Equivalence of the expectation and cost compounding methods of forest valuation - Faustmann revisited

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Abstract

In 1849, Faustmann showed that the value of a forest stand could be calculated either by compounding costs or discounting future cashflows. The linkage between the two approaches was the inclusion in both of the cost of land based on Land Expectation Value (LEV). In this paper a forest investment example is used to examine the comparability of compounding costs and discounting future cashflows to estimate Crop Expectation Value (CEV) in the context of the NZIF Forest Valuation Standards.

When valuation is based on pre-tax cashflows, the cost compounding method will give the same value as the CEV estimated by discounting cashflows, provided the same cost and revenue assumptions are used to estimate both. This is not the case when the current crop has sub-optimal management or when the cost compounding method includes non-recurring costs that only occur in the first rotation. In these cases, the cost compounding method overestimates CEV.

When valuation is based on post-tax cashflows, the cost compounding method will only provide the correct CEV if the present value of the tax deduction associated with the purchase price (i.e., cost of bush or cost of timber deduction) is added to the sum of compounded costs.

Introduction

The Guidance Notes for Forest Valuation Method in the NZIF Forest Valuation Standards (NZIF 1999) includes a section on "Equivalence of expectation method[1] and cost compounding methods under special conditions". This states that, when valuation is done on the basis of pre-tax cashflows and the same cost, revenue and discount rate assumptions are used, ***"Crop Expectation Value estimated from the cost compounding approach will equal Crop Expectation Value estimated from the expectation approach provided that notional land rental in both cases is charged based on LEV."***

This is essentially a restatement of what Faustmann (1849) found over 150 years ago when he published his Forest Land Rent Formula.

Faustmann makes no mention of taxes in his article. In contrast, the NZIF Forest Valuation Standards adopt the convention that valuation based on the expectation approach should be based on post-tax cashflows. This has implications for the equivalence of the cost compounding and expectation methods of forest valuation. As noted in the Standards; "***when valuation is based on post-tax cashflows, the cost compounding method will only provide the correct CEV if the present value of the tax deduction associated with the purchase price (i.e. cost of bush or cost of timber deduction) is added to the sum of compounded costs.***"

In addition, "***there are other situations where costs are non-recurring on a post-tax basis (either because of the activity being non-recurring or the first rotation tax treatment being different from that of subsequent rotations) where the cost compounding method does not give the correct CEV.***"

The purpose of this paper is to provide background information to support the NZIF Forest Valuation Standards and to illustrate the equivalence of the cost compounding and expectation methods under certain circumstances. It also reviews the situations under which the two valuation approaches are not equivalent and the adjustments that have to be made to the cost compounding method to give the correct CEV.

The paper summarises the work of Faustmann, in particular his development of the concept of LEV and how he showed the equivalence of the crop value calculated by compounding costs or discounting future cashflows. The equivalence is then illustrated using a simple forest investment example. Finally, the effects of departures from Faustmann's underlying assumptions are described.

The Faustmann Formula

In 1849, Martin Faustmann published the earliest known application of the principle of discounted cashflow analysis when he wrote his paper "Calculation of the value which forest land and immature stands possess for forestry" (Faustmann 1849). In his paper, Faustmann developed his Forest Land Rent Formula (i.e. the Faustmann Formula). The Faustmann Formula has provided the basis for forest economics ever since.

Faustmann wrote his article in response to a paper, "On determination of the money value of bare forest land", written in 1849 by Edmund Franz von Gehren a teacher of forest mathematics (von Gehren 1849). In his paper, von Gehren suggested that land could have different values depending on its use. He noted that forest land which is to be converted to agriculture has a

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[1] *The expectation method involves the discounting of future net cashflows to give forest value. It is also known as the Discounted Cashflow (DCF) or Net Present Value (NPV) approach.*

value based on its value for agriculture. However, "the forester should also know what the forest land to be given up would be worth if it remained part of the forest area."

von Gehren went on to argue that forest value "is based on two factors - the growing stock and the land capital." He speculated that bare land value could be determined by subtracting the value of growing stock from forest value. However, because his method for determining the value of growing stock was flawed (he used an immediate liquidation rather than an expectation approach), he found such "uncertainties and absurdities" in his estimates of bare land value that he concluded that "forest land which is to be converted to agriculture can only be appraised by its value for agriculture."

Faustmann, in response to von Gehren, wrote his article "from the forester's standpoint; i.e. we shall only calculate the value which bare forest land possesses when in forestry use. Also from the forestry point of view, in order to present a complete solution we must extend our analysis to immature stands. We must not calculate the value of such stands as represented by the sale price of their present timber content, but by their value as determined from their exploitation when mature."

He then set about to calculate the value of "forest land which is bare of trees" using two different approaches which led to the same result. In the first approach Faustmann converted all incomes and expenditures to annuities. He then calculated annual land rental as the difference between income annuities and expenditure annuities. Finally he capitalised annual land rental to give the bare forest land value.

Faustmann then arrived at the same result using discounted cashflow analysis. His approach was "to reduce to the present all the incomes and expenditures occurring until infinity...". He calculated the value of bare forest land as the difference between discounted incomes and discounted expenditures. The formula he arrived at is the classic Faustmann Formula which calculates LEV.

Faustmann then went on to consider the situation of "land currently carrying a stand." He calculated the economic value of a stand using three different methods:

- compounding costs;
- compounding/discounting annuities; and
- discounting future cashflows.

(1) Compounding costs

Faustmann considered that the owner of a stand of age n "cannot expect more than will completely compensate him for the n years' land rent not drawn and the expenditure disbursed." He went on to observe that "the sum of the annual land rentals, the plantation expenditure and the annual administration costs does not provide him with a satisfactory stand valuation; he is also entitled to compensation for the loss of interest which he has suffered...". Consequently, he calculated stand value as the sum of compounding (a) the annual land rent, (b) the annual expenditures for administration, and (c) the plantation costs.

(2) Compounding/discounting annuities

In his second approach, Faustmann converted incomes and plantation costs into annuities or "annual rentals" which would apply annually for the whole u year rotation. The value of the n year-old stand was calculated by adding (a) the sum of compounded income annuities for all the previous n years and (b) the sum of discounted plantation cost annuities for the remaining u-n years of the rotation. The first term represents the value of "accrued but not yet received" rentals relating to harvest income. The second term represents the value of "pre-paid" plantation costs. Annual expenditure on administration is not explicitly included in the calculation.

(3) Discounting future cashflows

Faustmann's third method involves discounted cashflow analysis. "The difference between the capital values of all the incomes and expenditures, which occur until infinity in a forest, gives the value of the forest. This forest value, which we shall call W, comprises the land value (B) and the stand value (H), viz. W = B + H, and hence H = W - B."

Faustmann was able to demonstrate that the three approaches all gave the same result - in fact the same formula for calculating stand value H. Further he noted that the formula was applicable to stands of all ages.

The NZIF Forest Valuation Standards essentially adopt the approach of Faustmann to determine the value of a crop. The Standards include the following definitions:

- Forest Expectation Value (FEV)
  The present value of cashflows arising from both the Land and the Crop, in perpetuity.
- Land Expectation Value (LEV)
  The present value of perpetual series of Crop rotations on the Land, the Land being bare of the Crop at the commencement of the series.
- Crop Expectation Value (CEV)
  The present value of cashflows arising from the Crop, the cost of land being included by a notional rent calculated as the discount rate applied to the LEV, alternatively calculated as CEV = FEV - LEV.

The equivalence of these terms to those used by Faustmann (H = W - B) is obvious.

Forest Investment Example

Consider the simple forest investment example shown in Table 1. (This is the same example used in Manley 2002 and Manley & Bare 2001). The details of the regime and the absolute costs and revenues assumed are not important for the paper. Although the general methods presented in this paper apply to other timing conventions, the consistency of the assumed timing conventions is important.

It is assumed that bare land is planted at time 0 (i.e.

Table 1: Forest investment example.

Age/Time	Silvicultural costs ($/ha)	Overhead costs ($/ha/year)	Clearfell revenue ($/ha)
0	1000		
1	40		
5	450		
6	450		
8	450		
10	400		
1-28		100	
28			70,000

the start of year 1) at a cost of $1000/ha. Subsequent silvicultural and overhead costs and clearfell revenues all occur at the specified time (at the end of the year). For example, clearfelling occurs after 28 years. Replanting is assumed to occur immediately after harvesting (regeneration lag of 0 years), with the timing and cost of operations for the second and subsequent rotations identical to that of the first rotation. All revenues and costs remain fixed in real terms for subsequent rotations.

A rotation age must be determined as part of the specification of 'optimal forestry'. This has been set at 28 years for the example. It has been left invariant throughout this paper at 28 years although in reality it is likely that it would have subsequently varied with some of the different assumptions made.

Land Expectation Value (LEV)

LEV can be calculated by discounting the cashflows associated with a perpetual series of rotations. The sum of discounted cashflows, using a real annual discount rate of 9%, is $3585.57/ha[2]. The LEV can also be calculated from the Net Present Value (NPV) of the first rotation ($3264.49/ha) because of the above assumption of consistency in the timing and cost of operations for all rotations (see Table 2).

Table 2: Determination of before-tax LEV for example.

Age/ Time	Operation	Cashflow ($) ($/ha)	Present Value ($/ha)
0	Establishment	-1000	-1000.00
1	Releasing	-40	-36.70
5	Low pruning	-450	-292.47
6	Medium pruning	-450	-268.32
8	High pruning	-450	-225.84
10	Thinning	-400	-168.96
1-28	Overheads	-100	-1011.61
28	Clearfelling	70000	6268.39
		NPV 1 rotation	$3,264.49
		LEV in perpetuity	$3,585.57

Note: Discount rate = 9%
LEV = NPV (rotation 1) * (1.0928/(1.09^{28} -1)

[2] *Values are shown to 2 decimal places in order to show the equivalence of different methods.*

LEV = NPV(rotation 1) * $(1+p)^u/((1+p)^u - 1)$

where p is the real annual discount rate applied to before-tax cashflows and u is the rotation length. For the example:

LEV = 3264.49 * 1.09^{28} / (1.09^{28} - 1)
= 3585.57 ($/ha)

Note that no explicit land cost is included in the calculation of LEV. All appropriate land rents are accounted for by the LEV.

Crop Expectation Value (CEV)

CEV may be determined using the three alternative approaches developed by Faustmann. As an example, we calculate CEV for a stand at age 5 (immediately after costs at time 5 years have been incurred).

(a) Discounting future cashflows.

CEV can be calculated by first calculating Forest Expectation Value (FEV) and then subtracting LEV. FEV for the 5 year-old stand, calculated by discounting future cashflows in perpetuity, equals $8160.40/ha. CEV is then found as:

	FEV	8160.40 ($/ha)
less	LEV	3585.57 ($/ha)
equals	CEV	4574.83 ($/ha)

As shown by Davis and Johnson (1987), another way to calculate CEV is to determine FEV as:

FEV_n = (FV_u (remainder of current rotation) + LEV) / $(1+p)^{u-n}$

where FV_u = Future value for remainder of current rotation if harvested at age u
n = Current stand age

For our example, FEV at age 5 is computed as:

FEV_5 = (70000 - 400*1.09^{18} - 450*1.09^{20} - 450*1.09^{22} - 100*((1.09^{23} -1)/.09) + 3585.57) / 1.09^{23}

thus	FEV = 8160.40 ($/ha)
less	LEV = 3585.57 ($/ha)
equals	CEV = 4574.83 ($/ha)

Another way to calculate CEV is to assume that land gets sold (at a value equal to LEV) immediately after harvest of the first rotation. CEV is then calculated by first discounting cashflows for the remainder of the first rotation, adding the value of the 'land sale' discounted back to the present, and then subtracting LEV:

For example, the NPV of cashflows for the remainder of the first rotation is computed as:

NPV = 70000/1.09^{23} - 400/1.09^5 - 450/1.09^3 - 450/1.09 - 100*((1.09^{23} -1)/(.09*1.09^{23}))

NPV (remainder of rotation 1)	7666.38 ($/ha)
plus LEV discounted back 23 years	494.02 ($/ha)
equals FEV	8160.40 ($/ha)
less LEV	3585.57 ($/ha)
equals CEV	4574.83 ($/ha)

As expected, adding the present value of LEV at the time of harvest to the NPV for the remainder of the first rotation gives a value equal to the FEV. The LEV at the time of harvest represents the net value of all subsequent rotations.

Table 3: Calculation of before-tax CEV at age 5 using compounded costs.

Age/Time	Silvicultural Costs ($/ha)	Overhead Costs ($/ha)	Land Rental* ($/ha)	Total Costs ($/ha)	Years to Compound	Compound Factor	Compound Cost ($/ha)
0	1000.00			1000.00	5	1.5386	1538.62
1	40.00	100.00	322.70	462.70	4	1.4116	653.14
2	0.00	100.00	322.70	422.70	3	1.2950	547.41
3	0.00	100.00	322.70	422.70	2	1.1881	502.21
4	0.00	100.00	322.70	422.70	1	1.0900	460.74
5	450.00	100.00	322.70	872.70	0	1.0000	872.70

* *Land rental = .09*LEV and is based on LEV = $3585.57/ha*

CEV $ 4,574.83 crop value

Table 4: Calculation of before-tax CEV at age 5 using the annuity approach.

Age/Time	Cashflow ($/ha)	Present Value ($/ha)	Equivalent Annuity[1] ($/ha)	Pre-paid Years 1-5 ($/ha)	Unpaid Years 6-28 ($/ha)	Years	Present/Compound Value[2] - Age 5 ($/ha)
0	-1000.00	-1000.00	-98.85				
1	-40.00	-36.70	-3.63			23	
5	-450.00	-292.47	-28.91	131.39			1258.75
6	-450.00	-268.32	-26.52				
8	-450.00	-225.84	-22.32			5	
10	-400.00	-168.96	-16.70		-65.55	5	-392.31
28	70000.00	6268.39	619.64		619.64		3708.39

CEV $4,574.83 crop value

[1] Equivalent annuity = PV * $(0.09 * 1.09^{28})/(1.09^{28} - 1)$
[2] PV= 131.39* $(0.09 * 1.09^{23})/(1.09^{23} - 1)$ = $1258.75/ha
Compound values = 65.55 * $(1.09^5 - 1)/.09$ = $392.31/ha and
619.64 * $(1.09^5 - 1)/.09$ = $3708.39/ha

A further method for directly calculating CEV is to discount cashflows for the remainder of the first rotation but with the inclusion of a notional land rental to represent the opportunity cost of land. This land rental is calculated by multiplying the LEV by the discount rate. For the example forest:

land rental = 3585.57 * 0.09
= 322.70 ($/ha/year)

For the 5 year-old stand, the present value of the land rental for the 23 years through to harvest is calculated using the general formula to calculate the present value of an annuity:

$$PV(annuity) = a * ((1+p)^m - 1) / (p * (1+p)^m)$$

where a is an annuity paid annually for m years and is due at the end of each year.

$$= 322.70 * (1.09^{23} - 1) / (0.09 * 1.09^{23})$$
$$= 3091.55 \text{ (\$/ha)}$$

	NPV (remainder of rotation 1)	7666.38 ($/ha)
less	PV of land rental	3091.55 ($/ha)
equals	CEV	4574.83 ($/ha)

Using this method, future rotations are effectively ignored because the discounted cashflow of these rotations (equal to the LEV at the time of harvest) is cancelled out by the notional land cost (the PV of all future land rentals equals the LEV).

(b) Compounding costs

Table 3 shows the detailed calculation of CEV for the 5 year-old stand by the compounding of costs (incurred from time 0 to time 5) forward at the 9% discount rate. Note that the calculation also includes the notional land rental as a cost. The CEV is calculated to be $4574.83/ha.

(c) Compounding/discounting annuities

Table 4 shows (in the third column) the present value at time 0 of each of the silvicultural costs and revenues associated with the example forest (overhead costs and land rentals are not included in this method). It also shows the annuity (to apply for 28 years) which is equivalent to this present value for each of the costs and revenues.

For the example 5 year-old stand, costs which have already been incurred are $1000 at time 0 (annuity equivalent $98.85), $40 at time 1 (annuity equivalent $3.63), and $450 at time 5 (annuity equivalent $28.91). These costs can be spread over the whole rotation by applying an annuity of $131.39 to every year. The costs that have been incurred can be considered as the prepayment of this annuity of $131.39 for each of the remaining 23 years of the rotation. The value of this annuity (at time 5), calculated by determining the present value of the annuity, equals $1258.75/ha.

Costs which have yet to be incurred are $450 at time 6 (annuity equivalent $26.52), $450 at time 8 (annuity equivalent $22.32), and $400 at time 10 (annuity equivalent $16.70). These costs can be spread over the whole rotation by applying an annuity of $65.55 to every year. The share of these costs, as yet unpaid at time 5, which should be accrued to each of years 1 to 5 is $65.55. The value of this annuity (at time 5), calculated by compounding the annuity forward, equals $392.31/ha.

Revenues which have yet to be received are $70,000 at time 28 (annuity equivalent $619.64). The share of these revenues, not yet received at time 5, which should be accrued to each of years 1 to 5 is $619.64. The value of this annuity (at time 5), calculated by compounding the annuity forward, equals $3708.39/ha.

Faustmann calls the prepaid costs ($1258.75) "advance rents paid" while he calls the difference between the unpaid revenues and the unpaid costs ($3708.39 - $392.31 = $3316.08) "annual rent owed". He added "advance rents paid" to "annual rent owed" to calculate stand value. Table 4 shows the calculation of CEV for the 5 year-old stand to be $4574.83/ha, the same as that calculated by the two previous methods.

A 5 year-old stand has been used to show the detailed calculation of CEV for the three different methods used by Faustmann. The equivalence of CEV under each of the methods applies generally to stands of all ages. Provided that the same assumptions about costs, revenues and discount rates are used and notional land rental is included (as the LEV times the discount rate) the CEV calculated by discounting future cashflows will equal the CEV calculated by compounding costs (and the CEV calculated by compounding/discounting annuities).

The key to the equivalence between the cost compounding and the expectation approaches is the use of LEV as the basis for determining land rental. It provides the consistent linkage between calculating value from past costs or from future net revenues. The equivalence of the different approaches can be proven mathematically (see Manley & Bare 2001).

Some situations where the methods give different results

There are a number of underlying assumptions, both explicit and implicit, in the work of Faustmann. In particular, in his analysis on the equivalence of different valuation approaches he assumed:

- optimal even-aged forestry in perpetuity (constant costs, yields and revenues),
- constant recurring costs, and
- pre-tax cashflows.

We will now look at the impact of departures from each of these assumptions on the equivalence of the cost compounding and expectation methods for forest valuation.

(a) Sub-optimal crop

Faustmann considered an example where the current stand was non-optimal for the site. He calculated the value of this abnormal (i.e., understocked) stand by discounting future cashflows. Faustmann took "account of the depressed yields during the first rotation" and then imagined "that the normal state is created after that". "Finally, in order to find the stand value we must deduct the land value from the forest value. The land value, however is the same as we calculated when imagining normal yields, because one need only fell and regenerate the present stand in order to create fully stocked conditions on the land immediately."

Faustmann went on to conclude that "the land value remains the same, whether the area carries a stand or not, whatever the age of the stand, and no matter whether it is fully stocked or abnormal; the difference [in the value of the forest] is attributable solely to differences in the stand value." (I.e. LEV should be based on optimal stand management for the site.)

Now consider the case where the example 5 year-old crop is sub-optimal for the site. Assume that all costs are unchanged but because of it being of inferior volume and quality (compared to what could have been achieved on the site and what is expected in subsequent rotations) the current crop is only expected to realise $50,000/ha on harvest (compared to $70,000/ha for subsequent rotations).

LEV remains at $3585.57/ha because it is based on optimal forestry for the site. CEV, calculated by discounting cashflows to the present, is now $1819.20/ha. This is calculated by subtracting the LEV from the reduced FEV of $5404.77/ha. Use of the compounding cost method will not yield the correct CEV. Because this method compounds all sunk or historical costs incurred, it still estimates the CEV as $4574.83/ha because these costs and the LEV are unchanged. It overestimates stand value by the present value of the difference in harvest revenue between the optimal crop and the current sub-optimal crop.

In general terms the cost compounding method will overestimate CEV by $(R-R_s)/(1+p)^{u-n}$; where R is the net clearfell revenue for an optimal crop and R_s is the net clearfell revenue for the current sub-optimal crop.

(b) Non-recurring costs

Suppose that the establishment cost for the first rotation is $2000/ha but that the establishment cost for subsequent rotations remains at $1000/ha. Immediately prior to establishment, the NPV of future cashflows in perpetuity is now $2585.57/ha. This value should not be interpreted as an LEV (which assumes the same cashflows in perpetuity) but is an estimate of the maximum land price an investor can pay. Not surprisingly it is $1000/ha less than the LEV calculated using establishment costs of $1000/ha in perpetuity.

LEV for the land remains at $3585.57/ha. The CEV of the 5 year-old example stand, calculated by discounting future cashflows, remains at $4574.83/ha. The sum of compounded costs method gives a value of $6113.46/ha with the difference of $1538.63/ha representing the value of the non-recurring portion of the establishment cost ($1000/ha) compounded forward for 5 years at 9%. In general terms, the cost compounding method will overestimate CEV by $C_{nr}(1+p)^n$ where C_{nr} is the non-recurring establishment cost.

In this case, CEV should be determined by compounding forward only recurring costs. Non-recurring costs associated with establishment are not included in the LEV which is based on future recurring costs. Although they are included in the calculation of the NPV of a project before they are incurred, once they are incurred they are sunk and ignored in the calculation of LEV, FEV and CEV. Thus, CEV for the 5 year-old stand remains at $4574.83/ha.

(c) Post-tax cashflows

Forestry expenditures in New Zealand can be divided into four categories on the basis of tax treatment (McSoriley & Herrington 1994):

1. Non-deductible expenditures. This includes the cost of land contouring or other permanent improvements to land.
2. Immediately deductible expenditures. This includes planting and tending expenses, annual operating expenses, harvest expenses and post-harvesting expenses.
3. Expenditures which are capitalised and depreciated. This includes land development expenditures such as the construction of roads.
4. Expenditures which have to be capitalised and deducted against future revenue. This includes the cost of purchasing a crop of trees which goes into a "cost of bush" or "cost of timber" account and is deducted against harvest revenue.

Non-deductible expenditures

This case is trivial - it reduces to the pre-tax cashflow situation. Provided the tax treatment is the same for the first rotation as for subsequent rotations, CEV calculated by compounding costs will equal the CEV calculated by discounting future cashflows.

Immediately deductible expenditure

For immediately deductible expenses (and also for revenues on which tax is immediately payable), the post-tax cashflow is computed as:

Post-tax cashflow = Pre-tax cashflow *(1 - tax rate)

These post-tax cashflows are used to calculate CEV (by either method) and LEV. Provided these post-tax costs (and revenues) are consistently applied, the observations of Faustmann continue to hold - the CEV calculated by compounding costs will equal the CEV calculated by discounting future cashflows.

Expenditures which are capitalised and depreciated.

Depreciation is not a cashflow and so is not directly included in the calculation of LEV or CEV. However the depreciation expense is tax deductible and so creates a tax shield. Provided that the cashflows associated with the depreciation tax shield are consistently applied in the calculation of CEV (by either method) and LEV, the CEV calculated by compounding costs will equal the CEV calculated by discounting future cashflows.

Expenditures which have to be capitalised and deducted against future revenue.

The NZIF Forest Valuation Standards adopt the convention that CEV should be determined from the perspective of a purchaser in a transaction. Following the current New Zealand tax situation, the purchase price is treated as a cost that is deducted when the crop is harvested.

The LEV is unaffected by the cost of purchase because it assumes bare land and hence a crop value of zero. When calculating CEV by discounting future cashflows, the value of the tax deduction associated with the purchase price is included. However, the cost compounding method does not include this tax deduction either directly or via the notional land rental (as LEV is unchanged). The cost compounding method will underestimate CEV by the present value of the purchase price tax deduction which equals 0.33 * CEV/ $((1+p) * (1+i))^{u-n}$, where i is the assumed rate of inflation and 0.33 is the current corporate tax rate.

Summary

When pre-tax cashflows are used, the cost compounding method yields the same value as the CEV estimated by discounting future cashflows provided the same cost and revenue assumptions are used. This equivalence arises because LEV links the two approaches. If the current stand is assumed to be part of a perpetual cycle of identical rotations then CEV can be calculated either by looking backwards or forwards (or indeed by a combination of both as shown by Faustmann's compounding/discounting annuities approach).

Whenever there are differences between assumptions of what has happened in the past and what will happen in the future, the cost compounding method will not provide the correct estimate of CEV (as provided by discounting future cashflows). This situation arises when the current crop is sub-optimal or when some costs are non-recurring. The latter arises when an activity is non-recurring or, where post-tax cashflows are used, when the first rotation tax treatment is different from that of subsequent rotations.

If post-tax cashflows are used, the cost compounding method yields the same value as the CEV estimated by discounting future cashflows when expenditures are

- non-deductible;
- immediately deductible; or
- capitalised and depreciated.

When expenditures are capitalised and deducted against future harvest revenue, the cost compounding method will underestimate CEV by the present value of the tax deduction that arises at the time of harvest. The

NZIF Forest Valuation Standard convention that CEV should be determined from the perspective of the purchaser in a transaction creates a tax situation (and associated after-tax cashflow) that is captured by discounting future cashflows but is not "anticipated" by the cost compounding approach.

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Farewell a time for remembering

School of Forestry

On Thursday, March 20, a large group of well-wishers met at the School to farewell Karl Schasching, Senior Technical Officer since the start of the School in 1970, on the occasion of his retirement. Piped into the hall by Dr. Graham Whyte, Karl was regaled with stories from past and present staff, including Prof. Peter McKelvey and Prof. Roger Sands, as well as from past students. We wish Karl all the best in his well-deserved retirement.

Karl Schasching, on his retirement, with current Head of School Prof Roger Sands and past Heads Prof Peter McKelvey and Dr Graham Whyte.

Dr. Nora Devoe has resigned from the School to take up a position In the United States. Nora's courses in Natural Forest Silviculture and Community Forestry attracted a great many overseas students as well as New Zealanders, and were very popular with the students. Nora, a Council member of the Institute, was also very active in native forest silviculture research in New Zealand. She will be greatly missed by staff, friends and the profession.

Professor Roger Sands recently returned from France where he gave lectures at the Forestry Department of ENITA in Bordeaux. Four students from ENITA will be taking courses at the School starting in the second semester this year.

On 17 April, 18 students (out of 23 who completed their studies last year) took part in this year's Graduation Ceremony. Two students - Yannina Whiteley and Tim McDonald - also received their B.Sc. degree during the ceremony. At the School's graduation function, Tim McDonald received the Schlich Memorial Prize as the top all-round student, while Jeremy Snook was presented with the Dissertation Prize for the most creative final year research paper and Yvette Dickinson was awarded the M. R. Jacobs Prize for obtaining the top mark in Silviculture. Congratulations to everyone.

Congratulations to Masters student Mark Grabianowski who won the prize for the best poster at the recent ANZIF Conference in Queenstown.