

Discount rates used for forest valuation – results of 2017 survey

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Abstract

A total of 23 forest valuers responded to the survey and provided information on 19 New Zealand and eight Australian transactions in 2016 and 2017. The average reported implied discount rate (IDR) for New Zealand transactions is 7.0% (range 4.0% to 9.2%) for current rotation post-tax cashflows and 7.6% (range 4.0% to 10.7%) for pre-tax cashflows, compared to 6.9% and 8.6% in the 2015 survey. IDRs for the four transactions of medium or large forests are, on average, lower than for the 15 small forests; 5.8% versus 7.2% for post-tax cashflows and 5.9% versus 8.4% for pre-tax cashflows.

The eight reported Australian transactions are all medium or large forests. For current rotation pre-tax cashflows the range of IDRs is 7.7% to 10.8% with an average of 8.5%.

Forest valuers provided the discount rate they use to estimate the market value of a forest. Valuers apply a discount rate in the range 6% to 10% (average 7.1%) to post-tax cashflows or a discount rate also in the range 6% to 10% (average 7.6%) to pre-tax cashflows. Fourteen of the 23 valuers included in the 2017 survey also participated in the 2015 survey. They are using discount rates for forest valuation that are, on average, 0.6% lower than in 2015. Although eight of these valuers are using a lower discount rate, the other six use the same, or higher, average discount rates in 2017 as they did in 2015.

Introduction

Forest valuers were surveyed during the last quarter of 2017 about the discount rate used for forest valuation. The survey is an update of similar surveys carried out every two years since 1997 (Manley 1998, 1999, 2001, 2003, 2005, 2007, 2010, 2012, 2014, 2016).

Method

A total of 23 forest valuers were surveyed about their valuation approach and the discount rate they use. Also included in the survey were questions about valuation of the carbon trading opportunity, transaction information, and factors relating to replanting and new planting decisions.

Responses to survey questions

1. Method used to determine the market value of a forest

All 23 valuers use the income (expectation value) approach to determine the market value of a forest.

Many valuers use a suite of approaches including the sales comparison and cost approaches. For example:

- 'We use the three main methods, expectation, cost and sales comparison. Value opinion is a weighting of the three approaches depending on their relevance and reliability in the specific case.'

Four valuers blend the income and cost approaches for young stands, including one between ages four and seven years and another between ages five and 15 years. Four valuers make some use of the liquidation approach for mature stands.

Use of the cost approach

Some 21 of the valuers sometimes use the cost approach for valuing young stands and other limited circumstances. For example:

- 'In young stands where expectation value is less than replacement cost, minor species or where no current market exists.'
- 'Estates with predominantly young stands (pre-commercial) where:
 - yield may not be able to be reliably determined
 - expectation approach results in an unrealistic willing buyer-willing seller scenario (i.e. negative value).'
- 'For development estates where there remains substantial uncertainty over yields, markets and performance.'
- 'Valuation for fire insurance purposes of stands less than 5 years old.'

One valuer noted:

- 'We rarely use the cost approach. Where the forest is primarily pre-merchantable plantation we follow USPAP, IVS, and IFRS. Therefore we use all relevant approaches. We normally place only tertiary weight on the cost approach. For Australia this may apply to greenfield plantations like sandalwood and mahogany. We do not use the cost approach in New Zealand.'

Follow-up questions were answered by the 21 valuers who sometimes use the cost approach:

- Do you include indirect costs (e.g. cost of supervision)?
 - Yes – 16
 - Sometimes – 3
 - No – 2
- Do you include overhead costs?
 - Yes – 16
 - Sometimes – 3
 - No – 2

- Do you include the cost of using the land for growing the tree crop?
 - Yes – 13
 - Sometimes – 2
 - No – 6
- Do you include the cost of time?
 - Yes – 19
 - No – 2
- Do you use pre-tax or post-tax costs?
 - Pre-tax – 17
 - Post-tax – 4

All but one of the valuers who include the cost of time use a lower rate to compound costs than they do to discount cashflows in the income (expectation value) approach. However, a wide range of rates is used. Respondents reported using rates of 1% to 10% on pre-tax costs and 1% to 5% on post-tax costs. The average rate was 3.8% for pre-tax costs and 3.4% for post-tax costs.

2. Discount rate used to estimate the market value of a forest

The response from each forest valuer is summarised in Table 1. Seven valuers apply the income (expectation) approach using only post-tax cashflows, 14 valuers use only pre-tax cashflows, while two valuers use both.

Valuers apply a discount rate in the range 6% to 10% to either post-tax cashflows or pre-tax cashflows. The average discount rate is 7.1% for post-tax cashflows and 7.6% for pre-tax cashflows. Note that if a valuer responded with a range of discount rates, the mid-point discount rate was used to calculate averages.

One comment was:

- ‘We normally use pre-tax cashflows. However, if we believe that the most competitive investors for a given asset will be from a foreign country and suffer exposure to foreign income (repatriation) tax, we may include that tax in our cashflows and apply the same discount rate.’

There was some differentiation between discount rates being applied when only the current rotation is being valued compared to when multiple rotations are being valued:

- ‘In relation to Australasian valuations:
 - Typical range is 7.5% – 10% for current rotation cash-flows.
 - Typical range is 6.0% – 8% for multiple rotation cash-flows.
 - Adjustments are made to account for asset specific risk, e.g. market access, very high or very low margins (value more or less sensitive to changes in prices or costs), asset size, fire, wind, etc.’

Another valuer commented about their valuations of Australian forests:

- ‘Typical range is 7.5% – 9% (applied to pre-tax cashflows) for *Pinus radiata*, *Eucalyptus globulus*,

Eucalyptus nitens estates:

- Large well managed softwood estates – 7.5%
- Large well managed hardwood estates – 8.0%
- Small estates with immature stands, market access issues or located in non-strategic regions – 8% – 9%.
- Other non-eucalypt hardwood species (e.g. African mahogany/sandalwood) – 10.5% – 14%.’

Other valuers also differentiated the discount rate used depending on size:

- ‘It depends on the risk profile of the crop. But in general for a large estate that is well described currently 6.75 – 7.25 (pre-tax cashflows), small forests which are generally not as well described 7.5% – 8.5%.’
- ‘6.5% for larger estates (post-tax cashflows), 7.0% for smaller forests.’

Has the ‘market’ discount rate changed since 2017?

In the 2015 survey, the 16 respondents were applying an average discount rate of 7.0% to post-tax cashflows and an average discount rate of 8.3% to pre-tax cashflows.

Some 14 of the 16 valuers included in the 2017 survey also participated in the 2015 survey. Figure 1 gives the frequency distribution of the change in discount rate. The average change is a reduction of 0.6% and this largely occurred because of six valuers who reduced the discount rate 0.5% or more. Almost half (six out of 14) of the valuers used the same, or higher, average discount rate in 2017 as they did in 2015.

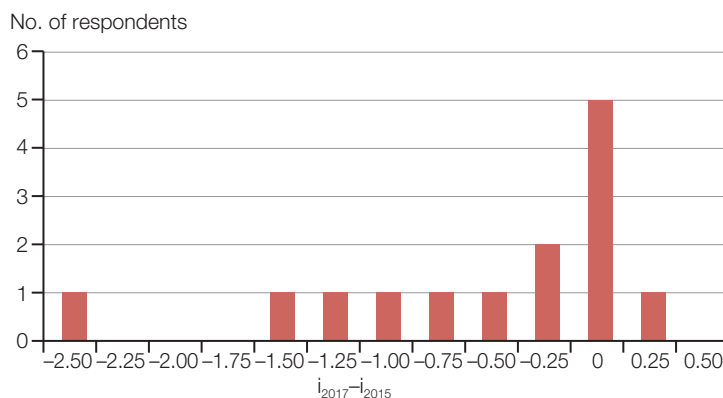


Figure 1: Frequency of change in discount rate ($i_{2017} - i_{2015}$) for individual valuers

3. How is the discount rate selected?

Valuers base discount rate on a range of information sources:

- 10 valuers use IDRs while another six use unspecified ‘market evidence’ or ‘reality checks’.
- Nine valuers use the results of this survey while another uses opinions from other valuers.
- Seven valuers use Capital Asset Pricing Model/ Weighted Average Cost of Capital (CAPM/WACC).

Table 1: Individual responses to survey questions

Respondent	Discount rate applied to post-tax cashflows	Discount rate applied to pre-tax cashflows	Basis for discount rate	Log prices based on	Cost of land based on
1	6.5		IDR	Current for mature crop to 12Q over 5 years	Actual or notional rental based on market rentals
2		7.5 to 10 current, 6 to 8 multiple rotations	CAPM/WACC, IDR, reported	Current to 5-year real average	3–5% of LMV. Market rentals from CFLs, forestry rights
3		8	NZIF survey, market trends, consistency	6Q to current for mature forest. 12Q for immature	Land rental based on CFLs
4		6.75 to 7.25 large, 7.5 to 8.5 small	IDR	Current to forecast over 5 to 6 years	Actual or notional rental based on market rental of CFL
5	6.5 to 8.5		IDR/Survey	6Q	Notional rental
6		7 to 8.5	Inertia and consistency	12Q adjusted by CPI	% of LMV
7		7 (multiple rotations)	IDR, theoretical WACC, reported	12Q for current to econometric model for future	LMV*Discount rate, or market rental
8	6.9	8.6	Survey	4Q for acquisition, 12Q reporting	Market based rental
9	6 to 10		IDR	Current or 4Q trending to 12Q over 3 years	4%LMV
10	6 to 8		Survey & comparison of returns with competing land use	12Q or current for liquidation	5–6%LMV
11		6	Market evidence	12Q	Actual rentals. If no rental – forestry right holder pays costs such as rates
12		8.5	Survey	4Q for mature, 12Q for immature	Nominal value of 6% of \$1500
13		6 to 8 depending on maturity	Client request, market evidence, survey	12Q	Notional rental
14		6 to 7	Investor input	Initially 4Q returning to trend	Notional rental
15		6 to 8	WACC, market evidence, investor expectations	Return to trend, econometric forecasts	4–5% of LMV
16		7.5 to 9 (Australia)	CAPM/WACC, IDR, reported	Current returning to trend	4.5–5% of LMV
17	7		Survey	4Q for current, 12Q	Notional rental based on market rental
18	6.5 larger, 7 smaller		IDR, consistency	Current to 12Q	4%LMV
19	7 to 7.5 NZ, 7 to 8.5 Australia		CAPM, market evidence, investor expectation	Current to forecast	Actual rental (lease & forestry rights), No rental (freehold)
20		7.5	IDR (60%), WACC (15%), surveys (25%)	Current return to trend (exports) or flat (Aust domestic)	5%LMV (freehold), Actual (lease), No cost (Forestry right)
21		8	Other valuers, cost of funds	12Q	0
22		7 to 8.5	Reality checks	8Q within 3 to 5 years of harvest, 12Q for younger	3%LMV
23	6 to 7	7.5 to 8.5	WACC, IDR, survey	Current to 12Q over 5 years	4.5%LMV

- Four valuers use investor input or expectations.
- Three valuers use consistency as the basis for deriving discount rate.
- Three valuers use discount rates from company reports.
- One valuer uses the cost of funds.
- One valuer uses a comparison of returns from competing land uses.

Many valuers use multiple sources, some in a very structured way:

- 'For the discount rate for current rotation cashflows we apply a weighting of 15% CAPM/WACC, 60% IDRs and 25% surveys. A different weighting is used for multi-rotation cashflows (15% WACC, 40% IDRs and 45% surveys).'

Consistency is a factor in revaluations for reporting:

- 'We use this survey, judgement based on market trends, the need to preserve continuity of a stable approach, and the need to manage expectations particularly for annual revaluations of younger to mid-rotation forests. We are averse to reporting significant value fluctuations on a year to year basis.'

4. How are log prices determined?

Some valuers (six out of 23) use constant prices for all years when forecasting cashflows. These are based on a 12Q average (four valuers), 6Q average (one valuer) or 4Q average (one valuer). However, most valuers (17 out of 23) transition over three to six years from current prices or a 4Q average to either 12Q average (nine valuers) or forecast prices (eight valuers). Examples of the latter include:

- 'We start with current prices reverting to the 5 year real average "long-term benchmark". Analysis of supply-demand factors may lead to an adjustment of the long-term price.'
- 'Current prices are used for the first 1 or 2 years reverting to a flat long-term forecast over 5 to 6 years. The forecast is based on FX, Shipping and CFR for China A grade.'
- 'We do not drive in the rear-view mirror. Current prices are those being achieved by the estate in the current market averaged over 12 months – we use AgriHQ prices where the estate has no current harvesting. Future prices are based on econometric model forecasts of future export prices and separate econometric forecasts of domestic prices. Markets must exist to be recognised.'
- 'We use a combination of econometric forecasts based on movements in macroeconomic drivers and return to trend based on historical actuals. Log price growth varies with product and geography. It ranges from flat real to projected real price growth of +20%.'
- 'Internally-developed econometric models provide forward-looking prices. For potential acquisitions,

a *market price* will be derived from seller-provided material or available market intelligence.'

5. How is the cost of land accounted for in valuing a tree crop?

Most valuers (20 out of 23) are including the opportunity cost of land for all tenures. On leasehold land, the actual rental is commonly being used as the cost of land, whereas for freehold land a notional land rental is being applied. Ten valuers calculate land rental as a percentage of land market value (LMV). The percentage varies from 3% to 6% with an average of 4.4%. Another valuer subtracts LMV from the discounted value of perpetual cashflows, implicitly applying a land rental of 7% (discount rate) of LMV. A further valuer calculates the land rental as 6% of a notional LMV of \$1500/ha.

Ten valuers (including two who also sometimes use a percentage of LMV) estimate the notional land rental using a range of sources including:

- Forest land rentals, including Crown Forestry Licence rentals.
- Market rentals for pastoral land.
- Land valuers.

Three valuers do not include a notional rental for freehold land. For example:

- 'Actual rentals are used for lease and forestry rights. Freehold assets are assumed to have no land costs other than direct costs such as land rates.'

Valuers typically have to deal with multiple land tenures. For example:

- 'For forest rights in Australia – no cost. We estimate one value for combined forest and land (multi-rotation cashflow used).
- For freehold – 5% of freehold value (freehold values either from independent land value or from local government rates notices).
- Lease land – current lease prices.'

6. Do you include cashflows from only the current crop?

When estimating the market value of a tree crop, 10 valuers only include cashflows from the current crop. A further five valuers only include cashflows from future rotations in special circumstances:

- 'Where the client is a long-term forest owner with multiple age-class forests or the client requests it; e.g. in a due diligence engagement.'
- 'Only if bound to future costs such as replanting.'
- 'If there is a legislative requirement to replant (or economic impediment to not replant), e.g. NZETS, or if the future rotation is expected to be NPV positive. Future rotations would be excluded from lease or freehold valuation where there is no requirement to replant and the expected return is below the discount rate.'

However, the other eight valuers routinely undertake a multiple-rotation valuation as part of establishing a market value as well as a single-rotation valuation that is accounting standard compliant. Cashflows from future rotations are included:

- 'Where required to mirror the practice of market determinants. In most cases transactions are on the basis of an ongoing investment model.'
- 'To derive market value of a forest estate. Where fair value is required we use current rotation cashflows where the discount rate is constrained so that current rotation tree crop value plus fair value of land = market value. To comply with the IFRS 13 definition of fair value both market value and fair value must essentially be the same.'
- 'Current crop only if for IFRS allocation to biological assets. However, if we are estimating the value of forestry rights that include multiple rotations, we do model the NPV of current and future rotations. But note that this is a true leasehold interest and, technically speaking, the value of future rotations reflects contributory land value.'
- 'In all circumstances, unless the tenure is a fixed term (such as a forestry right/cutting right for example).'
- 'Unless a lease is terminating after harvesting of the current tree crop or land is to be converted to an alternative land use, all analysis incorporates future rotations to understand the difference between the current tree crop (financial reporting) and perpetual (market based multiple rotation) tree crop values.'

7. When do you assume that cashflows occur?

A number of different conventions are assumed for the timing of cashflows:

- Start of a period – four valuers
- Middle of a period – 13 valuers
- End of a period – two valuers
- Mixture – four valuers
 - Start (annual costs), end (revenues), throughout year (operational costs)
 - Start (annual costs), anniversary (revenues), throughout (operational costs)
 - Start for revenues, costs evenly spread across period
 - Start for costs, middle for revenues.

8. Do you apply a stand-based or estate-based approach?

Ten valuers follow a stand-based approach while eight valuers adopt an estate-based approach. Five valuers use both approaches depending on the nature (size, age-class distribution) of the forest being valued and also the purpose of valuation. For estates of any size, stands cannot be treated independently of other stands. Estate models are used to regulate the yield.

9. Treatment of risk?

Eleven valuers primarily include risk in the cashflows by adjusting areas, yields, costs or prices. For example:

- 'Area attrition, yield adjustment and include insurance.'
- 'Try to load as much risk into cost, growth and revenue assumptions.'
- 'Allowance for a reduction in estimated Net Stocked Area to allow for windthrow.'

Four valuers use discount rate as the principal means of adjusting for risk. A further eight valuers use the discount rate as a secondary means to adjust for risk:

- 'Account for risk wherever possible in cashflow; i.e. areas, yields, costs and prices, inclusion of insurance cost in cashflow. Where this is difficult to quantify; i.e. market risk associated with an immature industry (redwood) – discount rate is used to allow for this risk.'
- 'Sometimes we will adjust input variables such as yield or area if we have evidence to support an adjustment, but typically we only use the discount rate to reflect risk.'
- 'To a degree we reflect this in the discount rate. For example if we are valuing a smaller, immature stand that is solely reliant on the export market we would use an 8.5% discount rate. If we are valuing a larger estate, close to maturity, with several markets available we would likely use a lower discount rate (sometimes as low as 7% – 7.5%).'

10. Method used to determine the market value of the carbon trading opportunity

Ten of the valuers have valued the carbon trading opportunity (i.e. the value of the opportunity to receive NZUs and the liability to surrender NZUs as carbon stocks increase or decrease) associated with a tree crop on post-1989 forest land. A further valuer is starting to include carbon in the valuation process but it was, 'Too early to provide definitive numbers.'

One valuer answered:

- 'No – but likely to do this in the future because of client requests.'

The income (expectation value) approach is the predominant method used. One valuer assumes that carbon value is attached to land and calculates it as the difference between pre-1990 and post-1989 land values.

11. Discount rate used to estimate the market value of the carbon trading opportunity

Discount rates used vary:

- Six valuers use the same discount rate for valuing the carbon trading opportunity as for valuing the tree crop.
- Two valuers use a discount rate for carbon that is higher. One uses a discount rate of 10% to 12% based on an analysis of post-1989 transactions. The

other adds a premium of 2% to 4% to the tree crop discount rate.

- One valuer uses a lower discount rate for carbon.
- One valuer uses a scenario approach. 'An emerging market and methodology! We test a range of discount rates (and carbon prices, and trading levels, and trading safe versus all). We look at the resulting impact on value and use professional opinion to select a value within that range (generally an average of the scenarios).'

Seven of the 10 valuers use pre-tax cashflows.

12. How do you determine the carbon prices used

Most valuers use current prices for carbon.

13. What carbon trading strategy is assumed?

Different trading strategies are assumed from selling only safe units (three valuers) to selling all units (five valuers). Two valuers consider both selling safe carbon and selling all carbon.

14. How is the cost of land accounted for in valuing the carbon trading opportunity?

Only two valuers partition land rental between the tree crop and carbon trading opportunity.

15. Discount rate implied by recent transactions

Information provided by 12 valuers on estimates of the IDRs for 19 New Zealand and eight Australian transactions is collated in Table 2. In summary, for the New Zealand transactions:

- The range of IDRs (applied to current rotation post-tax cashflows) in the 2017 survey is 4.0% to 9.2% (12 transactions) with an average of 7.0%. In the 2015 survey the range was 3.7% to 11.0% with an average of 6.9%.
- The range of IDRs (applied to current rotation pre-tax cashflows) in the 2017 survey is 4.0% to 10.7% (13 transactions) with an average of 7.6%. In the 2015 survey the range was 4.8% to 13.6% with an average of 8.6%.

The eight reported Australian transactions were all medium or large forests including three forests that were totally or predominantly eucalypt. For current rotation pre-tax cashflows the range of IDRs is 7.7% to 10.8% (6 transactions) with an average of 8.5%.

Replanting and new planting

16. What discount rate do you use to evaluate replanting or new planting investments?

All but one of the 14 valuers who responded to this question use the same (or a similar) discount rate to that for forest valuation. One valuer indicated, 'Maybe 0.5 to 1% higher for greenfield investment.'

17. What is your estimate of the internal rate of return (IRR) on replanting or new planting?

Sixteen valuers provided estimates of the IRR being achieved on replanting or new planting in New Zealand and these vary by valuer and region (Table 3). Eight valuers provided an estimate of the increase in IRR associated with the carbon trading opportunity associated with new planting. These estimates range from 0% to 5% with six between 1% and 2.3%.

The estimates in Table 3 are for radiata pine. Limited information was provided for other species:

- 8% to 9% Redwood CNI/SNI
- 3% to 5% Southland Douglas-fir.
- Three valuers provided estimates for Australia:
 - Radiata pine
 - 4% to 6.5% Green Triangle
 - 3.1% to 5.5% Murray Valley
 - 4.5% Tasmania.
 - Eucalypts
 - 0% to 12% eucalypt in Australia
 - 3.7% to 5.2% *E. globulus* in Green Triangle/WA
 - 1.8% to 5.8% *E. globulus* in Tasmania (NE/NW)
 - 1.5% to 6.6% *E. nitens* in Tasmania (NE/NW).

Discussion

Trends in IDR

Figures 2 and 3 show the IDRs (applied to current rotation post-tax cashflows and pre-tax cashflows, respectively) of transactions reported in all 11 surveys to date. Note that IDRs for each transaction have been averaged in the cases where there was more than one respondent.

The average discount rate being applied is:

- 7.0% for post-tax cashflows in 2017 compared to 6.9% in 2015:
 - 5.8% for medium-large forests in 2017 compared to 6.4% in 2015
 - 7.2% for small forests in 2017 compared to 7.1% in 2015.
- 7.6% for pre-tax cashflows in 2017 compared to 8.6% in 2015:
 - 5.9% for medium-large forests in 2017 compared to 7.8% in 2015
 - 8.4% for small forests in 2015 compared to 9.1% in 2015.

The differences in IDR between the medium-large and small forests in the 2017 survey are most evident in Figure 3 where the IDRs for the four medium-large transactions are all in the bottom half of the range. Obviously caution must be exercised given the small number of medium-large transactions reported in this survey – IDRs for pre-

tax cashflows were provided for all four transactions but IDRs for post-tax cashflows were provided for only two. However, the reduction in the discount rate for medium-large forests is a continuation of the trend in recent years from 9.0% in 2013 to 7.8% in 2015 to 5.9% in 2017 for pre-tax cashflows. For post-tax cashflows the trend has been from 7.6% in 2013 to 6.4% in 2015 to 5.8% in 2017.

In contrast, average IDRs for small forests have shown little change: from 8.7% in 2013 to 9.1% in 2015 to 8.4% in 2017 for pre-tax cashflows; and from 7.2% in 2013 to 7.1% in 2015 to 7.2% in 2017 for post-tax cashflows.

Discount rates declared in financial reporting

Discount rates being used for financial reporting have also reduced since 2014 (Table 4), although not at the same rate indicated by the reductions in IDRs for medium-large companies. Average reported discount rate for pre-tax cashflows for the 14 companies documented in Table 4 have reduced from 8.4% in 2014 to 8.1% in 2015 to 7.7% in 2016 to 7.5% in 2017. However, there have been different trends for individual companies. For the period that aligns with discount rate surveys (2015 to 2017) the reduction in discount rate ranges from 0% to 1% with an average of 0.6%.

Table 2: Estimates of the discount rate implicit in the transaction price of forests or interests in forests sold during 2016 and 2017. Forests are described by location and size class (small <1000 ha; medium 1000 to 10,000 ha; large >10,000 ha). Where there are multiple respondents for a transaction the average is reported together with the range

	Forest	Size	Location	Number of respondents	IDR applied to post-tax cashflows		IDR applied to pre-tax cashflows	
					Current rotation	Multiple rotations	Current rotation	Multiple rotations
New Zealand	1	Small	Northland	1				7
	2	Small	Northland	1	7			
	3	Small	Northland	1	7.5			
	4	Small	Northland	1	9.2		10.5	
	5	Small	Northland	1	6.9		9.2	
	6	Small	CNI	1			8	
	7	Small	Hawke's Bay	1	7			
	8	Small	Hawke's Bay	1	7.85		10.5	
	9	Small	Hawke's Bay	1	6			
	10	Small	Hawke's Bay	2	5.5 (5.0–6.0)			
	11	Small	SNI	2		5	6.8	6.3
	12	Small	Marlborough	1	8.5		10.7	
	13	Small	Nelson	1			8	
	14	Small	Canterbury	1	7		8	
	15	Small	Otago	1			4	
	16	Medium	Northland	2	7.5		7.4	
	17	Medium	SNI	3	4		5.6	5.1 (4.5–5.7)
	18	Medium	Marlborough	2		6.5	5.5	5.6
	19	Large	Nelson	3		6	4.9	6.1
Australia	1	Medium	Murray Valley	1		7.5		
	2	Medium	Murray Valley	2		6	8	
	3	Medium	Murray Valley	4		5	8.5 (6.7–11.6)	6.6 (6.2–7.3)
	4	Medium	Murray Valley	1		6		
	5	Medium	NSW	2			7.7 (6.9–8.5)	3.5 (0.2–6.8)
	6 (Hardwood)	Medium	Victoria	2		8.5	8	
	7 (Hardwood)	Large	SA	2			8.1 (5.7–10.5)	6.8 (5.7–8.0)
	8 (Hardwood)	Large	Tasmania	4		6.1 (5.2–7.0)	10.8 (7.5–14.2)	7.1 (6.7–7.5)

Table 3: Estimates of IRR on radiata pine replanting or new planting by region – the carbon add-on column gives the estimated increase in IRR when carbon trading costs and revenues are included

Valuer	NZ	North Is	Northland	CNI	East Coast	Hawke's Bay	SNI	Nelson/ Marlborough	Canterbury	Otago Southland	Carbon add-on
1		6.3									1.4
2				6–8	3–5						
3	4.5										1.5
4			7.3	7.5–9.4		9.3					
5						9–11	6–8				
6								4–6			
7			5–6	8–8.5	6–7	6–7.5	5–7	7–8.5	3–5	5–6.5	1–1.5
8				6							2.3
10				6–8			6–8				2
11	6										
15	6–8										5
18								4			
19	4–5										0
21						5–6			1.5–3	4–6	
22	4–8										
23				6.5–8.5			4.5–6.5				1.5

Comparison to Sewall Investor Survey

US forest valuation company James W. Sewall Company regularly carries out its own survey of discount rates. In the Sewall Investor Survey undertaken in 2017 Q4 there were 28 responses from active investors to the question, 'What is the 'base' discount rate (real, pre-tax, before TIMO fees & expenses) required for successful bids on generic timberland investments in the U.S. now?' Mean response was 5.23%. This value is similar to that for the Sewall June–July 2015 survey – 5.25%.

Respondents were subsequently asked to 'Provide the discount rate premium over the U.S. base rate' for a range of international forest investments. For New Zealand pine the

premium was 0.95% (mean), down from 1.32% in 2015. For Australian planted pine the premium was 1.05% (mean). For Australian planted eucalypt it was 1.83% (mean).

The discount rates in the Sewall Survey are applicable to multiple rotations rather than just the current rotation. IDRs for pre-tax cashflows and multiple rotations were reported for three New Zealand and four Australian medium-large forests in the 2017 NZIF discount rate survey. The IDRs for the New Zealand transactions are 5.1% to 6.1%, which are lower than the mean of 6.2% for the Sewall Survey. The IDRs for two Australian pine transactions are 3.5% and 6.6% compared to the Sewall estimate of 6.3%, while the IDRs for two hardwood transactions are 6.8% and 7.1%, similar to the Sewall estimate of 7.1%.

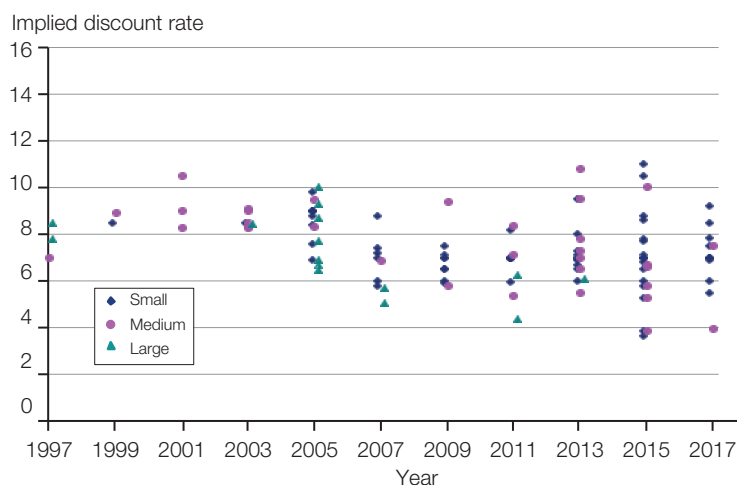


Figure 2: IDRs (applied to current rotation post-tax cashflows) for transactions reported in each of the discount rate surveys. Forests are identified by size class (small <1000 ha; medium 1000 to 10,000 ha; large >10,000 ha)

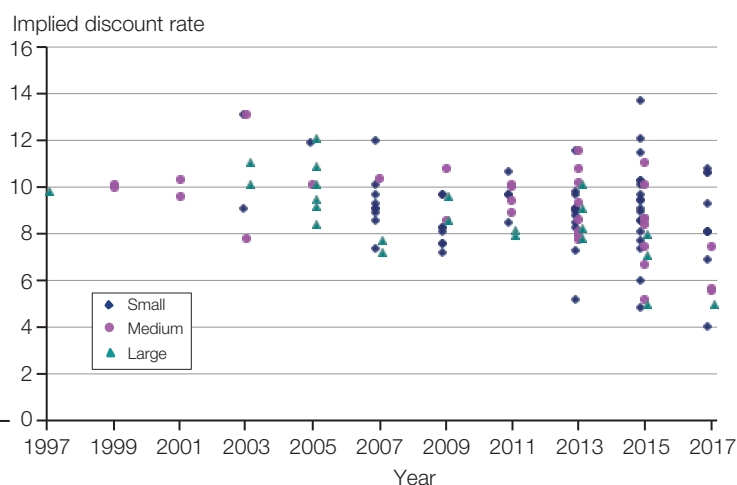


Figure 3: IDRs (applied to current rotation pre-tax cashflows) for transactions reported in each of the discount rate surveys. Forests are identified by size class (small <1000 ha; medium 1000 to 10,000 ha; large >10,000 ha)

IDR versus IRR

Table 2 has, for some transactions, estimates of IDR applied to cashflows for multiple rotations as well as the current rotation. For Australian transactions the multiple rotation IDRs (for pre-tax cashflows) are 1.3% to 4.2% lower than the current rotation IDR, indicating that the IRR of subsequent rotations is less than the IDR of the current rotation. For Australian Forest 5, one valuer estimated a current rotation IDR of 6.9% but a multiple rotation IDR of only 0.2% – ‘these are very low productivity sites.’

For New Zealand transactions, the difference between the IDR reported for multiple rotations and the current rotation IDR of the same transaction is less than for the 2015 survey. In that survey the IDR for multiple rotations was often over 1% lower than the current rotation IDR. However, the 2017 survey indicates that the IRR on replanting is getting closer to the IDR for the current rotation.

The NZIF Forest Valuation Working Party has been considering how to deal with the contribution of the second and subsequent rotations to forest valuation, particularly when it is negative. The IRRs reported in Question 17 are, on average, higher than those reported in 2015. This, in conjunction with the reductions in IDRs, at least for medium-large forests, means that there will be fewer cases (and less impact) of the second and subsequent rotations having a negative value.

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Table 4: Discount rates declared in financial reporting for NZ-registered companies with annual reports in the public domain. All rates are applied to current rotation pre-tax cashflows (apart from City Forests which uses current rotation post-tax cashflows)

Company	Reporting	2014	2015	2016	2017
China Forestry Group	31 Dec	8.2 ¹	8.2 ¹	8.2 ¹	8.0
Greenheart NZ	31 Dec	8.5	8.5	8.5	8.5
GTI 8 New Zealand	31 Dec	8.5	8.5	8.0	7.5
Invercargill City Forests	30 June	9.5	8.5	8.0	7.5
Kaingaroa Timberlands	30 June	7.5	7.5	7.0	6.5
Nelson Forests	31 Dec	8.5	7.5	7.5	7.0
Pan Pac Forest Products	31 March		8.0	7.5	7.25
Matariki Forestry Group	31 Dec	8.5	8.5	8.0	7.75
SunChang Forestry NZ	31 Dec	8.7	8.7	8.6	8.6
Taumata Plantations Ltd	30 June	8.5	7.5	7.5	7.25
Te Waihou Plantations	31 Dec	8.5	8.5	8.0	8.0
Tiaki Plantations	30 June	7.5	7.25	6.75	6.5
Timbergrow Plantations (Forest/Carbon)	30 June	9.0/8.0	8.5/8.0	7.5/8.0	7.5/8.0
Wenita Forest Products	31 Dec	7.5	7.5	7.0	7.0
City Forests (post-tax cashflows)	30 June	7.0	7.0	6.5	6.5

Note ¹: Reported as equivalent to the 6.5% discount rate applied to post-tax cashflows used in the valuation

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