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1. Introduction

Forest resources in the Philippines have been utilized over the years with the traditional view that they are inexhaustible. Although of great importance for their protection of watersheds and other environmental values, attention has been centered on timber products, especially logs, lumber, plywood and veneer.

The importance of these timber products arises from their contribution to the national product and their substantial foreign exchange earnings. For the last 30 years they have been among the country's top ten dollar earners; and their combined output constitutes about five per cent of the nation's net domestic product.

The Philippines, like most developing countries, presently faces a difficult external environment, with high oil prices and slow growth in world trade and capital flows, which challenges the country to find additional efficient means of earning or saving foreign exchange. Thus, the government looks to the foreign trade sector for promoting economic efficiency and growth, as well as for attracting foreign capital. In forestry, the focus is on the promotion of domestic processing of wood, together with reforestation and forest protection, as means of enhancing the sector's long-run capacity to earn and save foreign exchange.

The production of forest goods and services entails the use not only of forest land and trees, but also of labor, capital and management. The forestry sector competes with other sectors in its use of these resources. It is important, therefore, to assess its efficiency in resource use. The efficiency of an economic activity can be measured by the social opportunity cost of the resources used to achieve a given objective of the activity. The domestic resource cost of earning or saving foreign exchange (DRC) represents such a measure; and, as Bautista (1979) has pointed out, it is particularly relevant for tradable goods in a small, open economy where foreign trade policy distortions exist and foreign exchange is deemed scarce. The DRC measure represents, in effect, the rate at which domestic resources, measured in pesos of opportunity cost can be converted into foreign exchange through a particular economic activity. Comparative advantage for that activity is indicated if the DRC is less than the shadow price of foreign exchange.

In addition to judging the relative efficiency of forest sector activities, it is important to assess the impact of government policies on these activities. For it is possible through price intervention and other policies to transform a socially advantageous activity into a privately unattractive one, and vice versa. In this connection we must assess the effects not only of government policies specific to the forestry sector (e.g. export tax or export ban on logs) but also the powerful and pervasive effects of the tariff system and exchange rate policy on tradable forest products. In many instances these can swamp the effects of sector specific policies.

Accordingly, this study aims to: (1) assess the comparative advantage of the Philippines in producing major forest products such as logs, lumber and plywood, using the DRC criterion; (2) quantify the protection or penalty conferred on these activities by government policies; and (3) draw policy implications from the empirical results and suggest policy measures that might help to improve the efficiency of allocation of resources to and within the forestry sector.

2. Policies and Performance

Philippine forest resources are managed jointly by public and private interests. The exploitation of the forests, which are publicly owned, are delegated to private enterprises through a licensing system which allows for a 50-year maximum tenure, including renewals. In 1979 the total land area under license was 8.26 million hectares, which is about 26 per cent of the country's total land area.

The licensees manage their forest concessions under the supervision and regulations of the government; and pay cutting charges based on the volume of timber removed. Nominally, management is based on the principles of sustained yield and selective logging. In practice, however, overcutting and failure to implement the "timber stand improvement phase" of selective logging have led to the diminution of the forests (Revilla, 1979). It has been estimated that during the 1970s the annual rate of forest loss might have been as high as 200,000 hectares (Segura-de los Angeles, 1981).

The consequences of years of sub-optimal forest management include land erosion, increasing frequency of floods, clogging of irrigation systems, and decreasing productivity of croplands. To reverse this process, Revilla (1980) has argued that land in productive forest could almost double over 40 years, mainly through the conversion of unproductive grasslands and brush. In his view this would not be at the expense of agriculture, but indeed would provide net benefits to crop production through renewing and extending watersheds.

There appears to be general agreement on a number of reasons for the inadequacy of forest management (Segura-de los Angeles, 1981): inadequate government supervision, biased and incomplete land classification, too short a lease term (plus cancellation of licenses as a penalty for violations in lieu of firm enforcement of regulations), short run costs of implementing selective logging combined with high interest rates, uneconomically small-sized concessions, and low cutting charges.

In any case, the implication is that the production of forest products has not been accomplished by the most efficient or socially desirable methods. This presents us with a problem in assessing the Philippines' comparative advantage in the production of logs, lumber and plywood. Considering the external social costs associated with past practices, one might readily conclude that production of those products with those methods is not comparatively advantageous.

That is, foreign exchange earning and saving in the forest product industry has been achieved at far too high a cost in degradation of the environment. This is a judgement that we cannot back with quantitative measures. Rather it reflects what appears to be a general consensus among government and private experts.

Should we then conclude that the Philippines does not have a comparative advantage in forest products? The implication would be that resources should be taken out of forestry and transferred to other more comparatively advantageous activities. The principal resource, of course, is land; but to take land out of trees and devote it to other crops would only make matters worse.

Alternatively, the implication might be simply that logging should be halted completely. This, however, views the economic activity of forestry as simply the harvesting of trees, with no consideration for replanting and other aspects of sustained yield forestry. Past practices have, perhaps, bordered on "mining" the forests; and, as noted above, there seems to be a general consensus that this is not economically advantageous.

In our approach to assessing comparative advantage in forest products by estimating domestic resource costs of foreign exchange, we have made the heroic assumption that the government will in future be able to supervise and enforce reasonably well a sustained yield management of the forests. This means that we are assessing the potential comparative advantage of sustained yield forest activities. We return to this in the section on methodology below.

Policies. Comparative advantage depends on relative social costs and benefits, but actual performance of an industry depends on private costs and gains, including the effects of government policies on these. The principal policies, in addition to the licensing and supervision of forest management, are the cutting charges, export taxes, and the export quota on logs.

Forest Charges. These are considered to be the selling price of timber to the licensees. Before 1981, they consisted of the regular forest charges and other charges imposed to finance various activities such as reforestation, extension services, research and forest protection. In 1981 these were consolidated into fees of ₱30/m^3 and ₱15/m^3, respectively, for two broad species group. While these represent a substantial increase, the trend of forest charges as ad valorem rates has, nonetheless, been steadily down since the 1950s. Even the higher of the two rates represents only about 4.4 per cent of the wholesale price of logs in 1981, as compared to an average of 6.3 per cent in 1956-59.* Prior to the consolidation and increase in 1981, the average ad valorem rate had fallen to less than two per cent.

*By 1983 forest charges were between five and six per cent of log value, owing to the lower prices of logs.

Total revenues from forest charges remained level over the 1970s while government expenditures on forestry increased substantially after 1974, as can be seen in Table 1. In the first half of the decade expenditures and revenues roughly matched, while the former rose to almost six times the latter by 1979. Even the 1981 increase in rates will leave revenues far short of expenditures. These revenues do not, however, include those from export taxes, as well as sales, property and income taxes.

Export Taxes. Export taxes were imposed in 1970 on wood products, along with other major exports, as a stabilization measure accompanying the devaluation of the peso. The rate on logs was 10 per cent, double the rate on lumber, plywood and veneer. During the boom in world commodity prices in the mid-1970s, a premium duty was temporarily added to the export tax. While the original intention was to phase out over several years export taxes on all products, they were instead retained, presumably for their capacity to generate revenue. The present rates are 20 per cent for logs, four per cent for lumber and veneer, and zero for plywood.

The Export Quota. The policy on log export ban arose mainly from a desire to encourage wood processing, as well as to reduce the rate of forest destruction. On May 19, 1975, PD 705 was issued providing for a total log export ban effective January 1, 1976. Opposition to the ban has been aired owing to the importance of the foreign exchange earnings from log exports and the alleged unreadiness of the processing plants which were mostly of less than economic size. In addition it was predicted that the domestic market would not be able to absorb the processed products which the foreign market could not take due to its sluggish condition. Hence, PD 865 was issued to suspend the ban and allow log exportation on a selective and limited basis. On June 11, 1979, PD 1159 was implemented allowing for a total log export not exceeding 25 per cent of the total allowable cut. Finally, on May 1, 1982, a complete ban was to have taken effect.

Table 1. Government Forestry Revenues and Expenditures 1970-1979 (in ₱000 at current prices)

	Expenditures[1]	Revenues[2]
1970	66,514	67,247
1971	51,668	72,486
1972	61,105	65,780
1973	71,373	91,489
1974	65,314	115,639
1975	105,838	95,835
1976	235,536	100,770
1977	215,139	75,259
1978	270,625	73,119
1979 (est.)	356,903	61,548
1980 (est.)	394,501	

1 Principally by the Bureau of Forest Development. 1970-1975 are fiscal years, while 1976-1979 are calendar years.

2 Principally from forest charges and inspection fees. (Fiscal years)

The quota limitations have not at all been effective as is evidenced by the trade data from importing countries. Table 2 illustrates this with data from Japan for 1977-80, during which Japan took about 75 per cent of Philippine log exports.

Table 2

Hardwood Log Exports to Japan, 1977-80

Year	Quantity (1,000 cu. met.)			Value (1,000 US $)		
	Phil. data	Japan data		Phil. data	Japan data	
	(1)	(2)	(1)/(2)	(3)	(4)	(3)/(4)
1977	1,522,112	1,614,488	.943	124,455	138,131	.901
1978	1,616,047	1,754,952	.921	131,993	158,579	.832
1979	985,450	1,342,741	.734	132,130	206,812	.639
1980	502,458	1,119,451	.449	78,105	203,962	.383

While the reporting of Philippine exports was reasonably close to Japan's reporting of imports in 1977 and 1978, the discrepancy increased greatly in the next two years when quotas were sharply reduced.

Growth and exports. While the continuing importance in terms of output and foreign exchange earnings, forest products have not contributed significantly to the overall growth of the economy. While GNP tripled over the past two decades, output of the major wood products increased by only one-third. Total exports (in 1972 prices) were 3.5 times in 1980 what they were in 1960, while exports of wood products declined in physical volume by one-third over the same period. In value terms (U.S. dollars) wood products declined as a share of total exports from almost 20 per cent to eight per cent. Even if we could correct for the substantial under-reporting of log production and export in 1980, the image of forest products as a stagnant sector in the Philippine economy would remain.

This, of course, is not surprising, given the competing demands for scarce land that accompany rapid population growth. Even with ideal forest management, we could hardly expect forest output to keep up with overall economic growth. Actual management practices, have, of course, led to a shrinking of the forest resource base. It should be noted, however, that output of agricultural crops almost tripled over the same two decades, owing to substantial increases in yields.

What elements of dynamism and growth have been present are found in the processing of logs. This is revealed in Table 3 where the production and export of logs, lumber and plywood/veneer are shown for 1959-80. The growth of output and exports of the processed products stand in sharp

Table 3 - PRODUCTION AND EXPORT OF LOGS, LUMBER, PLYWOOD AND VENEER: 1959, 1964, 1969 to 1980
(1,000 cu. m.) (1,000,000 US dollars)

	Year	LOGS Quantity	LOGS Per cent Export	LOGS Export Value	LUMBER Quantity	LUMBER Per cent Export	LUMBER Export Value	PLYWOOD Quantity	PLYWOOD Per cent Export	PLYWOOD Export Value	VENEER Quantity	VENEER Per cent Export	VENEER Export Value
FY	1959	5,452	55	72	1,023	13	8	176	58	14	134		
	1964	6,536	63	135	1,179	7	8	277	68	23	180		
	1969	11,584	76	215	1,465	13	11	310	52	19	185		
	1970	11,005	79	237	1,341	18	13	338	74	20	90		
	1971	10,680	81	215	860	16	11	653	89	24	242		
	1972	8,416	74	164	1,411	13	10	642	91	34	234		
	1973	10,446	67	304	1,060	21	35	732	73	58	212		
	1974	10,190	57	216	1,114	22	30	705	51	26	173		
	1975	7,332	48	167	1,563	18	27	274	51	21	109		
CY	1976	8,646	27	135	1,609	31	68	416	63	43	403		
	1977	7,874	26	134	1,567	29	67	489	45	41	496		
	1978	7,169	31	145	1,781	32	85	490	74	72	546		
	1979	6,578	19	144	1,626	56	198	503	64	107	634		
	1980	6,352	11	92	1,529	49	181	553	58	111			

Sources: Bureau of Forest Development
Philippine Statistical Yearbook

Table 4. Historical prices of log, lumber and plywood, 1955 - 1980.

YEAR	PRICE OF LOGS[1] (₱ /m³)		PRICE OF LUMBER (₱ / MBP)		PRICE OF PLYWOOD (₱/MBP)	
	Domestic Wholesale[2]	Export[3]	Domestic Wholesale[2]	Export[3]	Domestic Wholesale[2]	Export[3]
1955	54	45	205	213	680	
1956	67	41	228	226	680	484
1957	63	40	217	253	670	484
1958	60	40	186	183	610	409
1959	64	43	186	251	700	- - -
1960	77	50	186	123	600	771
1961	89	--	241	---	570	682
1962	88	--	240	432	780	---
1963	97	100	258	---	800	1014
1964	102	98	286	413	800	1059
1965	102	85	290	515	980	20
1966	102	93	297	571	980	780
1967	111	99	232	557	980	820
1968	126	86	359	547	980	900
1969	131	99	370	567	1010	1010
1970	150	150	404	697	1180	1420
1971	188	165	487	778	1260	1160
1972	199	157	522	958	1200	1230
1973	251	270	611	1434	1820	1820
1974	354	311	917	1678	2624	2500
1975	304	267	793	1825	3120	2180
1976	347	441	1091	2362	3270	2830
1977	430	490	1550	1550	2476	3108
1978	456	490	1645	2363	2540	3390
1979	550	946	1986	3411	5705	4720
1980	676	990	2728	4022	6355	5610

1/ Price of white lauan logs

2/ Wholesale price ex-Manila

3/ Export price is FOB converted into pesos by multiplying by the official exchange rate.

Sources: Central Bank
Bureau of Forest Development. 1976 & 1980. Phil. Forestry Statistics
PREPF Technical Paper Nos. 3:4,5
World Bank. 1980. Price prospects for Major Primary Commodities.

contrast to the picture for logs. Still the growth of lumber output fell far short of overall GNP growth, while output of plywood and veneer grew at a pace only slightly ahead of GNP. Moreover, this growth occurred mainly in the 1960s and early 1970s. The latter half of the 1970s is characterized by stagnation in wood processing, accompanying a decline in log production.

Again, we must be cautious in interpreting these figures because of the likelihood of substantial under-reporting of log exports and production. The table nonetheless suggests a sharp increase in lumber exports together with a decline in log exports at the end of the decade as log export quotas tightened. Since output of lumber declined after 1978, this represented a diversion to the export market in response to sharp increases in the export price in 1979 and 1980 (see Table 4).

3. Economic Analysis of Forestry Policies

The whole set of government policies affecting forestry represents a broad and complex system of controls, regulations and price interventions. Here the focus is on price intervention policies; and a number of simplifying assumptions are made.

The policy instruments considered are (1) direct controls and regulations on logging concessions, (2) cutting charges, (3) export tax, (4) export quota, (5) export subsidy on processed wood products, (6) forest land rent, and (7) sales tax.

The first aim of the government is to conserve forest for multi-purpose uses-- e.g., as watershed. To this end, the government limits the area of logging concessions and sets rules and regulations regarding their use.

In addition, we set a number of other aims for government with respect to the forestry industry. Fist, it should aim to capture for society and economic rents* from logging concessions, since it is society who owns the forest. There are other income distribution goals to consider; but this is the only one considered here. An especially serious omission in this regard is the question of the livelihood of the people in the forest communities and their access to forest resources. This is a major issue which warrants separate study. Second, the government should aim to promote foreign exchange earnings from forest products to the extent that this is consistent with the principle of comparative advantage. Third, it should raise revenue for forest administration. In sum, the goals of the government with respect to forestry policies are assumed to relate to conservation, income distribution, foreign exchange earnings and revenue raising.

Associated with conservation are multiple goals and the analysis of effects of policies could be very complex and difficult to quantify. The basic assumption made here is that the government had decided to limit and regulate log production in order to conserve or augment the area of forest land. If it were simply a quantitative question, price intervention policies such as cutting charges or export taxes could limit production, as we shall see below. But important also are the questions, where logs are cut, which logs are cut, and how they are cut. Since many of the effects of forestry activity involve external benefits and costs, these various decisions--both quantitative and

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*By economic rents we mean returns beyond what investments would yield elsewhere, adjusted for risk

qualitative--cannot be left solely to private market forces. Thus, in addition to limiting concessions of forest land, and determining their location, the government must, of necessity, set rules and regulations regarding their use. Price intervention policies that operate through market incentives can, however, reinforce (and, in turn, be reinforced by) direct controls and regulations. Moreover, there can be institutional arrangements surrounding the granting of concessions that would promote complementarity between private and social interests.

The question of foreign exchange earnings is also complex, involving the overall incentives to forest product exports, the choice between exporting logs or processed wood products, and the optimum exploitation of foreign demand. These will be given special attention in the analysis that follows.

Direct Controls. This refers to limits on concessions and regulations on cutting. We describe this graphically in Figure 1 simply as a limitation on output at Q*, though we noted in the introduction that regulations must pertain to more than just the level of output. Domestic demand (D) and supply (S) curves are shown; and we initially take world price (P_w) as given. In the absence of price intervention policies this is also the domestic price. Domestic use is Q_D and exports are $Q^* - Q_D$, in contrast to the level $Q_F - Q_D$, which would obtain without controls.

The results of this policy can be listed as follows:

1) The conservation goal is met, if the control on output is met together with the qualitative goals.

2) Foreign exchange earnings are lower.

3) If we assume that S represents long-run supply price, including necessary profits, there are excess profits at the margin of production, equal to the distance, ac; and, in addition, there are intra-marginal rents that are not captured for society.

4) There is no government revenue.

5) Users are unaffected. There is no promotion of processing, (The implications of this are considered below).

6) Since P_w is assumed to be given, the question of optimum exploitation of world demand does not arise.

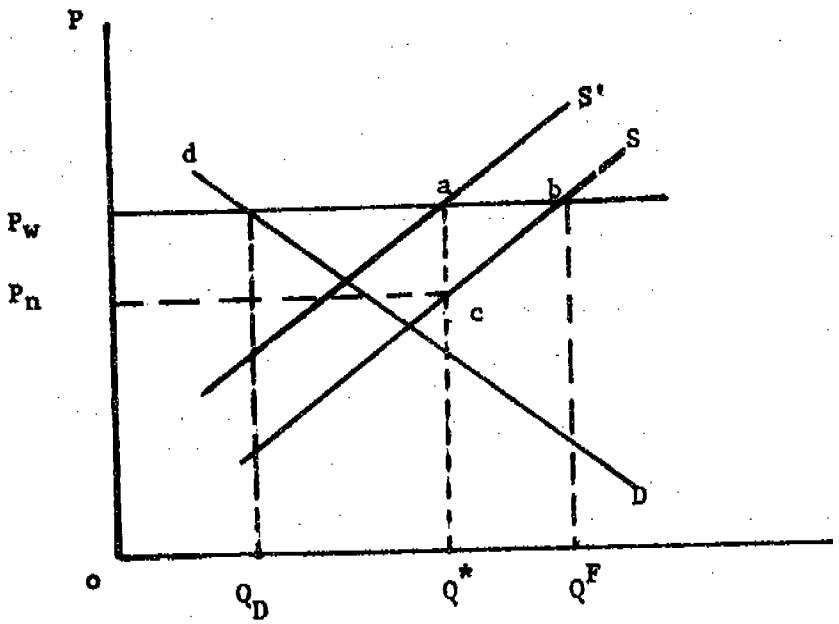

Figure 1

Cutting Charges. For simplicity it is assumed that various cutting charges can be represented by a tax per unit of output of cut logs. This is represented in Figure 1 as a shift in the supply curve from S to S'. The world price, P_w, is again taken as given and there are direct controls to meet the qualitative conservation goals.

Thus, a cutting charge, represented by the distance, ac, taken by itself, would (if effective) constrain output to the desired conservation level, Q*. The price (net of charge) to concessionaires is P_n.

The effects of a cutting charge differ from those of direct controls in a number of important ways, though in some respects thay are similar. The principal differences are that there is government revenue equal to $P_w acP_n$ and that rent on marginal output is eliminated so that total rent is reduced.

Export Tax. This is an ad valorem tax on exports and is represented in Figure 2 (similar to Figure 1) by the difference between P_w (still taken as given) and P_n (price net of export tax). We are assuming competition,

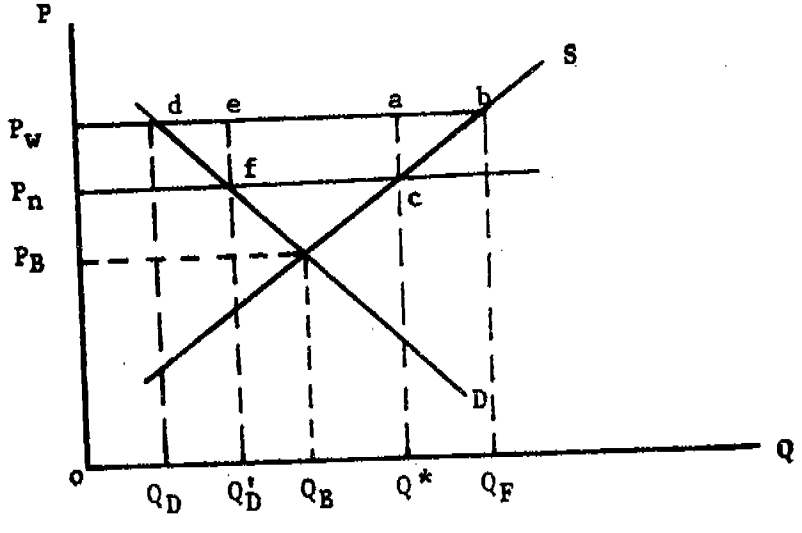

Figure 2

so that the net price to the seller must be the same in export and domestic markets. Accordingly, the domestic price to the seller is P_n. Moreover, in the absence of a domestic sales tax, this is also the price to the buyer. (A domestic sales tax would raise the price to the buyer above that to the seller by the amount of the tax.)

If the export tax is set at the rate indicated by the distance ac, the effect on output is the same as with the cutting charge of the same amount. Output is at Q*. Domestic use, however, is now Q_D', greater than Q_D, because of the lower price (assuming no sales tax). Correspondingly exports are less than with the cutting charge, indicated by the line ea rather than da, because of the greater domestic consumption. Government revenue is also less, indicated by eacf. The loss in producers surplus is the same, P_wbcP_n, but there is a gain in consumers surplus (not present with the cutting charge), indicated by P_wdfP_n. Considering the gains to government and consumers, together with the loss to producers, there is a total deadweight welfare loss equal to the area of the two triangles, def and abc. However there is a conservation welfare gain, not shown.

Summarizing, the effects of an export tax, taken by itself, are:

1) The output restriction goal is met, but a controls system is needed to attain the other aspects of conservation policy.

2) The substantial loss in producers surplus provides a strong incentive to avoid the export tax.

3) Foreign exchange earnings from log exports are reduced -- even more than in the case of the cutting charge because of the greater domestic

use. But this latter would be predominantly processing, the products of which are overwhelmingly exportable. Considering the value added in processing, overall foreign exchange earnings could actually be greater. It should be noted here that the extent to which the additional use from lower prices results in greater domestic consumption of processed products or greater exports depends, in part, on the sales tax on wood products.

4) As in the case of cutting charges, intramarginal rents remain.

5) Government revenue comes only from the exported portion of output; hence, it is less than with forest charges.

6) Users (processors) benefit from the lower domestic price and processing for export is encouraged.

Export Quota. Figure 2 can be used also to describe the effects of an export quota, which are in some respects similar to those of an export tax. If the quota is set (and enforced) at a level, $Q^* - Q_D'$, the same output limitation would be achieved. Again, other aspects ofconservation policy would require controls; and, again, the same loss in producer surplus would provide a strong incentive to evade the quota limitation. Other results are the same, except one very important difference. Instead of the government's receiving revenue equal to the area, eacf, this would accrue to the concessionaires as additional rents. The problem of eliminating private rents from use of public land would be exacerbated.

It is evident that a ban on log exports is simply the limiting case of a quota. Setting the quota at zero would put output and domestic

price at the value given by the intersection of supply and demand (P_B and Q_B in Figure 3). The results would be the same as setting a prohibitive export tax.

Optimum Export Tax. All of the above analysis has been conducted under the assumption of infinitely elastic world demand for logs. Modifying this assumption admits scope for increasing national welfare by exploiting world demand. This can best be accomplished via an export tax; and maximum welfare is achieved when the export tax depresses the domestic price to equal marginal revenue from export sales. Then, at the margin export sales and domestic sales have equal social values. The optimum export tax, is 1/e, where e is world elasticity of demand, since

$$MR = P(1 - 1/e)$$

where MR is marginal revenue and P is price.

This is illustratedin Figure 3, where D_w is world demand, D_d is domestic demand, and MR_w is marginal revenue from export sales. Without an export tax, price (both export and domestic) would be P_o. An export tax of a magnitude indicated by the line, cd, would make export price equal to P_w and domestic price equal to P_d, which is just the gap between D_w and MR_w at Q_E, the optimum level of exports. P_d equals MR_w, domestic sales are Q_D and total sales are Q_T (equal to Q_D plus Q_E).

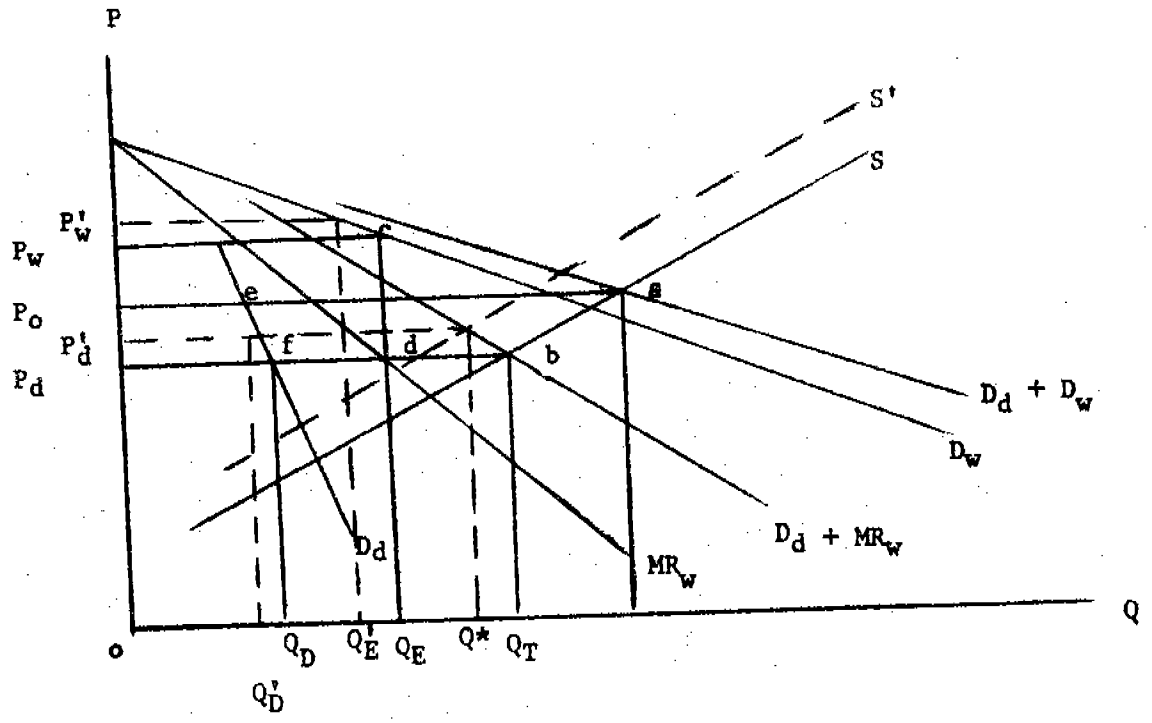

Figure 3

As above, in the analysis of the effects of an export tax, producers lose (area P_oabP_d), government gains (area P_wcdP_d), and users gain (area P_oefP_d). But in this case the tax is not a distortion but a correction of a distortion -- the gap between P_d and MR_w that would exist in the absence of the optimum export tax. For the opportunity cost of domestic use of logs is MR_w, not world price. While users gain, this means that they no longer have to pay for logs in excess of their opportunity cost. Hence, a bias against processing is removed.

The fact that producers lose is immaterial if other policies are properly in place -- cutting charges plus direct controls to restrict output to the desired level and achieve other conservation goals, plus some means of capturing intramarginal rents (for this, see below).

The price producers receive represents the real social value of their export sales.

The above analysis has implicit assumptions that exporters are atomistic competitors, taking world price as given; and that there is no retaliation from the world. How much monopoly power the Philippines has in world log trade is an open question. What is relevant is the long-run elasticity of demand, which may be very high.

Capturing Intramarginal Rents. None of the policies analyzed above is able to capture the private intramarginal rents from use of public forest land. What is desired, in addition to meeting the other goals included in the analysis, is to limit profits to those just necessary to attract the capital and entrepreneurship needed for the target level of output. Since the long-run supply price of output of logs is bound to be upward-sloping, the most than can be accomplished by price intervention policies, like cutting charges and an export tax, is the elimination of excess profit (rent) at the margin, leaving intramarginal rents intact.

This is not easy to accomplish. Competitive bidding for concession leases would tend to eliminate anticipated excess profits, but this may have little to do with realized returns over the life of a lease, which should be considerably longer than the roughly 60-year maturation period for some hardwood species. Alternatively, the government could auction the rights for cutting in specified areas; or, to be sure of effective competition, hire the cutting and transport of logs to a market for competitive bidding (Howe, 1979, p. 234). But this would mean government management of the forests, which might present some legal, to say nothing of

administrative, problems. (It should be noted, however, that recently a number of licenses have been revoked for violations. This could present an opportunity for government experiments along these lines).

Given the present system of licensing, the property tax on forest land would seem to be a logical instrument for capturing economic rents from the licensees. It has two disadvantages, however. First, if its is based on the value of the timber stand, it might tend to shorten the cutting cycle (Howe, 1979, p. 231). Second, an annual tax presents a financial problem for new and young forests; hence, it might discourage planting.

Promoting Processing. The promotion of the processing of logs is needed because of the bias against it that comes from the industrial protection system (Power, 1979). Virtually all wood products are exportable and most are already being exported. The industrial protection system in the Philippines favors industries that sell only in the domestic market over exports by a very substantial margin. Just to overcome the undervaluation of foreign exchange that the protection system defends would require an export subsidy of 20 to 30 percent (Medalla, 1980).

A direct subsidy of this order of magnitude to the export of processed wood products would be the ideal remedy (assuming infinitely elastic world demand for these exports). An export tax on logs beyond the optimum described above could also be used as a means of promoting processing, but this would be definitely second best. The same is true of a

quota or ban. The price of logs would be put below its social opportunity cost. Moreover, an export tax or a quota has an output limitation effect which would only by accident meet the conservation target. It is impossible for one instrument (export tax or quota) to achieve three targets (optimum output limitation, optimum export, and optimum promotion of processing).

Optimal Set of Policies. Given the number of different goals, it is likely that an equal number of different policies in combination would represent an optimal set. What would these be?

First, to capture private rents, government management with competitive private bidding for logs should be established. An alternative would be a system of land taxes.

Second, an export tax should be set which, together with the implicit tax on exports from the protection system, would achieve the optimum export level. Given likely estimates of world demand elasticity and the high existing rate of implicit tax on exports, the optimal policy might actually be to subsidize log exports. That is, the implicit tax from industrial protection might exceed the optimal export tax. Processed wood products would receive an even higher rate of subsidy, since they are subject to the same implicit tax and, presumably, have higher world demand elasticities.

The output limitation target and other conservation goals should be met via direct controls and cutting charges. The latter, together with the export tax would yield government revenue for forest administration.

To set a target for such revenue other than this determined amounts of revenue would require another policy instrument -- e.g., general taxation.

Promotion of processing as noted above should be achieved through a direct subsidy, designed to overcome the implicit tax from the protection system.

In sum, in an ideal set of policies there would be four policy ins- instruments to meet four major goals:

1) Conservation: forest charges combined with direct controls.

2) Income distribution (capturing of private rents); competitive bidding for logs.

3) Foreign exchange earnings consistent with comparative advantage: export taxes and subsidies.

4) Revenue for forest administration: general taxation to make up any shortfall from forest charges plus export taxes minus subsidies.

Note that cutting charges are combined with an export tax, and this is illustrated in Figure 3 (above) where S' is above S by the cutting charges per unit of output that would achieve Q^*, the desired level of output for conservation. (In the unlikely event that $Q^* > Q$ cutting subsidies would be required.) While the cutting charges, together with direct controls, serves the conservation goal, the role of the export tax is limited to creating the appropriate wedge between world and domestic prices -- now P_w' and P_d'.

Existing Policies and Second-Best Reform. The above represents a first-best approach to an optimal set of forestry policies. How would we judge present policies in the light of these same consideration? What might be done to improve present policies so as to move closer to the optimal set?

At present, there are direct controls, cutting charges, export taxes on logs and some processed products, qoutas on log exports, subsidies on some exports of processed products, and sales taxes on domestic sales of processed products. There is a land tax on forest concessions, but no system of bidding for logs. Hence, aside from the last, all of the instruments discussed above are currently in use. Again, with this one exception, the important questions are mainly the rates of charges, taxes and subsidies and their combination.

First, however, let us consider quotas on log exports, which are considered to be an interim policy until the industry is ready for the projected complete ban. Quotas have the effects of limiting production, raising world price, and depressing domestic price to encourage processing. Moreover, since the granting of quotas is tied to the integration of processing with logging, there is an additional incentive to processing. The latter, however, encourages processing to gain the benefit of a quota allotment, rather than primarily to earn profits through economical and efficient processing. This tie-in can, then be dismissed as an inept and , perhaps, costly means of encouraging processing. Beyond that, the quota system is revealed as inferior to direct controls

and cutting charges as a means of limiting output, and as inferior to an export tax as a means of exploiting foreign demand. These alternative policies have the important advantage of contributing revenue to the government to reduce the amount required from general taxation to finance forest administration.

A complete ban has the same weakness in more acute form. It raises no revenue and only by accident would it accomplish the right output limitation, or the right degree of exploitation of foreign demand, or the right subsidy to processing. The best that could be said for it is that it would reinforce other policies designed to limit cutting of trees. How well it could do this depends on how effectively it is administered. The present widespread evasion of quota limitations does not promise much in this respect. Moreover, it is difficult to safeguard against corruption in the administration of a quota system.

Direct controls include limiting (and locating) concessions, together with rules and regulation about forestry practices. These together with cutting charges could serve to limit output and promote conservation goals. Cutting charges also help to reduce rents and contribute revenue to the government. There appears to be widespread feeling that the administration of controls in the past has not beeen effective in meeting the conservation goals. Moreover, the cutting charges have become so low in real terms that they cannot serve effectively to reinforce conservation goals or to raise a significant amount of revenue. The weakness of administration of direct controls to achieve conservation targets is perhaps what lies behind the

urge to adopt such a crude policy as a ban on log exports. The latter, however, is no substitute for strengthening administration and raising cutting charges.

As noted above, the export tax on logs, along with similar taxes on other major exports, was instituted in 1970 as a so-called stabilization measure to accompany the floating of the peso and its subsequent depreciation. Originally scheduled to be phased out, the export tax system was continued apparently for the substantial government revenue it produced.

It is not easy to provide a rationale for a tax on log exports along these lines. Prior to the floating of the peso in 1970 undervaluation of foreign exchange from exchange rate disequilibrium was taxing log exports. With the floating of the peso an explicit export tax was substituted. But why tax log exports in the first place? We have seen above that the only first best rationale for such a tax is the goal of optimum exploitation of foreign demand. There is no evidence that the rate of tax has been set with this in mind, especially when we consider the heavy implicit tax on all exports from the industrial protection system. Second best justifications would include promotion of processing and the capturing of rents. Again, there is no evidence that the rate of tax has been consciously set so as to achieve an optimal subsidy to processing. And, as we have seen above, an export tax cannot capture intramarginal rents, while at the same it is inferior to cutting charges in raising revenue.

Nevertheless, in the absence of first-best direct subsidies to processing and some means of eliminating rents, an export tax can serve as a general second-best measure for capturing some rents, providing some subsidy to processing and raising some revenue.

Subsidies to exports of processed wood products have been awarded in some instances through BOI incentives (an example is furniture). However, these subsidies have not been general and fall far short of what is needed to overcome the general bias against exporting. (As we have noted above, the bias against processing in the forestry industry comes from the bias against exporting, since virtually all processed wood products are export products.) With the projected gradual reform of tariff protection the bias will diminish, but not disappear, over the next four or five years. The first-best solution would be to subsidize processed wood exports at the estimated rate of undervaluation of foreign exchange that is defended by the protection system. But the same argument applies to all exports, and to extend the principle to exports generally would call for a massive fiscal program. That is why, of course, a continuing liberalization of tariff protection beyond the projected first phase is so essential.

What is ironic in this picture, however, is the existence of export taxes on processed wood products: lumber and veneer.*
It is not easy to believe that world demand elasticities could justify these on top of the general penalty on exports. An accurate assessment would probably call for some subsidy, instead to offset the latter. But

*There is no export tax on plywood at present.

a second-best approach to improvement of forest industry policies would at least include removal of these export taxes.

What the above economic analysis of forestry policies suggests is that if the government is unable or unwilling to move at once to the optimal set of policies, first steps in the reform of the present system would include:

1) Removal of export taxes on lumber and veneer;

2) Substantially increased cutting charges;

3) Continuation of an export tax on logs without export quotas or threat of a ban; and

4) Strengthened control over forest administration.

4. Research Methodology.

The principal tasks of the study are to assess the comparative advantage of forestry activities, including processing, to evaluate the effects of government policies on these activities, and to present a critique of government policies in the light of the findings. The first two tasks represent the positive aspects of the study, and the methods and procedures followed in carrying them out represent the subject of this section.

In an ideal world of perfect markets and perfect information market prices could be expected to reflect social costs and values, subject to important qualifications where externalities* are present. In the real

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*"Externalities" are elements of value that the market cannot capture.

world, however, market prices do not necessarily reflect social opportunity costs because of the presence of market distortions or imperfections due to taxes, subsidies, price controls, trade restrictions, and monopoly power, as well as externalities. In such cases, social opportunity costs or shadow prices, can diverge from market prices.

Particular attention is given in this study to price distortions from government policies, which can represent incentives or disincentives to producers. We attempt to measure these as the nominal and effective protection rates (NPR and EPR) accorded the various activities, which can be either positive or negative.

To assess comparative advantage, we estimate the social opportunity cost of using domestic resources to earn or save foreign exchange -- commonly called "domestic resource cost" (DRC). Border prices, which are world prices at the domestic port (FOB for exports, CIF for imports), are used in price comparisons to represent the opportunity costs of internationally traded goods in both DRC and protection rate estimates.

Nominal Protection Rate (NPR). This is the proportional difference between the domestic and border prices of a product. This difference or "wedge", may be created by tariffs, discriminating sales taxes, quotas, or other price interventions policies.

$$NPR_j = \frac{P_j^d - P_j^b}{P_j^b}$$

where: P_j^d is domestic price of commodity j

P_j^b is border price of j expressed in pesos at the official exchange rate.

Effective Protection Rate (EPR). This measure of protection takes into account protection accorded to inputs, as well as outputs, of a particular activity. Thus, it measures protection of value added.

$$EPR = \frac{V^d}{V^b} - 1$$

where V^d is value added at domestic (protected) prices and V^b is value added at border prices (in domestic currency at the official exchange rate). No new estimates of EPRs were undertaken in this study, but previous estimates (Bautista, et.al., 1979) are reviewed in connection with the discussion of government policies.

Domestic Prices. To be comparable to border prices, domestic prices must be measured at the same point in the marketing chain. Moreover, price comparisons are directly meaningful only for identical quality. Manila wholesale prices represent the most readily available data. Since most logging firms are near their own regional ports, where shipments both to Manila and to the world originate, an adjustment for transport to Manila is required. Moreover, it is widely believed

that exported logs are of superior quality. Hence, a quality adjustment is also required.

Rather than attempt to estimate these adjustments separately, a combined adjustment for both was estimated by comparing wholesale prices and export unit value during the period 1956-69 when there were no export taxes or quotas. This suggested a 14.5 per cent downward adjustment of the Manila wholesale price to account for quality differences and transport costs from the regional port to Manila. Applying this adjustment to the price relationship in the 1970s enabled us to estimate the effects of export taxes and quotas on the nominal protection rate.

Another modification is necessary because of the quotas, which began in 1974. With an effective quota on exports, the domestic price will be below the export price, net of tax. To get the nominal protection rate, we really want the price to the producer, which is a weighted average of the domestic price and the net export price.

$$\tilde{P} = \frac{P_d D + P_b (1-e) X}{D + X}$$

where $\tilde{P}$ is the producer price.

D is domestic sales volume.

X is export volume.

e is rate of export tax.

Then $\tilde{P}$ was substituted for P_j^d in the formula for NPR.

Domestic Resource Cost (DRC). This is, in effect, the "own" exchange rate for an activity -- the rate at which it can convert domestic resources measured in peso social values into foreign exchange either by exporting or substituting for imports.

$$DRC = \frac{R + C_d + L_d + N_d}{P^bQ - (C_f + N_f)}$$

Where: R is land rent (social value)

C is user cost of capital (social value)

L is labor cost (social value)

N is cost of intermediate inputs

P^bQ is value of output at border price

and the subscripts,

d and f, refer to domestic and foreign origin. Foreign costs and border prices are in terms of foreign exchange.

DRCs have previously been estimated for the major forest products, using data from the 1969 and 1974 input-output tables (Bautista, et.al., 1979). This study supplements this with DRC estimates based on 1977-79 data from a sample of six logging and wood processing firms. New estimates for 1974 were also made on the basis of input-output data and the capital structure of the sample firms. Social values for the primary inputs, land, labor and capital, were estimated as explained below.

Social Value of Land. Normally we would take as the opportunity cost of land in forest its value in the best alternative use, which might be marginal upland crop farming. The question is complicated, however, by the important social benefits that accrue from keeping land in forest, including benefits to crop farming in general. Given the widespread concern over the extent to which forests have already disappeared in the recent past, it might be judged that the external benefits (quite apart from the value of wood products) from a marginal hectare in forest would, in the present situation, be at least equal to its direct value in crop farming.

Following our assumption of reasonably well-managed sustained yield forestry, the question comes down to how much land should be in forest. As forest land expanded we could expect the external benefits at the margin to diminish and the opportunity cost in the form of the land's value in other uses to increase. Expressing the social value of land as an annual rent, this value would represent the difference at the margin between the opportunity cost and the external benefits.

If, as above, we would judge that at the present allocation of land to forest, the marginal benefits exceed the cost, the rent would be, at most, zero. We take zero, then as the lower limit.

For comparison, and to test the sensitivity of our DRC estimates to the social value of land, we somewhat arbitrarily assume an upper limit of ₹600 per hectare to represent the rental value in marginal upland crop farming. Again, somewhat arbitrarily, we apply this to one-half

of the total area of the concession on what we think is a conservative assumption that, no more than that proportion is likely to qualify as suitable for crops.

The above method applies to the DRC estimates for the sample firms. For the input-output data estimates, we include rent in a residual after deducting capital cost from "other value added" in the 1974 table.

Social Value of Labor. Most logging operations are integrated with wood processing and firms are subject to minimum wage legislation. It has been estimated (Medalla, 1979) that the social opportunity cost of unskilled labor was about 80 per cent of the minimum wage (including allowances in the late 1970s). A study of the wage data of the six firms indicated that unskilled labor was receiving at least the minimum wage (plus allowances). Hence the 'shadow price' of labor was put at 80 per cent of reported cost.

Social Value of Capital. The user cost of capital consists of interest and depreciation costs. The estimate of these requires a prior estimate of the replacement cost of capital, a social (or shadow) interest rate, and an estimated rate of depreciation. Replacement cost of capital was determined by adjusting the original reported acquisition cost for the rate of inflation in capital goods prices over the age of the equipment. Depreciation was estimated by the straight-line method on an estimated life of the capital goods. For the latter, the reported values were adjusted upward to take into account the fact that equipment

in use was often older than the reported estimated life. Finally, the shadow rate of interest was put at 15 per cent, which is the rate used by the National Economic and Development Authority in project evaluation.

Cost Allocation Between Domestic and Foreign. The allocation of depreciation and interest cost was based mainly on the aloocation ratios determined in the Industrial Promotions Policies in the Philippines (IPPP) project (Bautista, et. al., 1979), as shown in Table 5. Interest cost was allocated according to the source of finance, which was estimated as the average ratio of foreign borrowing to gross domestic capital formation from the mid-1950s to the early 1970s. The basis for allocating depreciation was the source of the capital equipment.

Joint Production. When logs are extracted from the forest the operation leaves a large bulk of logging wastes such as stumps, branches and damaged residuals. A few studies (Decena, 1975; dela Cruz, 1975) have shown their values as inputs in the manufacture of plywood, veneer, hardboard and other wood products. However, these logging wastes are usually left in the woods if the firm does not use them in processing.

In the wood processing sector, lumber, plywood and veneer are produced with mill residues such as sawdust, sawkerfs, slabs, edgings, trimming and the like. In this study, howevr, only the four major products -- log, lumber, plywood and veneer were taken into consideration since these comprise the bulk of the firm's output. At present, only

Table 5. Allocation ratios used in estimating DRC using established data.

COST OF INPUT	DOMESTIC	FOREIGN
Interest Cost	95	5
Depreciation:		
Building & Structure 1/	100	0
Production machinery and equipment 2/	5	95
Transport equipment 3/	10	90
Other fixed assets 4/	85	15
Labor	100	0
Glue	0	100
Fuel and lubricants	0	100
Land	100	0

1/ This is based on theimport content of the "general building construction" sector in the 1969 & 1974 input-output tables which is less than 2%.

2/ In the IPPP, the ratio is 0-100 but this study used a 5-95 ratio based on the import content of "special industry machinery" sector in the 1974 input-output table which is 96%.

3/ IPPP Project Technical Note No. 4 determined this as the ratio of domestic value added to total cost in the transport equipment manufacturing sector.

4/ Consists of items like office furniture and equipment not directly used in the production process. It has been estimated in the IPPP that 15% of the value of such goods come from foreign sources.

a few firms are actually engaged in the utilization of logging wastes and mill residues.

Sampling and Data Collection. Data were gathered from six firms which were the only acceptable respondents from an initial list of 30 firms obtained from the Presidential Committee on Wood Industries Development (PCWID) Directory of Timber Licenses in the Philippines (1980). Table 6 gives the employment level and product lines of the six firms. The survey questionaires were mailed in the first week of January 1981 to the selected firms and the data were personally collected from the firms from May to July of tbe same year.

Table 6. Employment level and product lines of the six sample firms, 1977-1979.

SAMPLE FIRM	TOTAL EMPLOYMENT	PRODUCT LINES AND % SHARE TO TOTAL VALUE OF THE FIRM's OUTPUT		
		Log	Lumber	Plywood
F_1	1345	23	4	73
F_2	1658	0	100	0
F_3	708	68	5	27
F_4	2659	67	29	4
F_5	3215	22	24	54
F_6	2352	21	18	61

5. Protection and Comparative Advantage: the Empirical Evidence.

Protection: Logs. As explained in Section 4 (above) it is assumed that prior to 1970, when there was no export tax or quota, quality adjusted regional domestic price was equal to export unit value, which represents border price. The nominal protection rate, in other words, was zero. There may have been exceptions to this generalization -- for example, during 1962-1965 when the so-called "retention scheme" penalized major exports via a less favorable exchange rate. The focus here, however, is on the major interventions in the 1970s in the form of export taxes and quotas.

Table 7 shows estimates of the NPR for logs, based on price comparisons, for 1970-80. The average rate for the years 1970-75 was minus 6 per cent, reflecting the export tax and the sliding scale premium that was in effect for a limited period after 1973.* The rate varied sharply from year to year, as we have measured it , but this is to be expected when international prices or the exchange rate change suddenly as they did in 1970 and 1973. There is a lag in adjustment of domestic prices which exaggerates the wedge temporarily. Overall for the period, however, the price comparison yields a result close enough to what we would expect from the export tax plus premium to justify confidence in our adjustment for quality and transport costs.

Quotas began in 1974, but their effect was negligible until more stringent limits were imposed in 1976. The period 1976-78 shows an

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*The export tax on logs has recently been raised to 20 per cent.

Table 7. Nominal Protection Rate for Logs, 1970-1980

Year	Adjusted Domestic Price 1/ (₱ per cu. meter)	Border Price (₱ per cu. meter)	Nominal Protection 2/ Rate (per cent)
1970	128	150	-15
1971	161	165	-02
1972	170	157	+08
1973	215	270	-20
1974	303	311	-03
1975	260	267	-03
1976	297	441	-33
1977	368	490	-25
1978	390	490	-20
1979	470	946	-50
1980	578	990	-42
Average (unweighted):			
1970-75			-06
1976-78			-26
1979-80			-46

1/ Manila wholesale price divided by 1.17 for combined quality and transport cost adjustment, as explained in Section 4.

2/ $\frac{\text{Domestic Prices}}{\text{Border Price}} - 1$ 100 for 1970-1973.

$\frac{\text{Weighted Average of Domestic and Net Export Price}}{\text{Border Price}} - 1$ 100 for 1974-80

Sources: Central Bank
PREPF Technical Paper, nos. 3: 4-5
Philippine Forestry Statistic, 1976 and 1980.
World Bank, "Price Prospects for Major Primary Commodities" 1980.

average penalty on log production of minus 27 per cent — almost double that of the previous five years. The penalty increased sharply again in 1979-80 when even more severe quota restrictions were in effect. The average NPR for the two years was minus 45 per cent, despite the extensive evasion of the quota limitations that was noted above in Section 2. Turning this around, we could say that the wide discrepancy between domestic and world prices in those years provided an enormous incentive to evade the legal restrictions on exports.

Protection: Lumber, Plywood and Veneer. Price comparisons of a similar nature were attempted for these products also, but no consistent long-run pattern emerged that would enable us to determine with confidence an adjustment for quality and marketing costs. It seems that there was no consistent quality relationship over time between domestic and export sales.

In any case, the main policy instrument creating a wedge between domestic and border prices has been the export tax, which was initiated in 1970. Except for a brief period in the mid-1970s when apremium duty was in effect, the export tax has been at a rate of four per cent.* Thus we can put the NPR for lumber, plywood and veneer at minus four per cent for the 1970s.

Effective Protection Rates. Effective protection takes into account the effect from the protection premium on imputs, as well as the

*At present there is no export tax on plywood.

penalty on the price of output. For logs, this additional penalty is negligible, so that the EPR is roughly equal to the NPR. For 1974, the IPPP Project set both NPR and EPR at minus 10 per cent, the rate of export tax.

For lumber, the IPPP Project estimated an EPR of 16 per cent -- positive protection overall because the depressed price of logs as the major input more thatn offset the paenalty of the export tax on output.

Plywood and Veneer are combined in the input-output table; hence, the Project estimated a combined EPR for these products at five per cent -- again positive because of the greater export tax on the principal input, logs.

Finally, it should be noted that these effective rates of protection are calculated at the existing exchange rate, which in the 1970s was estimated to undervalue foreign exchange anywhere from 14 to 24 per cent because of the trade restrictive effect of the entire industrial protection system (Bautista, et. al., 1979). All exports, then were penalized to this extent as compared to what they would earn under free trade or, alternatively, under what the IPPP Project called an "optimal intervention system". In this project we are using a slightly narrower range of 17 to 23 per cent for the estimate of the undervaluation of foreign exchange (equivalent to a 20 to 30 per cent overvaluation of the peso). Adjusting for this we get ranges of net effective protection rates for the major wood products of:

Logging	-31 to -25 per cent
Lumber	-11 to - 3 per cent
Plywood & Veneer	-19 to -12 per cent

These are measures of the total penalty from export taxes and industrial protection (mainly in the form of tariffs). This does not take into account the effect of quotas on log exports, which would make the total penalty on logs much greater.

Comparative Advantage: Domestic Resource Costs. Two separate sets of estimates of DRCs were made. The first was based on data from the input-output table for 1974. The second was based on data from our survey of six firms. The method of estimation was explained above in Section 4. The results for the first set are as follows:

Logging	5.47
Lumber	6.20
Plywood & Veneer	6.04

These figures represent in pesos the estimated social costs of earning one dollar through production for export. To assess comparative advantage we need to compare them with the shadow price of foreign exchange. The latter was estimated according to the method of the IPPP Project to be in a range of 20 to 30 per cent above the official rate during the middle and late 1970s. This gives a range of 8.15 to 8.83 for the shadow exchange rate in 1974. It is evident, then, that these DRC results indicate strong potential comparative advantage. It must be stressed that this advantage is potential only on the assumption of reasonable well managed sustained yield forestry. We believe that past practices of virtually mining the forests would incur such high social costs as to result in very unfavorable DRCs.

Turning to the DRC estimates for the sample firms it should be noted that all were integrated in that they combined logging with some lumber and/or plywood production. Each had a definite concentration, however, in terms of value of final product. These concentrations are indicated in the table below, which gives DRC estimates for 1977 -1979 on the alternative assumptions of zero rent and ₱600 per hectare.

FIRM	DRC	
	Zero Rent	₱600 Rent
1. Plywood	5.78	10.73
2. Lumber	6.89	8.97
3. Logging	4.49	13.64
4. Logging	3.42	4.84
5. Plywood	4.73	7.14
6. Plywood	5.55	7.35

With two exceptions, these DRC estimates fall below the shadow exchange rate for 1977-79, which is in the range, 8.86 to 9.59. The two exceptions for firms 1 and 3, showed much greater sensitivity to a variation in land rent, the reason being that they had much the lowest ratios of hectares actually logged to total hectares in the concession. Correspondingly, they had by far the lowest values of output per concession hectare. Since concession hectares simply measure space, it is possible that for these two the proportion of concession space that was

usable forest was lower. Hence, our rent estimates would be relatively too high for them. Alternatively, they may have been operating at below optimum levels of logging and output. Among the six there was a perfect negative rank correlation between size of operation, indicated by value of output, and DRC, with rent at ₱600. But the rent factor was not decisive, since the correlation was very high with zero rent.

In any case, we think that the zero rent assumption comes closer to reflecting the present situation, as we indicated above. This implies again a very strong showing of potential comparative advantage for these six wood product firms. While the sample is too small to provide a basis for strong conclusions, the results are reasonably consistent with those from the aggregated input-output data. We have no direct evidence on the forest management practices of these firms. It is possible that to meet the standards of our assumption of sustained yield forestry, the firms might have to incur additional costs.

It is interesting to compare these results with IPPP Project estimates for wood and paper products for the years 1969 and 1974, as shown in Table 8, together with their estimates of the shadow exchange rate for the two years (Bautista, et. al., 1979).

Table 8. DRC Estimates 1/ for Wood and Paper Products Industries 1969-1974

INDUSTRY	DRC ESTIMATE	
	1969	1974
Lumber	3.68	6.14
Plywood and veneer	4.65	6.48
Pulp, paper and paper manufacturing	6.04	9.14
Paper products	6.04	11.10
Paper and paperboard containers	6.36	11.47
Shadow exchange rate	6.48	9.21

1/ As determined in the IPPP Project, 1979.

Again the potential comparative advantage of wood products is clear a stands out in relation to less advantage or comparative disadvantage for paper products.

6. Summary and Conclusion.

The importance of efficient management of forest resources is well appreciated in the Philippines. The government has shown an increasing interest not only in the conservation of forests, but also in the economic benefits to be gained from forest products. Increasing attention has been given recently to the forest communities in an effort to end their destructive activities and find for them a more constructive role.

This study has not attempted to evaluate the whole range of government policies affecting forestry, but rather has concentrated on those that most strongly affect the price incentives for production, processing and export of forest products. Conservation goals have been taken as given and technical questions of efficient forest management have been left aside. The focus instead has been on broader aspects of economic efficiency.

Principally, two questions were studied. First, does the Philippines have a comparative advantage in forest products? Is it in the interest of efficient utilization of Philippine resources to promote the growth of the forest product industry? Subsidiary to this question is, of course, the very important issue of the choice between exporting primary or processed wood products. Second, how have government price intervention policies affected the development of the forest product industry? Have these policies been helpful or detrimental to the economic use of forest resources to meet the development goals of the Philippines? Here we have considered not only policies specifically directed to forest products, but also the indirect, but powerful, effects on price incentives from the industrial protection system.

What we have found? With respect to the first question, our estimates of DRCs both from input-output table data and from more detailed survey data indicate strong potential comparative advantage in all three major wood product activities -- logging, lumber and plywood veneer if the goal of sustained yield forestry can be met. A common measure of the degree of comparative advantage is the ratio of the DRC to the shadow exchange rate (SER). A value less than one indicates comparative advantage and the lower the value the greater is the degree of comparative advantage. Ratios for our estimated DRCs, assuming zero land rent, range from .37 to .71 indicating a very substantial margin within which prices and costs could vary without sacrificing the Philippines comparative advantage in wood products.

The DRC results depend, of course, on the particular levels of prices and costs that prevailed during the period to which the data belong -- for the survey, 1977-79. Moreover, the results depend also on the assumptions about the shadow prices of land, labor and capital, as well as on our heroic assumption about future forest management.
Table 8 shows elasticity coefficients to indicate the sensitivity of the DRC estimates to variations in costs and value of output. Again, we assume zero land rent -- in effect, judging that in the present situation marginal external benefits compensate for opportunity cost at the margin of land in forest.

Table 9. Elasticity of DRC Coefficient in Log, Lumber and Plywood Production of Six Firms with respect to stated Parameters, 1977-1979.

FIRM	PARAMETERS			
	Labor Cost	Cost of Capital	Cost of Intermedial Inputs	Price of Output
F_1	0.17	0.34	0.52	-1.39
F_2	0.29	0.44	1.03	-1.03
F_3	0.45	0.22	0.66	-1.12
F_4	0.30	0,30	0.30	-1.22
F_5	1.48	1.48	0.21	-1.91
F_6	1.44	1.80	1.44	-2.69

The price of the final product is clearly the most important single parameter in the determination of the DRC estimate. From their respective elasticity coefficients we find that the six firms on the average could withstand a drop in world prices of their products of

about 40 per cent without pushing DRCs above the shadow exchange rate -- i.e., without losing their comparative advantage.

One might be tempted to compare the DRCs for logging with those for the processed products to throw light on the question whether it is better for the Philippines to export logs or lumber and plywood. The survey results, as well as those from input-output data, seem to suggest a stronger comparative advantage in logging. It would be a mistake, however, to interpret this as favoring log export over export of lumber and plywood. The rate of logging activity is dictated mainly by conservation policy. Therefore, logging cannot expand beyond that by drawing resources away from lumber and plywood manufacture. Clearly logging is comparatively advantageous and should be pursued within the limits of conservation policy. The remaining question is whether labor and capital should be applied to processing logs or to some other economic activity -- e.g., automobile assembly or steelmaking. In other words, because of the conservation policy, logging and wood processing are not in competition with each other for the use of resources. Rather, wood processing competes with other, non-forest activities. In this respect, the answer is clear. The very favorable DRC-SER ratio's strongly indicate a comparative advantagr for wood processing as compared to the average for manufacturing in general. So it is better to export processed wood to gain the advantage from both logging and processing.

We turn now to price intervention policies. In Section 3 (above) we set four major goals for policy:

1) limiting output to meet the conservation target,

2) capturing private rents from logging concessions,

3) promoting foreign exchange earnings consistent with comparative advantage, and

4) raising revenue for forest administration.

We noted that no single policy (e.g., export tax or forest charge) can be expected to attain all four goals. Indeed, consistent with the widely accepted theory of economic policy, we concluded that we need four separate policies (or sets of policies) to meet four goals.

Taking the last one (revenue) first, we note only that forest charges and export taxes cannot be designed primarily for this purpose since they have other roles to play. What revenue they do raise can contribute to the financing of forest administration, but revenues from general taxation must be used to fill the gap between this need and the revenues from strictly forest policies. (If the gap is negative, of course, forest policy revenues would make a net contribution to general revenues.) The point is simply that forest charges and export taxes should not be designed to meet a specific revenue target for forest administration.

With respect to conservation, we noted that, because of externalities and the need to meet qualitative, as well as quantitative, aspects of the conservation target, direct controls and regulations are needed. Forest charges, by themselves, could limit output (if they are effective), but could not meet the qualitative requirements of conservation policy.

Nevertheless, forest charges could play a role in supplementing direct controls. We noted above that forest charges have declined in real terms over the period studied; and , even with the recent rise in rates, represent only a very light tax on output of logs -- probably less than six per cent ad valorem. Moreover, while a decade ago revenue from forest charges roughly matched government expenditures on forestry, they now represent only about one sixth of those expenditures. No doubt they could be raised substantially without reducing incentives to output below the conservation target.

If forest charges were, indeed, raised to the point where it is just profitable at the margin to produce the conservation-determined output of logs, marginal rents would be eliminated. This leaves intramarginal rents as a remaining problem. The ideal method of eliminating them -- namely competitive bidding for timber ---- is not presently available. A higher land tax would be a possible substitute. Serious study should be undertaken to determine, first, the extent of intramarginal rents, i.e., excess of returns to capital in logging concessions over the normal rate of return in other activities (with due allowances for risk); and second, a means of administering a land tax on forest concessions that would largely capture such rents for society.

Finally, we turn to the area of policy where this study and the findings are most relevant -- promoting optimal foreign exchange earnings from forest products. Policies that have the greatest impact here are: (1) the industrial protection system which penalizes all exports via

undervaluing foreign exchange; (2) export taxes, quotas and subsidies.

We have already noted above, in the discussion of comparative advantage, that it is preferable to export lumber and plywood/veneer rather than logs. Moreover, we noted the strong indication of comparative advantage in both producing logs and processing them for export. In Section 3 (above) we noted also the advantage of creating a wedge between world and domestic prices of logs that reflects world elasticity of demand. In addition, we noted that an export tax is the ideal instrument for this purpose, and that export quotas (or ban) represent an inferior method. Finally, we noted that the protection system imposes a penalty on all exports in the range of 17 to 23 per cent via undervaluation of foreign exchange.

Ideally, then, we would have a total export tax equal to 1/e, where e is the estimated long-run world elasticity of demand for logs. By "total" we mean the combined effect of the penalty from undervaluation of foreign exchange and the explicit export tax. Since the former is probably at least 17 per cent, it seems very difficult to justify for this reason any explicit export tax at all on logs. It is not likely, in other words, that the world demand elasticity for Philippine logs has an absolute value less than six.

It should be noted that the 17 to 23 per cent penalty on export from undervaluation of foreign exchange is quite apart from any peso overvaluation that results from disequilibrium in the foreign exchange market. It is due solely to the distortions caused by industrial

protection. If it is judged that the present value of the peso is not an equilibrium one -- e.g., because of excessive foreign borrowing -- this would represent an additional element of distortion in the value of foreign exchange. This can be easily seen with the aid of Figure 4.

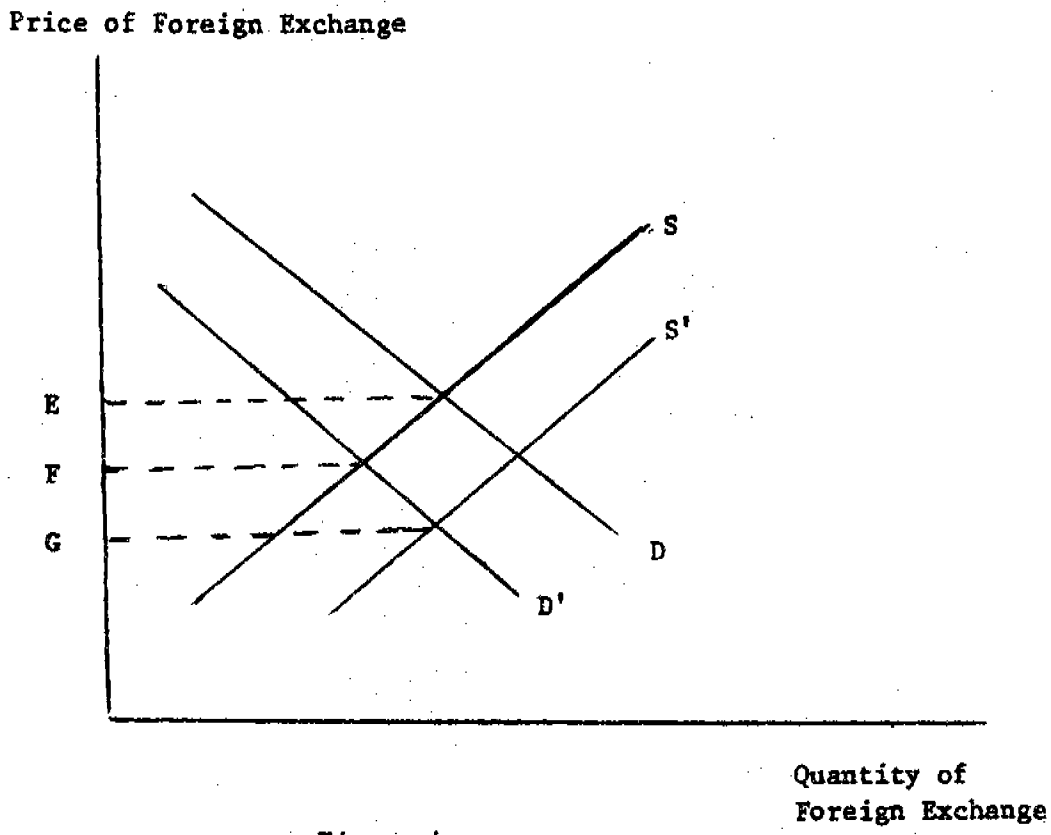

Figure 4

S and D represent the supply and demand for foreign exchange in the absence of industrial protection and with foreign borrowing at a level that is judged to be desirable. Industrial protection (in the form of tariffs) reduces the demand for foreign exchange (by reducing

imports) to D'. The price of foreign exchange is reduced to F from its initial equilibrium at E. If we add excessive foreign borrowing, the supply of foreign exchange is now S', reducing its price further to G.

The gap between E and G is the total undervaluation of foreign exchange, made up of the "distortion gap," EF, and the "disequilibrium gap," FG. What this suggests is that the 17 to 33 per cent estimate of the distortion gap may represent a conservative estimate of the total undervaluation of foreign exchange, in view of the government's desire to reduce dependence on foreign borrowing.

There is, of course, a similar penalty on exports of lumber and veneer. To correct this in a first-best manner, would require the removal of the four per cent export tax on these products and its replacement by a 20 per cent subsidy (the latter also for plywood).

Thus the first -best package might be: (1) no quota or ban on log exports, (2) no export tax on logs, lumber or plywood/veneer, and (3) a 20 per cent subsidy to processed wood exports. There is a tacit assumption here, of course, that the implicit export tax on logs from undervaluation of the currency is about right for the optimal exploitation of foreign demand. The implied elasticity of world demand is probably too low on a long-run view, however.

In any case this first-best package has financial implications that might be disturbing. We must consider that not only processed wood products, but all exports face the same penalty and, in a sense, "deserve" the same subsidy. To implement tha latter might imply an impossible tax and transfer problem for the government.

A second-best approach, then, would be to continue the export tax on logs both for revenue and as an instrument for promoting processing. We saw above, in Section5, that depressing the domestic price of logs via an export tax could raise the effective protection of processed wood products. Net effective protection (i.e., net of the effect of undervaluation of foreign exchange) was seen to be still negative, but eliminating the four per cent export tax on lumber and plywood/veneer would help to correct that.

Carrying this argument further, the second-best solution might be an even higher export tax on logs to give adequate relief to the export of processed wood products. There is some level for this which, together with the removal of the export tax on lumber and plywood/veneer, would give the latter at least zero net effective protection. (If foreign exchange is given still greater value for balance of payments reasons -- i.e., to reduce foreign borrowing, the export tax on logs should be higher again for this reason.) The fact that the tax on log exports puts the net price to exporters below marginal revenue is of little consequence if log exports are to be phased out anyway in favor of processed wood exports.

In sum, a second-best approach to policy reform would include at least: (1) removal of export tax on processed wood products, (2) increased forest charges, (3) perhaps an increase in the export tax on logs, (4) elimination of quotas on logs exports, and (5) hopefully an improved land tax on forest concessions.

Finally, it will be recalled that in approaching the problem of estimating DRCs we made the assumption that the government would be able in future to administer reasonably well an efficient sustained yield system of forest management. This, of course, is the crucial element in the forestry policy package.

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