The Cumulative Impact of Taxes on Forest Investments

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As an owner or manager** of private forest lands,taxes loom as a "special" cost which must be reckoned with at the local, state and federal levels. It is a "special" cost because it is a cost which can not be reduced by more efficient management or by making cuts in programs or production schedules. In short, it is a cost which is largely out of the manager's control. For this reason it attracts the attention of the forest manager every time he(she) inspects the income statement for a given accounting period. The only way to reduce or control this cost is to seek relief from local, state or federal legislative bodies. And, as a quick glance at a recent survey of state timber tax laws shows(e.g. see the paper by Cliff Hickman in this Proceedings), most states have passed special tax laws which affect timber landowners. This,coupled with special concessions granted in the federal income tax code,leads to the logical question of determining the total impacts of taxes on forest investments. Are things as bad (or better) as some authors lead us to believe? Do timber landowners deserve preferential tax treatment? Do they deserve more(less) than they currently enjoy? Or,do the long investment periods, high risks and delayed returns warrant continued special tax treatment?

Importance of Taxes

By way of introduction it is instructive to sample some quotes from past tax experts concerning the significance of taxes to forest owners as they evaluate potential investments in forestry. The following quotes will succeed if they do nothing more than jog our memories and start us thinking about the cumulative impacts of taxes on forest investments.

1. From the 1920's and 30's we find the following statements,"... the notion that concessions in taxation are necessary to promote forestry is a mistake". Further,"...the kind of favors the legislature will grant are useless, and the kind that would do any good will never be granted and

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**Throughout the paper the terms forest manager and owner are used interchangeably.

ought not to be granted."(Murphy 1925 quoting Fairchild).

2. "Taxation is not now and never has been in broad way the chief factor in determining the time and rate of cutting mature timber." (Fairchild 1935).

3. In addressing the impacts of taxes on land use shifts, McKetta concludes that,"land abandonment and use shifts out of forestry do occur, but the taxation causality hypothesis - even though it is not dismissible - is a weak one". (McKetta 1980).

4. Reaching different conclusions, Condrell(1976) points out that timber is treated no more favorably than any other capital asset, and that this fair treatment of timber investments has been one of the most significant reasons that forestry has flourished since the end of WWII.

5. Sunley(1972,1975) argues that the corporate timberland owner enjoys a significant "tax subsidy" , with five companies, in 1971, receiving almost forty percent of the benefit accruing to all taxpayers.

6. Finally, the GAO has recently reported that,"we could find no publicly available,definitive evidence that capital gains tax treatment has augmented timber supplies"(GAO 1981). Further,the level of the tax subsidy for fiscal years 1976-80 as reported by the GAO was $1.2 billion; and seventy six percent of this subsidy accrued to corporate taxpayers even though the non-industrial owners provided the largest percentage of timber supply.

Clearly, additional authors could be cited. However, the results would be just as inconclusive. It appears that each author reaches different conclusions partly because he(she) uses different sets of evaluative criteria and partly because political judgments weigh more heavily in certain analyses--thus masking the effects of analytical differences.

Framework for the Analysis

In an attempt to take a rational look at the cumulative impacts of taxes on timber investment decisions I propose to perform some fairly simple cash flow analyses to demonstrate

the impacts of current tax policy. The analyses which follow are conducted on a per acre basis for hypothetical corporate and non-industrial landowners* using an after-tax cash flow soil expectation value investment criterion. The soil expectation value reveals the value of all future incomes less all future costs when properly discounted to the present at an appropriate rate of interest. By expressing the soil expectation value in terms of after-tax cash flows we are better able to simulate a taxpayer who: (a) receives capital gains treatment when timber is harvested and (b) offsets certain timber-related expenses against surplus ordinary income.

The first of these benefits is brought about by the use of the lower long-term capital gains tax rate in place of the higher tax rate on ordinary income. For corporations, the capital gains rate (28 percent) is 18 percent lower than the ordinary rate (46 percent for income in excess of $100,000), while for the non-industrial owner comparable tax rates used in the analysis which follows are 30 and 12 percent, respectively.

Offsetting timber-related expenses against surplus ordinary income is also beneficial to timber owners because it allows ordinary income to be converted to long-term capital gains, with the attendant tax savings. This occurs because the IRS allows certain types of expenditures to be expensed (the year incurred) against ordinary income. This is allowed for many expenditures associated with timber growing even though the income from timber harvesting is taxed as long-term capital gains in some future year. Of course, the taxpayer must have a surplus of ordinary income in order for these additional expenditures to have the desired effect. In essence, long-term capital gains income is increased while taxable ordinary income is simultaneously decreased. With an 18 percent tax rate differential, this is to the taxpayers advantage**.

One way to accomplish this is to generate high bid prices for public stumpage. These prices may then be used to aid the establishment of the fair market value under Section

*The non-industrial landowners described in the paper are assumed to be individual taxpayers.
**This is the corporate tax rate differential which ,as previously stated, is also assumed to apply to the non-industrial owner.

631a of the Internal Revenue Code . In a rising stumpage market these sales, which will be harvested in some future year, will generate higher fair market values than timber being harvested today. Since this fair market value is deducted against surplus ordinary income, it reduces the size of the total tax bill. Again, the taxpayer pays tax on a larger long-term capital gain but receives compensation in the form of reduced income subject to ordinary rates. The significance of these consequences of current tax policy has been discussed in detail by Sunley(1972,1975), Condrell(1976), and Fortson and Hargreaves(1974).

Cash Flow Model

The standard definition of after-tax cash flow is used in this paper. This definition holds that the after-tax cash flow is computed as:

Cash flow = After-tax profits + Depletion expense - Capitalized expenditures + Amortized expenses

This formula is used to calculate the actual flow of cash through an organization in any given accounting period. Depletion and amortization expenses are additive terms because they are subtracted from before-tax profits to arrive at the amount of profits subject to the federal income tax. However, because these expenses do not require the actual expenditure of cash, they are added to after-tax profits when calculating the after-tax cash flow. Capitalized expenditures such as planting and site preparation are deducted when calculating the after-tax cash flow because an actual outlay of cash has been made but the expenditure has not been reflected in the calculation of before-tax profits.

It is assumed that the hypothetical taxpayer has excess ordinary income against which certain timber management activities can be expensed. Included in this category are precommercial thinning, spraying, state yield tax, annual land tax, and other annual costs. For the corporate taxpayer it is further assumed that the costs of site preparation and planting are capitalized and recovered through depletion at the time of thinning or final harvest. The unit depletion rate is determined by dividing the sum of these two costs by the total volume(thinnings plus final harvest) produced over the rotation.

The impacts of the Recreational Boating Safety and Facilities Improvement Act (PL 96-451) signed into law on October 14,1980 are included in the analysis. This law allows taxpayers to:(a) amortize the first $10,000 of qualifying reforestation expenditures over a seven year period and (b) claim a 10 percent investment tax credit on qualifying reforestation expenditures. In the analysis which follows, the investment tax credit is included in the corporate ownership case. However, because of the $10,000 limitation, the corporate analysis does not consider the amortization provision. The analysis of the non-industrial owner is done with and without the amortization of reforestation expenditures and the tax credit.

The cash flow formula is the basis for the treatment of all expensed and capitalized expenditures included in this analysis. For those expenditures being expensed against surplus ordinary income the after-tax cash flow is computed as:

$$(S - E) - y(S - E) = (1-y)S - (1-y)E$$

Where S = Surplus ordinary income
E = Expenditures being expensed against surplus ordinary income
y = Tax rate applied to ordinary income

For investments being considered, S is assumed to exceed E but the former is not directly included in the per acre analysis because the intent is to determine the profitability of forestry investments and not the total enterprise. All expenditures being expensed are computed at (1-y) percent of their before-tax values when calculating the after-tax cash flow. This represents a tax savings on an after-tax basis.

Income from a revenue generating activity such as thinning or final harvest affects the after-tax cash flow as shown below:

$$(T - D) - g(T - D) + D = (1-g)T + gD$$

Where T = Timber income from thinning or final harvest
D = Depletion expense
g = Long-term capital gains tax rate

The fertilization expenditures included in the analysis are amortized over a three year period(Bare 1979). This represents the period of benefit for such expenditures for purposes of this paper. Such expenditures are incorporated

into the cash flow analysis as shown below:

$$(S - F/n) - y(S - F/n) + F/n = (1-y)S + yF/n$$

Where F = Fertilization expenditure
n = Number of years over which fertilization expenditure is being amortized

As previously outlined, planting and site preparation expenditures are capitalized for the corporate taxpayer. Since these expenditures are not expensed against surplus ordinary income, the after-tax cash flow is calculated at 100 percent of the before-tax value. In the case where the reforestation expenditures for the non-industrial taxpayer are being amortized, the after-tax cash flow is computed as shown below:

$$(S - R/n) - y(S - R/n) + R/n = (1-y)S + yR/n$$

Where R = Qualifying reforestation expenditures
n = Number of years over which reforestation expenditures are being amortized.

By law, n is defined to be seven years. However, only one-half year's amortization can be claimed in the first year. In years two through seven the fully amortized amount can be claimed, leaving the final one-half's year amortization expense to be claimed in the eighth year. As previously discussed, an investment tax credit of 10 percent of qualifing reforestation expenses my also be claimed. This tax credit is added directly to the after-tax cash flow. Once computed, all before and after-tax cash flows are discounted to the present at the appropriate rate of interest to obtain the present value for one rotation. This present value is subsequently converted to a soil expectation value to incorporate revenues and costs from all future rotations.

Single Acre Analysis

To demonstrate the cumulative impact of the above taxes, a simple hypothetical example is shown below. In this example we investigate the growing of Douglas-fir on a single acre of medium site land(site quality 110 at 50 years) in Washington State. A management regime consisting of planting with 2-0 stock following a one year regeneration delay, spraying for brush in the fourth year, precommercial thinning in the fourteenth year, fertilization with 200 lbs. of N in years 14,24 and 34, commercial thinnings in years 34 and 39 when the average stand diameter reaches 10 inches and a final clearcut harvest in the forty ninth year is assumed.

The Scribner board foot yields for this management regime are shown in Table 1. These yields assume that commercial thinning will commence when the average stand diameter reaches 10 inches with trees 11 inches and larger being removed.

The economic assumptions incorporated in the example are shown in Table 2. These data are assumed to reflect the average forest landowner. Cost and price appreciation rates for deriving future costs and prices are also shown in Table 2. The interest rate and all rates of appreciation shown in Table 2 are in nominal terms(i.e., including inflation). Thus,in real terms a 2 percent price appreciation rate, a 3 percent cost appreciation rate and a 7 percent real interest rate are used in the analysis. These values are typical of those cited by forest analysts in the Pacific Northwest and generally represent the time period between 1979-80.

A sample worksheet illustrating the calculation of cash flows and net present values for a corporate taxpayer following the above described management regime is shown in Table 3. The after-tax soil expectation value for this sample acre is $424.59/acre. This is the maximum amount an investor can spend and earn 12 percent on his(her) investment using the assumed board foot yields and economic inputs. In the absence of taxes the before-tax soil expectation value rises to $566/.46 acre. Thus, the soil expectation value has been reduced by $141.87/acre or 25 percent because of taxes.

Similar calculations for the non-industrial forest landowner with and without the amortization of reforestation expenditures and the investment tax credit are summarized in Table 5. A worksheet detailing the procedures used in the calculation of after-tax cash flows is shown in Table 4. This worksheet includes the investment tax credit and the amortization of reforestation expenditures. As shown, the before-tax soil expectation value is still $566.46/acre--just as it was for the corporate taxpayer. However, the after-tax soil expectation value is now calculated to be $583.50/acre. This result shows the cumulative effects of current tax policy and illustrates how this policy can seriously distort the allocation of capital to forest investments as seen by two taxpayers. Because of current tax policy, the non-industrial taxpayer can afford to outbid the corporate taxpayer by $158.91/acre for an identical acre of land. Further, this acre only possesses a "real" value of $566.46/acre. However, because of current tax policy, non-industrial owners are (theoretically) given misleading

signals which could lead to a misallocation of scarce capital resources.

Also shown in Table 5 are the soil expectation values for a non- industrial taxpayer under conditions where the reforestation expenditures are capitalized and recovered through depletion at the time of thinning or final harvest. Additionally, the investment tax credit is not used in this illustration. Under these circumstances, the after-tax soil expectation value falls to $528.66 /acre. The difference of $54.84/acre is the difference in soil expectation value solely attributable to the amortization of reforestation expenditures, the investment tax credit and the depletion allowance. Clearly it is more advantagous to recoup $55.02/acre out of $199.80/acre of reforestation expenditures($0.28 per dollar invested) than $0.18 - the present value of the depletion expense on an after-tax basis.

Lastly, in Table 5 we show the after-tax soil expectation value for the non-industrial taxpayer for the case where a cost-sharing payment covering 60 percent of qualifying reforestation expenditures is assumed. Added to this, the taxpayer utilizes the investment tax credit and the amortization of reforestation expenditures. It is further assumed that the cost-sharing payment is not treated as ordinary income in the year received. Under these circumstances, the after-tax soil expectation value rises to $633.15/acre or $49.65/acre more than when no cost-sharing payment is received and $66.69/acre more than under the no tax case. Again, the effects of current tax policy are evident.

At this point a few qualifications should be enumerated. First, in the above analyses we have assumed that the optimal financial rotation is unaffected by tax policy. This, unfortunately, may not always be true. However, it is unlikely that incorporation of this factor would alter the conclusions of the analysis. More than likely, the magnitude of the soil expectation values would shift, but the ranking of the values would remain unchanged. Secondly, the above analyses have assumed that any increase(decrease) in taxes would be fully capitalized into lower(higher) land values. Thus, with this assumption - which is generally justifiable given the competitive nature of the forest products industry - the supply of forest land is treated as being fixed. While this is an unrealistic assumption, it is a consequence of the earlier assumption that taxes are fully capitalized into higher(lower) land values. More than likely, lower(higher)

taxes are probably partially shifted into higher(lower) land values. Some of the decrease(increase) of taxes would be passed forward to consumers and some would be absorbed by the land owner, thus lowering the financial attractiveness of forestry vis-a-vis other investment opportunities. Passing costs forward might stimulate both land use shifts into forestry from other land uses and lead to an increase in the level of management intensity. Absorbing costs would tend to drive land out of forest production and reduce management intensity. It is difficult to quantify these general trends due to a dearth of empirical evidence. Lastly, the above analyses have all assumed that we are starting with bare land. If we assume that land is generally stocked with mature timber, then our conclusions don't necessarily hold.

Conclusions

What, if any, conclusions can be drawn from this analysis? If the assumptions used are valid then we are justified in concluding that:

1. The non-industrial taxpayer receives substantial benefits from existing tax policy; at least to the extent that reforestation expenditures can be amortized. Of course, as higher marginal tax rates are used in the analysis or as the $10,000 annual limitation is reached, the after-tax soil expectation values will approach those of the corporate taxpayer. Under current policy the soil expectation values are distorted in favor of the non- industrial owner. However, the corporate taxpayer is witness to a 25 percent reduction in the before-tax soil expectation value. This suggests that: (a) corporate taxpayers are over-taxed, (b) non-industrial taxpayers are under - taxed, or(c) neither of the above. Unfortunately, we can't draw definitive conclusions from the analysis because we have not compared forestry across other forms of income producing property. Hence, we are unable to determine whether current tax policy is vertically equitable. All that we can conclude is that current policy treats non-industrial taxpayers more favorably than corporate taxpayers.

2. It is difficult to accept the arguments of non-industrial taxpayers when they request additional tax breaks. In fact, the above analysis suggests that too many preferential tax breaks have already been granted. It certainly would be difficult for these taxpayers to argue for lower state property taxes using the argument that current

tax policy is unfair vis-a-vis the corporate taxpayer.

The above analysis has hopefully demonstrated that it is necessary to examine the cumulative impacts of all taxes before making any recommendations for a change in tax policy concerning any one of the taxes. Only in this manner can the synergistic effects of the different forms of taxation be treated. The simple minded analysis presented in this paper has shown that current tax policy significantly distorts before-tax soil expectation values--especially in the case of the non-industrial taxpayer.

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Table 1

Scribner Board Foot Yields (32 Foot logs)

For Site Index 110 - 50 year basis.

Stand Age	Av. Diameter	BF Yield	
		Thinning	Clear cut
35	11.0	5,028	-
40	11.1	5,747	-
50	13.1	-	27,170

Source: Charles Chambers, Washington State Department of Natural Resources, Olympia, Washington, August 21, 1979.

Table 2

Economic Data Used in Analysis

Stand Age	Stumpage Prices[a] ($/MBF)	Costs[b] ($/A)	
35	180	Site Preparation	$ 85.00
40	180	Planting	100.00
50	215	Spraying	20.00
		Fertilization	70.00
		Precommercial Thinning	80.00
		Annual	4.00

Other Inputs[c]

Nominal interest rate	12%	Yield tax rate 6.5%
Inflation rate	5%	Nominal price appreciation rate 7%
Nominal Cost Appreciation rate	8%	

[a] Source: Charles Chambers, Washington State Department of Natural Resources, Olympia, Washington, August 21, 1979.

[b] Source: Per acre management costs were patterned after those found in Land Expectation Values for Western Washington Timber Species, Washington Forest Productivity Study, Phase III, Part II, Washington State Department of Natural Resources, Olympia, Washington, June 30, 1980.

[c] Source: Interest rates and cost/price appreciation rates reflect values reported in Forest Land Management Program, Draft Environmental Impact Statement, Washington State Department of Natural Resources, Olympia, Washington, January 23, 1979. Cost and price appreciation rates only extend over one rotation.

Table 3

Sample Worksheet of Cash Flow Analysis
for Corporate Taxpayer

End of Year	Activity	Cash Flow		Present Value Single Rotation	
		Before Tax	After Tax	Before Tax	After Tax
1	Site Preparation	-91.80	-91.80	-81.96	-81.96
1	Planting	-108.00	-108.00	-96.43	-96.43
1	Tax Credit	-	19.98	-	17.84
4	Spraying	-27.21	-14.69	-17.29	-9.34
14	Precommercial Thinning	-234.98	-126.89	-48.08	-25.96
14	Fertilization	-205.60	-205.60	-42.07	-42.07
15-17	Fert. Amortization	68.53	31.52	-	15.49
24	Fertilization	-443.88	-443.88	-29.24	-29.24
25-27	Fert. Amortization	147.96	68.06	-	10.76
34	Thinning	9663.82	6957.95	204.99	147.59
34	Thinning Depletion	26.50	7.42	-	0.16
34	Yield Tax	-628.15	-339.20	-13.32	-7.20
34	Fertilization	-958.31	-958.31	-20.33	-20.33
35-37	Fert. Amortization	319.44	146.94	-	7.48
39	Thinning	15488.17	11151.48	186.42	134.22
39	Thinning Depletion	30.29	8.48	-	0.10
39	Yield Tax	-1006.73	-543.63	-12.12	-6.54
49	Final Harvest	172067.61	123888.68	666.83	480.12
49	Harvest Depletion	143.19	40.09	-	0.16
49	Yield Tax	-11184.39	-6039.57	-43.34	-23.41
1-49	Annual	-4.00	-2.16	-89.80	-48.50
Present Value of One Rotation		-	-	564.26	422.94
Soil Expectation value		-	-	566.46	424.59

Table 4

Sample Worksheet of Cash Flow Analysis
for Non-Industrial Taxpayer[1]

End of Year	Activity	Cash Flow		Present Value Single Rotation	
		Before Tax	After Tax	Before Tax	After Tax
1	Site Preparation	-91.80	-91.80	-81.96	-81.96
1	Planting	-108.00	-108.00	-96.43	-96.43
1	Refor. Amortization	14.27	4.28	-	3.82
1	Tax credit	-	19.98	-	17.84
2-7	Refor. Amortization	28.54	8.56	-	31.42
8	Refor. Amortization	14.27	4.28	-	1.73
4	Spraying	-27.21	-19.05	-17.29	-12.11
14	Precommercial Thinning	-234.98	-164.49	-48.08	-33.66
14	Fertilization	-205.60	-205.60	-42.07	-42.07
15-17	Fert. Amortization	68.53	20.56	-	10.10
24	Fertilization	-443.88	-443.88	-29.24	-29.24
25-27	Fert. Amortization	147.96	44.39	0	7.02
34	Thinning	9663.82	8504.16	204.99	180.39
34	Yield Tax	-628.15	-439.71	-13.32	-9.33
34	Fertilization	-958.31	-958.31	-20.33	-20.33
35-37	Fert. Amortization	319.44	95.83	-	4.88
39	Thinning	15488.17	13629.59	186.42	164.05
39	Yield tax	-1006.73	-704.71	-12.12	-8.48
49	Final harvest	172067.61	151419.50	666.83	586.81
49	Yield tax	-11184.39	-7829.07	-43.34	-30.34
1-49	Annual	-4.00	-2.80	-89.80	-62.87
Present Value of One Rotation				564.26	581.24
Soil Expectation Value				566.46	583.50

[1] Amortization of reforestation expenditures; investment tax credit; no cost-sharing receipts

Table 5

Summary of Soil Expectation Values

	Before Tax ($/A)	After Tax
Corporate		
Without reforestation amortization; with investment tax credit	$566.46	$424.59
Non-industrial		
With reforestation amortization and investment tax credit	566.46	583.50
Without reforestation amortization or investment tax credit	566.46	528.66
With reforestation amortization, investment tax credit and cost-sharing	566.46	633.15