rent Loss Measured	Extent of Rent Loss Measured or Indication of Rent Loss	Causes of Rent Loss Measured or Cause of Indication of Rent Loss	Potential Available Rents from Harvest US\$ million over time period (unless stated)	Current Available Rents from Harvest US\$ million over time period (unless stated)	Rents Captured by Government and/or Land Owner		Captured Rent as % of Potential Rent (or Current Available Rent if Potential Rent not stated)	Source
						US\$ million over time period (unless stated)	US\$ per m ³ harvested (unless stated)		
Papua New Guinea	1993	Entire Country	Low Fees					Exported Logs: 27.5% Domestically Consumed Logs: 21.4%	World Bank Analysis 1994
Russia	1996	Entire Country	Low fees Under production Inefficiency	\$5,500	\$900	\$500		9%	World Bank (1996)
Solomon Islands	1994	Entire Country	Low Fees					Approx. 60%	World Bank (1995)
Suriname	1995	One Proposed Concession	Low fees Fee Evasion	\$13.76		Proposed Contract: \$8.79 Moderate Fee Evasion: \$2.02		Proposed Contract: 64% Moderate Fee Evasion: 15%	Sizer and Rice (1995)
Vanuatu	1994	Entire Country	Low Fees					Approx. 45%	World Bank (1995)
Vietnam	1992	Entire Country	Illegal Logging	Current Cut: \$880 to \$1,172 Sustainable Cut: \$300 to \$700	\$670 to \$892			(76% of potential rent actually available due to illegal logging)	Brandon and Kishor (1994)

Notes For Table 4.16:

^a *Current Available Rents* refers to those rents that are currently being realised from harvesting timber.

^b *Potential Available Rents* refers to a measure of the forest rents that are currently being realised from harvesting timber *plus* the researchers estimate of the rents that are being dissipated through inefficient practices.

^c Examples presented in italics are *Indications* of uncaptured forest rents

^d Examples presented in normal text are *Estimates* of uncaptured forest rents

4.4 Geographical and Temporal Patterns of Rent Capture

Table 4.16 provided a summary of many of the studies of forest rent capture that have been carried out in recent years. Discerning geographical or temporal patterns from this data is made difficult for a number of reasons

- First, studies have tended to focus on a relatively few countries (notably Malaysia and Indonesia). For many countries little or no information exists.
- Second, though it is often possible to find an isolated study for one country, it is relatively unusual to find a number of studies for the same country. This makes it hard to judge whether any particular study is reliable and almost impossible to trace changes in the levels of forest rent capture in a country over time.
- Finally, a major problem in drawing general conclusions from the data in Table 4.16 is that few of the studies are directly comparable. Not only are some of the studies *indications* of rent loss whilst others are *estimations* of rent loss, but the studies have been carried out at different scales. One study, for instance, might be interested in estimating rent lost per m³ of timber output from a single concession, whilst another will be estimating the present value of a stream of rent losses for an entire country. Similarly, the extent of rent loss investigated varies between studies such that one study may be interested in the effect of low fees on a government's ability to capture rents, whilst another will attempt to estimate the loss in forest rents brought about by distortions and inefficiency in the forest sector.

Despite these difficulties we can make the following comments.

South and Central America:

There are very few direct estimations of uncaptured rents from South and Central America. Those studies that do exist have tended to concentrate on the extent to which rents go uncaptured through the existence of low fees and taxes.

The three case studies described in Section 4.3.1 above, suggest that low fees and taxes are a problem across South and Central America, though the degree of undercharging varies considerable from country to country. The Suriname study (see Section 4.3.1 *Example 2*) suggests that low fees and fee evasion may result in rent capture levels as low as 15%. In Nicaragua (see Section 4.3.1 *Example 1*) undercharging results in forest rent capture levels somewhere between 6% and 30% of what is possible. Whilst in the Chimanes Forest in Bolivia (see Section 4.3.1 *Example 3*), low fees and the lack of exploitation of all commercial species, mean that only 53% of the potential rent is being captured.

The low level of fees suggested by these case studies is backed up by several *indications* of low rent capture. In Costa Rica where auctions have been introduced to sell standing timber owned by small- and medium-size land owners (see Box 3.1), revenues have increased by 100%. Similarly, in Bolivia, changes in the forest revenue system that have introduced an area fee set at auction, look likely to increase rent capture as much as five times.

Apart from low fees and taxes there is some evidence of fee evasion in the Americas. Not only is this highlighted in the Suriname case study but also, data from Belize suggests that the average revenue collected per m³ of harvested timber was only some 50% of the set levels of royalties.

The evidence from South and Central America is too sparse to draw any clear conclusions on the success of governments in capturing rents in the region. Most of the evidence points towards low levels of rent capture brought about by poor fee and tax systems. It will be interesting to see how recent reforms to these systems, outlined in the last chapter, will change this situation.

Africa:

Again, relatively few studies are available from Africa, though the general impression of researchers in the Congo Basin countries is that levels of rent capture are generally 'inadequate' (World Bank, 1996). Certainly, evidence from a change in the forest fee and tax system in the Cameroon (see Section 4.2.2 *Example 1*) that introduced the competitive allocation of concessions according to an area fee, has led to big increases in collected revenues.

It is also generally accepted that fee evasion and inefficiency in the sector may be responsible for a considerable reduction in the rents that are collected by governments. In Ghana, fee evasion was a major problem. There are indications that as little as 10% of what should have been paid to the government and forest owners was actually being paid (see Section 4.2.3). As described above, new laws have been introduced to correct this situation. In the People's Republic of the Congo research suggests that the current fees are too low. However, the losses through low fees are much compounded by the loss in possible rents brought about through under production and inefficiency in the sector.

Again, it is difficult to generalise about how successful the governments of Africa have been in collecting the rents from timber harvesting. The general impression is that levels of rent capture have been very low in the past. Again, changes in forest laws and forest fee and tax systems are underway in many countries and follow-up studies may show considerable improvements in the situation.

Southeast Asia:

There has been a great deal more research done in the countries of Southeast Asia than in other regions of the world. Much of this research has centred on the two major regional producers of timber, Indonesia and Malaysia.

In Indonesia, much of the research points towards very low levels of rent capture brought about by low levels of forest fees and taxes. A number of these estimates hover around an estimate of 15% of the available rents being captured, though some studies are much more favourable suggesting a figure of 30% with one study estimating rent capture to be as high as 51%. The variation in these estimations, highlights the difficulties involved in calculating the true level of available forest rents. This is especially true for a large country like Indonesia where the rents available from the many different productive forests in the country are likely to differ. The possible inefficiencies brought about by the existence of a long term log export ban in the country used to nurture a sizeable home processing industry, have, as yet, not been investigated.

Over the course of 1998 the series of reforms imposed by the IMF, including increases in royalty charges, the allocation of concessions by competitive auction and the removal of punitively high log export charges may well result in significant improvements in the levels of rent capture in Indonesia. Hopefully, research will be undertaken to trace the efficacy of these reforms.

Studies in Malaysia, would seem to suggest that they have been more successful than Indonesia, in capturing forest rents. Again the majority of studies have concentrated on the existence of low fees, with estimates of rent capture ranging from as low as 15% to as high as 83%. Since forest law in Malaysia is set by the different states, many of the studies have been on a state by state basis. Studies in Sabah have returned consistently high figures. Those reported in Table 3.16 give figures of 83%, 46.2% and 53% of available forest rents being captured. On the other hand, studies in Peninsular Malaysia have returned some of the lowest estimates of the levels of rent capture in the country. The studies in Table 3.16 report only 21.8% and 15% of forest rents being captured by the government in the region. It is somewhat surprising that Peninsular Malaysia has fared so poorly considering that competitive auctions are sometimes employed to set area fees for concessions.

One study in Malaysia has investigated the influence of the log export ban on the availability of forest rents. The study concludes that only 67% of the potential rent is actually available due to distortions in the forest sector brought about by the ban. This suggests that the levels of rent capture achieved by the states of Malaysia may be even lower than suggested by the studies that have focused on the existence of low forest fees and taxes.

Elsewhere in Southeast Asia, things are not a great deal better. In Papua New Guinea under the old forest fee and tax system, the level of rent capture was steadily falling as the prices of tropical timber have risen without increases in charge rates. By 1993 it has been estimated that about 25% of the forest rents were being captured from the logging companies. The new forest law presently being put into force in the country should improve matters. Estimates from the Philippines from the 1970's and 1980's suggest that, before commercial forestry all but ended on the islands, as little as 10% of the forest rents were being appropriated by the government.

The situation is similarly bad in the countries of the Indochina region. The World Bank study in Cambodia (see Section 4.3.3 *Example 8*) suggested that enormous rental values are being foregone by the governments present forest policy. Estimates from 1996 and part of 1997 suggest that fee evasion is a major problem with current capture being no more than 9% of the potential. Further, as described in Box 2.4, there is a massive problem with illegal harvesting in the countries of the Indochina region. In Cambodia only 71% of what could be collected in rents is actually available due to widespread illegal logging. In Myanmar and Vietnam this figure is around 75 %, whilst in Lao PDR it falls as low as to 46%.

The situation in Southeast Asia would appear to be a cause for concern. The majority of studies suggest that current systems of fees and taxes are leaving much of the available forest rents in the hands of the companies of the forest sector. In addition, considerable evidence exists of fee evasion through illegal logging in the indochina region, whilst it is likely that the possible rental values of the forests of the region are being dissipated through inefficiencies in the sector introduced through distortionary measures designed to encourage the domestic timber processing industry.

Whilst, the picture is far from complete, it would appear that many of the nations of the world are failing to capture the rents available from the exploitation of the timber in forests. It is difficult to fit any geographical pattern to this failure since information is sparse and often incomparable.

One positive note, however, is that in general, where measures have been taken to reform forest fee and tax systems or increase the powers of the forest service to collect these fees and taxes, governments have witnessed considerable increases in the revenues enjoyed from the forest sector (see Section 4.2). One area of research that certainly demands further attention is that of the dissipation of available rents. Few studies have yet addressed the significance of market distortions or forest sector inefficiency on the total available rents in the sector.

4.5 Summary and Conclusions

[TO BE COMPLETED]