

# Discount rates used for forest valuation - Results of 2009 survey

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## Summary

Fourteen forest valuers responded to the survey and provided information on 12 transactions between mid-2007 and 2009. The average reported IDR (implied discount rate) for each of these transactions was in the range 5.8 to 9.4% for post-tax cashflows and 7.1 to 10.7% for pre-tax cashflows. Overall averages were 6.9% (post-tax cashflows) and 8.6% (pre-tax cashflows), compared to 6.7% and 9.0% in the 2007 survey.

Forest valuers also provided the discount rate they use to estimate the market value of a forest. They are using discount rates for forest valuation that are on average 0.3% lower than in 2007.

## Introduction

Forest valuers were surveyed during the last quarter of 2009 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).

## Method

A total of 14 forest valuers were surveyed and asked:

1. What method do you use to determine the market value of a forest?
2. When using the DCF (Discounted Cashflow or Expectation value) approach, what real discount rate do you use to estimate the market value of a tree crop?
3. What is the basis for deriving this rate?
4. How do you determine the log prices used?
5. How do you account for the cost of the use of land in valuing a tree crop?
6. Do you include cashflows from only the current crop?
7. When do you assume that cashflows occur?
8. Do you apply a stand-based or estate-based approach?
9. What specific allowance do you make for risk? Do you adjust the discount rate for forest-specific risk?

Forest valuers were also asked for transaction information:

- What is your estimate of the discount rate implicit in the transaction price of recent (mid-2007 to 2009) forest sales. (Valuers were also asked to provide price (\$/ha) and key factors for transactions. However insufficient information was provided to include here.)

Finally valuers were asked about factors relating to replanting and new planting decisions:

- What real discount rate do you use to evaluate replanting or new planting investments?
- What is your estimate of the internal rate of return on replanting or new planting?

## Responses to survey questions

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

All 14 valuers use the DCF approach to determine the market value of a forest. Some valuers use a suite of approaches:

- Comparable sales, expectation value, cost.
- Expectation value method mainly, also immediate liquidation and sometimes cost compounded.
- Comparable sales, expectation value and sometimes hybrid method (cost-based plus expectation).

### Use of a cost-based approach

Thirteen of the valuers sometimes use a cost-based approach in limited circumstances; particularly for valuing young stands but also for special situations; for example, areas restocked with alternative species where the future yields and log values are uncertain.

Follow up questions were asked of these thirteen valuers:

- Do you include indirect costs (eg, cost of supervision)?
  - o Yes - 11
  - o Sometimes - 1
  - o No - 1
- Do you include overhead costs?
  - o Yes - 11
  - o Sometimes - 2

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	7		IDR	Current to 12Q over 3 years	Market rental
2	7		IDR	Current to 12Q over 5 years.	Actual rental or LMV
3	7-8	10	Market/consistency	Current to 12Q over 5 years.	Market rental
4		8.5-9	IDR & WACC/CAPM	Current to trend over 5 years.	Market rental
5		9-10	CAPM/Survey	2Q to trend over 5 years	Actual rental or 6% of LEV
6		8-10	IDR	20Q	Market rental
7		8	Market	Higher of current or trend	Actual rental
8		8-8.5	Survey/Consistency	12Q	LEV
9		8	IDR & WACC/CAPM	Forecast to long-term average	Market rental
10	7		Survey/WACC	12Q	LEV
11	7-9		IDR/Survey	12Q	Market rental
12	7-8		Survey/Others	Current to 20Q over 5 years.	Market rental
13		8	Consistency	12Q	LMV
14	7		Market/Others	Current/12Q	Market rental

- Do you include the cost of using the land for growing the tree crop?

- o Yes - 7
- o Sometimes - 3
- o No - 3

- Do you include the cost of time?

- o Yes - 9
- o No - 4

Valuers who include the cost of time invariably use a lower rate to compound costs than they do to discount cashflows in the DCF or expectation value approach. Typically a rate of 3 to 5% is used. Some valuers compound post-tax (rather than pre-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. Six valuers apply the DCF approach using only post-tax cashflows, seven valuers use only pre-tax cashflows, while one valuer uses both.

Valuers apply a discount rate in the range 7 to 9% (average 7.3%) to post-tax cashflows or a discount rate in the range 8 to 10% (average 8.7%) to pre-tax cashflows.

### Has the "market" discount rate changed since 2007?

In the 2007 survey, the 19 respondents were applying an average discount rate of 7.6 % to post-tax cashflows and an average discount rate of 8.6 % to pre-tax cashflows.

The 14 valuers included in the 2009 survey also participated in the 2007 survey. Fig. 1 gives the frequency distribution of the change in discount rate. The average change is a reduction of 0.3%. This decrease is largely the result of the relatively large reduction of 0.75 to 1.5 by four of the 14 valuers.

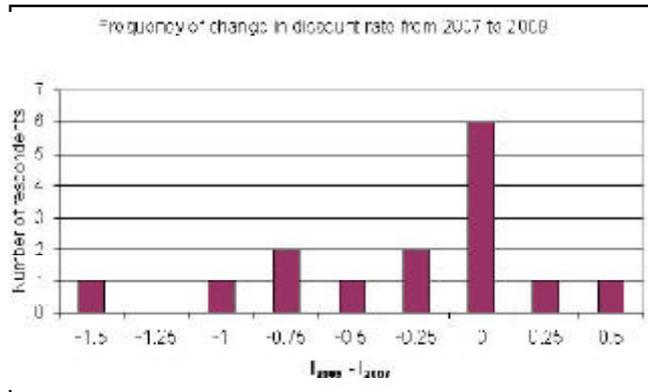


Fig. 1: Frequency of change in discount rate from 2007 to 2009 for individual valuers.

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

Valuers select discount rate based on a range of information sources. This information includes analysis of the discount rate implied by recent transactions (ie, the IDR or implied discount rate), WACC (Weighted Average Cost of Capital), use of CAPM (Capital Asset Pricing Model) and other evidence (eg, "Returns on financial investments"). Some valuers select discount rate primarily on the basis of current industry practice using information from previous rounds of this survey or from other valuers. Consistency is also a consideration for some valuers.

### 4. How are log prices determined?

The majority of valuers use current prices for the short-term with long-term prices (eg, after 5 years) predicted using average prices of the last 12 or 20 quarters. Some valuers use analysis and models to forecast long-term price trends.

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

Eight valuers are using the general approach proposed in the 2007 Discussion Draft; ie, that the opportunity cost of occupying land with the current crop should be calculated as the market-based land rental. 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. This notional land rental is being estimated using a range of sources including:

- Forest land rentals including Crown Forestry Licence rentals.

- Market rentals for pastoral land.
- Land valuers.

The other six valuers use more mechanistic approaches to account for the land cost when the land is freehold:

- Three valuers use the LEV (Land Expectation Value) to calculate the cost of land. Two of these valuers use the product of LEV and the discount rate while the other uses 6% of LEV. These valuers assume zero cost if the LEV is negative.
- Two valuers use the product of LMV (Land Market Value) and the discount rate.
- One valuer assumes zero cost. For freehold land the "Forest is treated as being separated from the land with a forestry right where no rent is paid to the land owner".

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

All valuers include cashflows from only the current crop in the "base" valuation model. This is as required by accounting standard NZ IAS 41 [paragraph 22 states that "An entity does not include any cash flows for ..... re-establishing biological assets after harvest (for example, the cost of replanting trees in a plantation forest after harvest)].

In some circumstances the value of future rotations is also estimated:

- Assess the added value of future rotations if tenure requires replanting.
- Where there is a commitment to plant additional rotations this is separately accounted for.
- We also look at the second rotation to see what its apparent implications are.

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

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

- Start of a period            5 valuers
- Middle of a period        5 valuers
- End of a period            3 valuers

One valuer assumes that costs occur at the start of a period while revenues occur at the middle of a period.

*Table 2 - Estimates of the discount rate implicit in the transaction price of forests or interests in forests sold during mid 2007 to 2009. Forests are described by location and size class (Small < 1000 ha; Medium 1000 to 10,000 ha; Large > 10,000 ha).*

Forest	Year	Implied discount rate (applied to post-tax cashflows)	Implied discount rate (applied to pre-tax cashflows)
1. Small forest - Northland	2009	7.5	9.6
2. Small forest - East Coast	2008	7.1	8.2
3. Small forest - East Coast	2008	6.5	7.1
4. Small forest - East Coast	2008	7.0	8.2
5. Small forest - East Coast	2008	5.9	7.5
6. Small forest - East Coast	2009	7.0	9.6
7. Small forest - Hawkes Bay	2009	6.0	8.0
8. Small forest - Hawkes Bay	2009	6.2 - 6.8	7.5
9. Medium forest - CNI	2007	9.4	10.7
10. Medium forest - CNI	2008	5.8	8.5
11. Large forest	2007		8.5
12. Large forest	2007		9.5

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

Seven valuers follow a stand-based approach while 4 valuers adopt an estate-based approach. Three valuers use both approaches depending on the nature (size, age-class distribution) of the forest being valued.

## **9. Treatment of risk?**

Valuers use a range of approaches for incorporating risk into forest valuation. A typical response was: "Try to model as best as possible in the cashflow. Sometimes adjust the discount rate where the forest is different in its risk profile." Valuers made specific mention of adjustments to area, yields, costs and prices. Five valuers sometimes make adjustments to the discount rate to allow for forest specific risk. For example:

- Non-quantifiable risks are subjectively assessed. Typically add 1% to 2% absolute to the discount rate used.
- Use a higher discount rate if not yet harvesting or relying on unverified yields.
- Adjust the discount rate if the forest is all Douglas fir or eucalypt - then there seems to be a different forest risk profile.

## **Discount rate implied by recent transactions**

Information provided by valuers on estimates of the implied discount rates in recent transactions is summarised

in Table 2. In addition to the transactions reported in Table 2 information was provided on a number of transactions in Canterbury and Otago. However, as no IDR was provided, these transactions could not be included in the analysis.

## **Replanting and new planting**

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

Of the eleven valuers who responded, eight use the same discount rate as for forest valuation while three use a lower discount rate.

### ***What is your estimate of the internal rate of return on new planting?***

There were 11 responses to this question. Responses are given in Table 3. The estimates vary widely depending, to some extent, on the range of activities that the respondent is involved with. Some respondents gave specific examples while others gave a ballpark estimate.

## **Discussion**

### ***Trends in discount rates***

Figs. 2 and 3 show the IDRs (applied to post-tax cashflows and pre-tax cashflows respectively) of transactions reported in all seven surveys to date. Key features are:

- The range of IDRs (applied to post-tax cashflows) in the 2009 survey is 5.8 to 9.4% with an average of 6.9%. In the

Table 3: Estimate of the IRR (Internal Rate of Return) on new planting.

Respondent	IRR (post-tax cashflows)	IRR (pre-tax cashflows)
1	3.5% (forestry only) 9.5% (forestry + carbon)	
2	0 to 6%	
4		5%
5		2 to 7%
6		5 to 6%
7		1 to 4 % (forestry only) 10% (forestry + carbon)
8		7% (radiata pine) 6% (Douglas fir)
11	6.5 to 9.5% (good sites)	
12	0 to 6 %	
13		2 to 5%
14	5 to 6%	

2007 survey the range was 5.1 to 8.8% with an average of 6.7%.

- The range of IDRs (applied to pre-tax cashflows) in the 2009 survey is 7.1 to 10.7% with an average of 8.6%. In the 2007 survey the range was 7.1 to 11.9% with an average of 9.0%.
- Given the limited number of transactions, the overall conclusion would be that the distribution of discount rates in the 2009 survey is similar to that observed in the 2007 survey.
- The main trend in Figs. 2 and 3 is the reduction in discount rates between 2005 and 2007.

**Alignment with IRR**

The estimates of IRR collected in this survey cover the range 0 to 9.5 % for post-tax cashflows and 1 to 7 % for pre-tax cashflows. There is still a disconnect between the discount rates used for forest valuation in New Zealand and the IRR of new planting or replanting projects. The estimated IRR is typically less than the discount rate used for forest valuation.

These IRRs are for forestry only. The responses from two valuers suggest that the inclusion of carbon trading has the potential to increase the IRR of new planting projects by 6%.

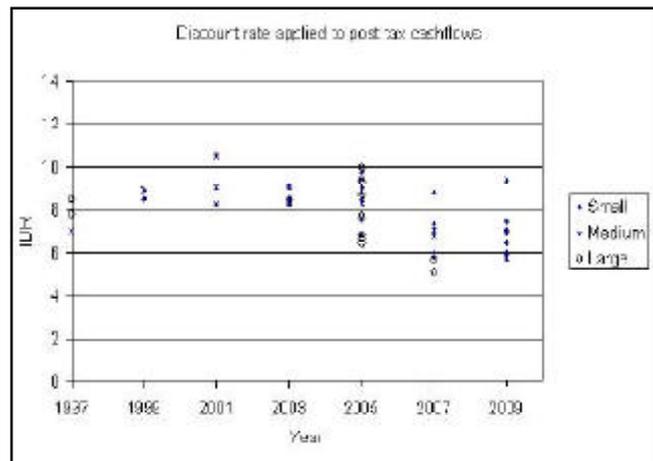


Fig. 2: IDRs (applied to post-tax cashflows) for transactions reported in each of the seven discount rate surveys. Forests are identified by size class (Small < 1000 ha; Medium 1000 to 10,000 ha; Large > 10,000 ha).

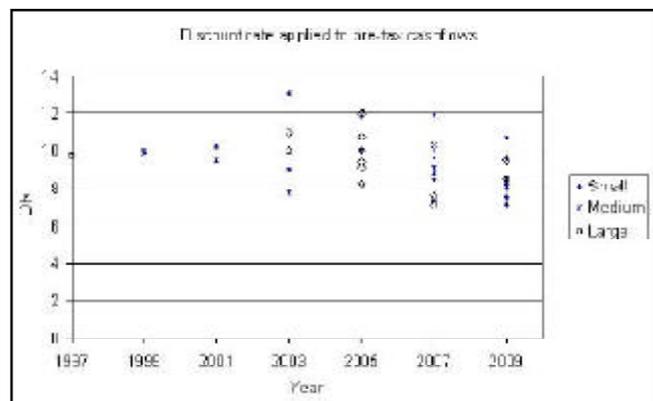


Fig. 3: IDRs (applied to pre-tax cashflows) for transactions reported in each of the seven discount rate surveys. Forests are identified by size class (Small < 1000 ha; Medium 1000 to 10,000 ha; Large > 10,000 ha).

**References**

Manley, B. 1998: Discount rates used for forest valuation - Results of a pilot survey. *New Zealand Forestry* 42(4): 47.

Manley, B. 1999: Discount rates used for forest valuation - Results of 1999 survey. *New Zealand Journal of Forestry* 44(3): 39-40.

Manley, B. 2001: Discount rates used for forest valuation - Results of 2001 survey. *New Zealand Journal of Forestry* 46(3): 14-15.

Manley, B. 2003: Discount rates used for forest valuation - Results of 2003 survey. *New Zealand Journal of Forestry* 48(3): 29-31.

Manley, B. 2005: Discount rates used for forest valuation - Results of 2005 survey. *New Zealand Journal of Forestry* 50(3): 7-11.

Manley, B. 2007: Discount rates used for forest valuation - Results of 2007 survey. *New Zealand Journal of Forestry* 52(3): 21-27.