

# Discount rates used for forest valuation – results of 2021 survey

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## Abstract

A total of 23 forest valuers responded to the survey and provided information on 25 New Zealand and four Australian transactions in 2020 and 2021. The average reported implied discount rate (IDR) for the New Zealand transactions is in the range 3.4% to 9.5% for current rotation pre-tax cashflows (17 transactions) and 4.7% to 8.4% for multiple rotation pre-tax cashflows (14 transactions). Overall, averages are 6.2% (current rotation) and 6.6% (multiple rotations) compared to 7.3% and 7.1% in the 2019 survey. IDRs for the transactions of medium or large forests are, on average, lower than those for small (<1,000 ha) forests, 5.3% vs 6.9% for current rotation pre-tax cashflows and 6.3% vs 7.3% for multiple rotation pre-tax cashflows.

Forest valuers also provided the discount rate they use to estimate the market value of a forest. Valuers apply an average discount rate to current rotation pre-tax cashflows of 7.3% for medium-large forests and 7.8% for small forests. They use an average discount rate for multiple rotation pre-tax cashflows of 6.8% for medium-large forests and 7.4% for small forests. Some 20 of the 23 valuers included in the 2021 survey also participated in the 2019 survey. There has been an average reduction of 0.3 percentage points in discount rate for 19 valuers of New Zealand forests and 0.2 percentage points for eight valuers of Australian forests.

## Introduction

Forest valuers were surveyed during the last quarter of 2021 about the discount rate used for forest valuation. The survey is an update of similar surveys carried out every two years since 1997, with the last survey carried out in 2019 (Manley, 2020). Some 23 forest valuers were surveyed.

## Responses to survey questions

### 1. Method used to estimate the market value of a forest

All 23 valuers use the Income (Expectation Value) approach to estimate the market value of a forest. Many valuers use a suite of approaches and also use the Cost approach and, in some cases, the Sales Comparison approach. One valuer noted that:

*‘The commonly described methods to which I am obliged to give at least initial attention are:*

- *Transaction evidence*
- *Income*
- *Cost.*

*If the forest is fully (economically) mature and could be harvested promptly, value may be estimated on the basis of its standing stock. If it has only recently sold, the transaction value may be based on what it sold for.’*

Six valuers blend the Income and Cost approaches for young stands, including one between ages five and 10 years, and another between ages five and 15 years.

## Use of the Cost approach

The Cost approach is sometimes used by 21 of the valuers for valuing young forests (typically when stands are under five to 10 years old) and in other limited circumstances. For example:

*‘When the forest is wholly young, or perhaps for the younger age classes of a forest with a bimodal age class distribution.’*

*‘Estates with predominantly young pre-commercial stands where:*

- *Yields and end markets may not be able to be reliably determined,*
- *The expectation approach results in an unrealistic ‘willing seller-willing buyer’ scenario (i.e. negative tree crop value).’*

Follow-up questions were answered by the 21 valuers who sometimes use the Cost approach (Table 1).

Table 1: Components included by valuers who use the Cost approach to forest valuation

Component included	Yes	No	Sometimes
Indirect costs (e.g. supervision)	19		2
Overhead costs	19		2
Cost of using land	15	4	2
Cost of time	18	3	

All valuers who include the cost of time use a lower rate to compound costs than they do to discount cashflows in the Income approach. However, a wide range of rates is used. Respondents reported using rates of 1% to 6% on pre-tax costs and 2% to 4% on post-tax costs. The average rate was 3.6% (3.4% in 2019) for pre-tax costs and 3% (3.5% in 2019) for post-tax costs.

Eighteen of the valuers use pre-tax costs and three post-tax costs.

## 2. Discount rate used to estimate the market value of a tree crop (or forest)

Some 22 of the 23 surveyed valuers value New Zealand forests, while 10 value Australian forests. Of the 22 valuers of New Zealand forests, three apply the Income approach using only post-tax cashflows, 13 use only pre-tax cashflows, while six use both.

Average discount rates are presented in Table 2. There is only a small number of responses for some of the 16 combinations of country, forest size, type of cashflows and number of rotations. The most

precise comparison is when responses are considered only from valuers providing a response for both discount rates in each comparison. These comparisons indicate that:

- Lower discount rates are generally used for medium-large forests compared to small forests (Table 3)
- Lower discount rates are generally used for multiple rotations compared to current rotation (Table 4)
- There is no consistent difference between the discount rates used for New Zealand forests compared to Australian forests (Table 5).

### Has the discount rate used by valuers changed since 2019?

Some 20 of the 23 valuers included in the 2021 survey also participated in the 2019 survey. Figure 1 gives the frequency distribution of the change in discount rate. The average change for the 19 valuers of New Zealand forests is a reduction of 0.3 percentage points, with a reduction of 0.2 percentage points for the eight valuers of Australian forests.

Table 2: Discount rates being used to value forests by country (New Zealand vs Australia), size (small vs medium-large), type of cashflow (pre-tax vs post-tax) and number of rotations (current rotation vs multiple rotations)

New Zealand	Discount rate applied to post-tax cashflows		Discount rate applied to pre-tax cashflows	
	Current rotation	Multiple rotations	Current rotation	Multiple rotations
Small forests (<1,000 ha)	7.0 (6) 6.0 – 8.0	7.0 (2) 6.5 – 7.5	7.8 (13) 6.5 – 9.5	7.4 (7) 6.5 – 9.0
Medium-large forests (>1,000 ha)	5.9 (6) 4.0 – 6.8	6.4 (3) 6.0 – 6.8	7.3 (14) 5.5 – 8.5	6.8 (10) 5.5 – 8.0

Australia	Discount rate applied to post-tax cashflows		Discount rate applied to pre-tax cashflows	
	Current rotation	Multiple rotations	Current rotation	Multiple rotations
Small forests (<1,000 ha)	7.5 (1) 7.5 – 7.5	7.0 (1) 7.0 – 7.0	8.2 (4) 6.5 – 10.0	7.6 (5) 6.5 – 8.5
Medium-large forests (>1,000 ha)	6.9 (2) 6.5 – 7.3	6.6 (2) 6.0 – 7.3	7.5 (7) 5.5 – 9.0	7.1 (10) 5.5 – 9.0

Note: The results presented for each cell are the average with the number of respondents in brackets. The second row in each cell contains the range across all respondents. Some valuers provided a range of values

Table 3: Impact of forest size – differentials in discount rate for forest size using paired comparisons from valuers who provided a response for both discount rates in a comparison

New Zealand	Post-tax		Pre-tax	
	Current	Multiple	Current	Multiple
Differential	1.00	0.75	0.65	0.75
Respondents	4	2	10	7

Australia	Post-tax		Pre-tax	
	Current	Multiple	Current	Multiple
Differential	1.00	1.00	0.88	0.95
Respondents	1	1	4	5

Note: Differentials are calculated as discount rate for small forests (<1,000 ha) minus discount rate for medium-large forests

Table 4: Impact of number of rotations – differentials in discount rate for rotations using paired comparisons from valuers who provided a response for both discount rates in a comparison

New Zealand	Post-tax		Pre-tax	
	Small	Large	Small	Large
Differential	0.50	0.25	0.13	0.33
Respondents	1	2	4	8

Australia	Post-tax		Pre-tax	
	Current	Multiple	Current	Multiple
Differential	0.50	0.25	0.50	0.50
Respondents	1	2	4	5

Note: Differentials are calculated as discount rate for current rotation minus discount rate for multiple rotations

Table 5: Impact of country – differentials in discount rate for country using paired comparisons from valuers who provided a response for both discount rates in a comparison

	Post-tax		Pre-tax	
	Current	Multiple	Current	Multiple
Small				
Differential	-0.50	-0.50	0.00	0.00
Respondents	1	1	3	4
Med-large				
Differential	0.25	0.25	0.13	0.10
Respondents	2	2	4	5

Note: Differentials are calculated as discount rate for Australian forests minus discount rate for New Zealand forests

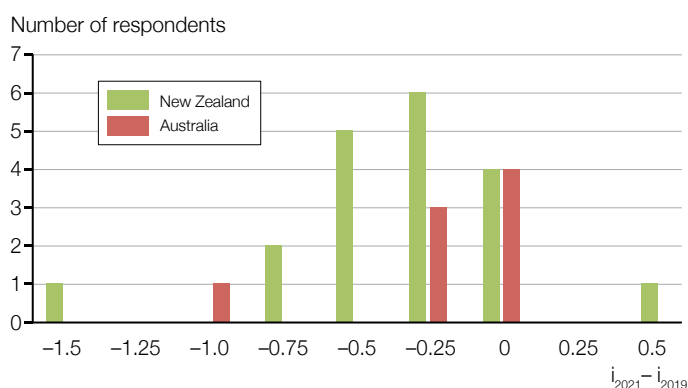


Figure 1: Frequency of change in discount rate from 2019 to 2021 for individual valuers

### 3. How is the discount rate selected?

Valuers base discount rate on a range of information sources:

- 14 valuers use IDRs, while another four use unspecified 'market evidence'
- Nine valuers use survey results, while another two use opinions from other valuers
- Five valuers use investor input or expectations
- Eight valuers use CAPM/WACC
- Two valuers use reported discount rates
- One valuer uses a US discount rate plus a New Zealand country risk premium.

Many valuers use multiple sources. For example:

*'We do look at WACC/CAPM derived rates but mainly to assess trends rather than absolute figures. The main basis for assessing an appropriate rate is from implied discount rates from transactions. (In that way there is consistency between the discount rate and the cashflow characteristics e.g. log price forecasting methodology, single-multiple rotation, treatment of land etc). There is then a subjective adjustment made relative to the 'country average forest' 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 (though where possible these risks are incorporated in the cashflow).'*

### 4. How are log prices determined?

Some valuers (eight out of 23) use constant prices for all years when forecasting cashflows. These are based on prices that range from current prices to a three-year average. Commonly different prices are used for forests of different ages:

*'Depends on the valuation and timeframes. Mid rotation = 3-year average. Mature = 12 months average. Immediate liquidation = current log prices.'*

Many valuers (15 out of 23) transition over one to five years from current prices (or a one-year or a three-year average) to a three to five-year average or to forecast prices from econometrics models. Examples include:

*'I use 1-year averages for trees to be harvested within 3 years and 3-year averages for harvest 4+ years into the future.'*

*'The price assumed in the first period of the model is our expectation of what prices will be over the next 12 months. We do not adopt a fixed approach to determining what this is. It might be the current quarter price, the average of the last 12 months or these may be adjusted based on expectations from market participants. Longer term prices (3-5+ years) generally return to trend or return to historic average (3-5 years, real). We also utilise an econometric model as a further check on the assumed prices.'*

Recent log price volatility has caused some adjustment to the approach used:

*'We return to trend with the long-term trend based on 5-year average prices. We used to use 3-year averages but changed because there has been so much volatility lately.'*

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

Most valuers (21 out of 23) include the opportunity cost of land for all tenures. On leasehold land, the actual rental is commonly used as the cost of land whereas for freehold land a notional land rental is applied. As part of estimating a market-based land rental, 17 valuers will calculate land rental as a percentage of land market value (LMV). The percentage varies from 3.5% to 7.5%, with an average of 4.2%, which is similar to 4.4% in the 2019 survey. One valuer uses a notional rental of \$60 to \$90/ha/yr.

*'We include a notional rental that as far as possible is based on rental rates for similar land, though this often equates to around 3-5% of the capital value. In the absence of rental evidence, we will often use a rental rate that is around 3%-4% of the capital value.'*

Sources of the market-based land rental are forest land rentals and land valuers. In some cases, land valuers are asked to directly provide the land rental. In other cases, the land valuer is asked to provide LMV which the forest valuer then applies a percentage to in order to estimate land rental.

*'The client typically engages a land valuer to provide land rental (80% of cases). We will select a land rental cost based on the land valuer's land valuation assessment (20% of cases).'*

*'In at least two recent valuations (for both NZ and Australian assets) clients have stipulated that the land valuer will provide an opinion for the notional land rental, for which the land valuer provided useful access to rental evidence. In those cases, the rates selected by the land valuer were in the range 3.0–3.75% of LMV. In other cases, it is common that we have opportunity to discuss rural land rental rates with the assigned land valuer or with other land valuers known to us. Failing that we do own research for publicly available land rental rates.'*

*'We have not used a land valuer but we are considering this moving forward with impact of carbon on land prices.'*

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

When estimating the market value of a tree crop, eight valuers only include cashflows from the current crop. A further four valuers only include cashflows from future rotations in special circumstances, such as budgeting or calculation of land value from LEV.

While one valuer only does multiple-rotation valuations, 10 valuers routinely undertake both multiple rotation valuations as well as single rotation valuations:

*'Other than if the asset for sale is a single rotation forestry right, we have never observed a purchaser of a forest asset ignoring the costs and returns of subsequent rotations. We believe it is therefore prudent to replicate the practice of forest buyers and include multiple rotations (and indeed believe IFRS 13 encourages a valuer to replicate purchase behaviour). We do however also calculate the rates that would need to be applied to current and future rotations to achieve an equivalent value.'*

*'The market value of the tree crop is derived for the long-term cashflows (long-term investment model). We also use current cashflows where IFRS fair value is required with the value constrained to the long-term value by use of the discount rate. Fair value must equal market value by definition.'*

Ten of the 11 valuers who value multiple rotations include a terminal value in multiple-rotation valuations. These are typically calculated by assuming that the average of cashflows for a period prior to termination apply. The averaging period varies from the last year to the last rotation.

## 7. Do you separately distinguish the value of durable assets (e.g. roads and buildings) from the value of land?

Only two valuers routinely distinguish the value of roads and buildings. One values roads at depreciated construction cost, while the other separates building, plant and equipment (but not roads). Of the other 21 valuers, five stated that they occasionally separate out the durable assets. For example:

*'If durable assets make up a very large component then we have separated. However generally they are not separated. Their value is intrinsically embedded in the value of the asset by way of an avoided cost (so is typically part of the tree crop value). In principle a notional rental could also be included in the cashflows for these components, but this is infrequently applied.'*

## 8. When do you assume that cashflows occur?

Different conventions are assumed for the timing of cashflows:

- Start of a period – two valuers
- Middle of a period – 16 valuers
- End of a period – four valuers
- Mixture – one valuer:
  - Start (annual costs), end (revenues), whenever they occur but usually start (operational costs).

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

Six valuers follow a stand-based approach, while 12 valuers adopt an estate-based approach. Five valuers use both approaches, depending on the nature (size, age-class distribution) of the forest being valued.

## 10. Treatment of risk?

Seventeen valuers include risk in the cashflows by adjusting areas, yields, costs or prices. Of these 17 valuers, 14 also use the discount rate to adjust for forest-specific risk – five regularly and nine as a last resort for factors that cannot readily be incorporated into cashflows. An additional four valuers use discount rate as the principal means of adjusting for forest-specific risk. Two valuers make no specific allowance for risk. Example responses were:

*'We consider the following key value drivers:*

- *Stability of existing cashflows*
- *Status of market access arrangements*
- *Market risk*
- *Price volatility*
- *Lack of existing log or chip sales evidence*



- Robustness of resource description
- Uncertainty around future yield outcomes, particularly for hardwood plantations
- Climatic risk – climate change impacts, fire & storm history.

*Where these inputs can't be effectively accounted for in the forest estate model inputs, then the discount rate is adjusted.'*

*'We incorporate insurance as a cost where we have sufficient evidence for this (even if the client does not insure) as a proxy for risk.'*

## 11. Harvesting strategy applied in yield regulation

Forest valuers apply yield regulation constraints when the scale of the estate and circumstances warrant it:

*'The wood flow constraints are specific to each asset. There is no particular formula that is applied. Contracted commitments are modelled to ensure they can be satisfied. Beyond 10 years, constraints are typically relaxed with volumes constrained by market/production capacity limits.'*

*'Generally some sort of yield regulation is applied so that the annual harvest volumes are realistic in terms of local crew capacity, forward road construction, and market capacity (including ports). For a woodlot or small forest, then the harvest would normally coincide with optimum rotation length assuming the above checks are not violated.'*

## 12. Do you factor into the replant yield tables expectations of ongoing productivity improvements from tree breeding or evolving management practices?

Valuers are very cautious with expectations about yield improvement in subsequent rotations. Eleven valuers make no allowance for yield improvement while the other 12 sometimes do:

*'Only improvements already captured in the yield tables.'*

*'Sometimes. Especially if we deem the current regime to be suboptimal.'*

*'For larger managed estates then where the replant yield tables are provided then it will depend on their assumptions. Our understanding is that in most cases an explicit adjustment for tree breeding is not normally made, although if the replant yield tables are based on plot measurements from existing crops (some of them quite young) then the corresponding level of improvement will be captured. The principle seems to be that only improvement that can be measured is included. In due diligence jobs, we frequently run scenarios where different levels of improvement are applied to replant yield tables – however because of the long time until harvest, the impact on NPV may not be that high.'*

*'Prepared to accommodate this to careful extent. This would mostly be through utilising the generic yield tables that are already assigned to younger age classes of the existing tree crop.'*

*'We may do, this will depend on the underlying commitment to tree breeding and management regimes. Changes in regime are incorporated.'*

*'We assess this on a case-by-case basis. In most cases, we assume that improved management and genetics will lead to an increase in yields in subsequent rotations.'*

*'Yes where data can support.'*

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

Seventeen of the 22 valuers who value New Zealand plantations have valued the carbon trading opportunity associated with a tree crop on post-1989 forest land. Another valuer noted that it is 'Currently at a formative stage in Australia –with the Plantation Forestry Method introduced into the Emission Reduction Fund. The valuation approach is continuing to evolve.'

The Income approach, in some form, is the method used by all 17 valuers. Variations arise from differences between the current stock change approach, including whether production or permanent forestry is intended, and the future averaging approach.

One valuer emphasised:

*'... that nearly every current Post89 registered forest we look at now for small forest owners we are being asked to value the carbon trading opportunity for permanence. Every small forest owner wants to know what the future value of the carbon trading opportunity is and wants to compare this with the harvest value opportunity. In cases where the forest has been registered since 2008 or later, and has been generating NZUs every year with the forest owner anticipating to hand these NZUs back, the carbon value opportunity by selling NZUs under a permanent forest strategy outweighs the harvest value, with no log price risk, health and safety risk, etc. I have seen a number of well managed forest 50 ha–150 ha that have been pruned and thinned being brought for the carbon value under a permanent forest strategy.'*

*'We are only doing carbon valuations on forest that are currently ETS registered. For non-registered blocks which may be eligible we are just providing a possible carbon cashflow opportunity as there is inherent risk with eligibility and the ETS registration process.'*

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

Discount rates used vary:

- Eight valuers use the same discount rate for valuing the carbon trading opportunity as for valuing the tree crop. One of these valuers noted that:

*'Currently there is no clear basis for arriving at an appropriate discount rate for carbon so in the absence of clear direction we have used our normal forest discount rate. There is an argument that the discount rate should be significantly higher given the immaturity of this market, but it also comes back to the carbon price that is being assumed.'*

- Eight valuers use a discount rate for carbon that is 1% to 3% higher (average 2.2%) than that used for valuing the tree crop:

*'Higher than pure log production to account for the risk in carbon projects from political interference and world influences.'*

*'Market volatility and political/regulation risk.'*

- One valuer uses different discount rates for different carbon accounting approaches:

*'For the stock change approach the discount rate is based on low-risk deposit rates, i.e. what an owner could earn on a low risk investment for their traded NZUs to meet future obligations. For the averaging approach the discount rate is similar to forest investment discount rate.'*

## 15. How do you determine the carbon prices used?

Carbon prices are based on:

- Current prices (11 valuers)
- 12-month average (one valuer)
- Current price with a 2% to 3% annual increase (one valuer)
- 'Spot carbon price for valuing the carbon generated from 2018–2022 and have been applying a 3% to 5% NZU price growth annually. We place a \$120–\$150 NZU price cap within our models to reflect future price uncertainty.' (one valuer)
- Other non-specified approach (three valuers).

## 16. What carbon trading strategy is assumed?

Fifteen valuers normally assume that only units that do not need to be subsequently surrendered are sold, i.e.:

- Safe carbon under the stock change approach when production forestry with clearfelling is intended.
- All carbon under the stock change approach when permanent forestry is intended
- Average level of carbon under the averaging approach.

*'For forests that are registered under the stock change approach we normally only assume trading up to a safe level. However, determining the appropriate safe level can be challenging as it is dependent on the harvesting strategy employed when modelling at an estate level.'*

Two valuers assume that all carbon units are sold. One of these assumes that 'all NZUs are traded subject to the constraint that stumpage revenue covers surrender liability.'

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

Only six valuers have partitioned land rental between the tree crop and carbon trading opportunity. One assumes that the 'Cost of land (removing any value associated with carbon to the land) has a market rental assigned to the tree crop, with the carbon opportunity valued separately.' One valuer who does not normally partition the land cost commented that:

*'Ideally should be partitioned but is difficult to infer the appropriate rates. Will become clearer as market evidence increases for differences between ETS eligible and non-eligible land.'*

## 18. Discount rate implied by recent transactions

Information provided by 11 valuers on estimates of the IDRs for 25 New Zealand (24 softwood and one hardwood) and four Australian (two softwood and two hardwood) transactions is collated in Table 6. There are relatively few IDRs reported for post-tax cashflows. Consequently, comparisons with 2019 results are only made for IDRs reported for pre-tax cashflows. In summary, for the New Zealand softwood transactions:

- The range of IDRs (applied to current rotation pre-tax cashflows) in the 2021 survey is 3.4% to 9.5% (17 transactions), with an average of 6.2%. In the 2019 survey the range was 4.1 to 11.5%, with an average of 7.3%
- The range of IDRs (applied to multiple rotation pre-tax cashflows) in the 2021 survey is 4.7% to 8.4% (14 transactions), with an average of 6.6%. In the 2019 survey the range was 5.9% to 8%, with an average of 7.1%.

Differences are evident in the estimates of IDR by different valuers for the same transaction. This occurs because different valuers will have different assumptions about other valuation inputs. New Zealand transactions 3 and 20, in particular, show a range of IDRs. The IDR estimated by one valuer for transaction 3 was negative (–1.7%) – 'with normal market prices the sum of the cashflow is less than the purchase cost. Also, there is a potential strategic component to the purchase.'

## Replanting and new planting

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

All but two of the 17 valuers who responded to this question use the same (or a similar) discount rate to that for forest valuation. One valuer noted:

*'Our observations of forest acquisitions and forest management is that as long as the return from replanting matches or exceeds that from other land uses (which is typically between 3% to 5%) then forestry tends to be perpetuated.'*

Table 6: Estimates of the discount rate implicit in the transaction price of forests or interests in forests sold during 2020 and 2021. Forests are described by location and size class (small <1,000 ha, medium 1,000 to 10,000 ha and large >10,000 ha)

		Size	Location	Number of respondents	IDR applied to post-tax cashflows		IDR applied to pre-tax cashflows	
New Zealand					Current rotation	Multiple rotations	Current rotation	Multiple rotations
1		Small	Northland	1			7	7.4
2		Small	CNI	1			8.5	
3		Small	CNI	2			3.6 (-1.7-5.5)	6.3
4		Small	SNI West	1			6	
5		Small	SNI West	1			7.75	
6		Small	SNI West	1			7.5	
7		Small	SNI West	1			9.5	
8		Small	SNI East	1			6	
9		Small	SNI East	1			6	
10		Small	SNI East	1				7.5
11		Small	SNI East	1				8
12		Small	Marlborough	1	8			
13		Small	Marlborough	1	8			
14		Small	Marlborough	1				7.5
15		Medium	CNI	2			6.5	6
16		Medium	East Coast	2			5.2	7 (5.5-8.5)
17		Medium	East Coast	1			4.7	4.7
18		Medium	SNI East	1				8.4
19		Medium	SNI	3			3.4	5.6 (4.4-6.3)
20		Medium	Nelson	3	3.7		5.3 (1.7-9)	
21		Medium	Southland	3			6	5.9 (5.2-6.5)
22		Medium	South Island	4			4.7	5.9 (4.9-7.5)
23		Large	North Island	2			6.9	6.7 (6.5-6.9)
24		Large	Otago	1				6
25	Hardwood	Medium	Southland	1			7.5	
Australia								
A1		Large	SA/Vic	4			5	4.9 (3.5-5.9)
A2		Large	Tasmania	2				8.8 (8-9.5)
A3	Hardwood	Large	Tasmania	1				7.8
A4	Hardwood	Large	WA	1			6.3	

Note: Where there are multiple respondents for a transaction the average is reported together with the range

## 20. What is your estimate of the IRR on new planting?

Results are shown in Table 7 for the subset of regions that valuers provided estimates of IRR for. There is variation between valuers and regions. The estimated increase in IRR from carbon trading is also variable. A number of valuers stated that a confounding factor was the cost of land.

## Discussion

### Trends in IDR

Figure 2 shows the IDRs (applied to current rotation pre-tax cashflows) of transactions reported in all 13 surveys to date. Note that IDRs for each transaction have been averaged in the cases where there was more than one respondent.

Table 7: Estimates of IRR of 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

New Zealand								Australia	
Valuer	New Zealand	CNI	East Coast	Hawke's Bay	Nelson/Marlborough	Canterbury	Carbon add-on	Radiata pine	Eucalyptus
1	3-6								
2	7						1.5		
3				6-9			3-4		
4	6.5						12.5		
5						4-5	9		
6					8		4-6		
7	6-8						2	4-6	
8									5-9
9					6.5		4.5-9		
10					4-6		3.5		
11	4-5								4-7
12						4			
13	5.7-7.4								
14	3.5-7	7	3.5				3-4	3.5-7	6-10
15	4-7.5	7.5	4						

The average IDR is 6.2% for current rotation pre-tax cashflows in 2021 compared to 7.3% in 2019:

- 5.3% for medium-large forests in 2021 compared to 6% in 2019
- 6.9% for small forests in 2021 compared to 7.8% in 2019.

Smaller reductions in IDRs have occurred between 2019 and 2021 with multiple rotation pre-tax IDRs. The average IDR is 6.6% for multiple rotation pre-tax cashflows in 2021 compared to 7.1% in 2019:

- 6.3% for medium-large forests in 2021 compared to 6.7% in 2019

- 7.3% for small forests in 2021 compared to 7.4% in 2019

The differences in IDR between the medium-large and small forests in the 2021 survey are most evident in Figure 2, where the IDRs for eight medium-large transactions are almost all in the bottom half of the range. The reduction in the average discount rate for all forests is a continuation of the trend in recent years from 8.9% in 2013 to 8.6% in 2015 to 7.6% in 2017 to 7.3% in 2019 to 6.2% in 2021 for current rotation pre-tax cashflows. Certainly, the demand for New Zealand plantations remains strong.

### Discount rates declared in financial reporting

Discount rates being used for financial reporting have also reduced further since 2019 (Table 8). Average reported discount rate for pre-tax cashflows for the companies documented in Table 8 has reduced from 7% in 2019 to 6.9% in 2020 to 6.7% in 2021.

### Comparison to Sewall 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 December 2021 there were 23 responses from active investors to the question ‘What is the “base” discount rate (real, pre-tax, before TIMO fees & expenses) required to acquire generic timberland investments in the U.S. now?’ The mean response was 4.60%, lower than the average of 5.02% for the Sewall December 2020 survey and the average of 5.07% for the Sewall 2019 survey.

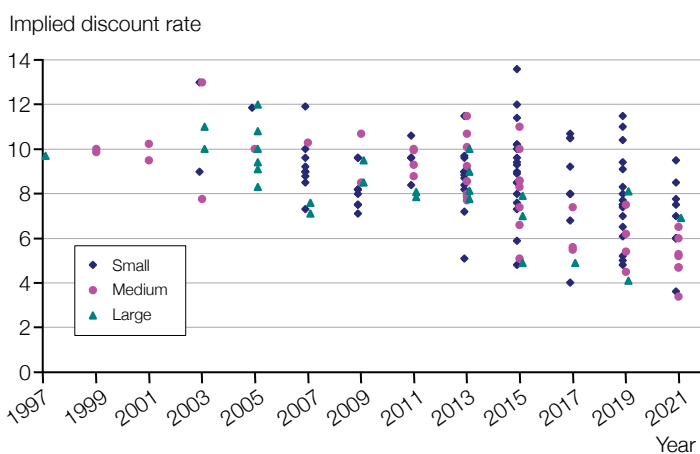


Figure 2: IDRs (applied to current rotation pre-tax cashflows) for transactions reported in each of the discount rate surveys. Forests are identified by size class (small <1,000 ha, medium 1,000 to 10,000 ha and large >10,000 ha)



Table 8: Discount rates declared in financial reporting for New Zealand-registered companies with annual reports in the public domain

Company	Reporting	2015	2016	2017	2018	2019	2020	2021
ANZFF2	30 Jun		8.5	8	8	7.5	7.5	6.5
Aratu (Eastland Estate)	30 Jun						7	7
China Forestry Group	31 Dec	8.21	8.21	8	7.5	7.5	7	6.5
Greenheart NZ	31 Dec	8.5	8.5	8.5	7.5	7.5	7.25	7.25
GTI 8 New Zealand	31 Dec	8.5	8	7.5	7	7	7	7
Kaingaroa Timberlands	30 Jun	7.5	7	6.5	6.25	6.25	6.25	6
Matariki Forestry Group	31 Dec	8.5	8	7.75	7.5	6.5	6.5	6.25
OneFortyOne NZ	31 Dec	7.5	7.5	7	7.38	7.5	7.5	6.5
Oregon Group (Ernslaw One)	30 Jun	8	8	8	7.5	7.25	7	7
OTPP	31 Dec	7.75	7.75	7.5	7.37	7.06	7.02	6.5
Pan Pac Forest Products	31 Mar	8	7.5	7.25	7	7	6.75	6.5
Summit Forests	31 Mar	8.5	8	7.7	7.7	6.5	7	6.75
Taumata Plantations	30 Jun	7.5	7.5	7.25	7.25	7	7	6.5
Te Waihou Plantations	31 Dec	8.5	8	8	7	7	7	7
Tiaki Plantations	30 Jun	7.25	6.75	6.5	6.5	6.5	6.5	6.5
Timbergrow Plantations	30 Jun	8.5	7.5	7.5	7.5	7.25	7	7
Wenita Forest Products	31 Dec	7.5	7	7	6.5	6.5	6.5	
City Forests (post-tax cashflows)	30 Jun	7	6.5	6.5	6.5	6	6	6

Note: All rates are applied to current rotation pre-tax cashflows (apart from City Forests which uses current rotation post-tax cashflows)

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 0.98% (mean), similar to 0.91% in 2019. For Australian planted pine the premium was 1.25%, compared to 1.18% in 2019. For Australian planted eucalypt it was 1.36% compared to 1.31% in 2019.

The discount rates in the Sewall Survey are applicable to multiple rotations rather than just the current rotation. IDRs for multiple rotation pre-tax cashflows were reported for nine New Zealand and three Australian medium-large forests in the 2021 NZIF discount rate survey. The IDRs for the New Zealand transactions are 4.7 to 8.4% (mean 6.3%), which overlaps the mean of 5.6% for the Sewall survey. The IDRs for the two Australian softwood transactions were 4.9% and 8.8% compared to the Sewall mean of 5.8%.

One of the Australian hardwood transactions has an IDR of 7.8% compared to the Sewall mean of 6%.

## Acknowledgements

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## References

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