Analysis of the value of the State plantations sold in 1990

Bruce Manley and Alan Bell

ABSTRACT

Data from the 1990 sale of cutting rights to 43 State plantations in 12 transactions have been used to develop a model to explain the difference between the values of the forests sold. The model developed explains forest value as a function of the discounted net clearfell revenue associated with the average stand in the forest less silvicultural and overhead costs. Parameters within the model include log prices, transport cost and discount rate. The model explains 92.7% of the variation in market value of the 12 sales.

INTRODUCTION

Forest valuation has been the subject of much debate in New Zealand in recent years. For example, when Fletcher Challenge Ltd attempted to acquire NZ Forest Products Ltd in 1987 the different valuation practices of the two companies were a major issue. In another instance, New Zealand Forestry Corporation (as buyer) and Treasury (as seller) were unable to settle on a purchase price for the State plantations despite protracted negotiation and analysis between 1986 and 1988.

The major difficulty in resolving the debate over forest valuation has been the limited market information available. The sale of cutting rights to the State plantations in the second half of 1990 provided transactional information on an unprecedented scale. A total of 43 forests were sold as part of 12 different transactions with settlement dates ranging between October 31, 1990 and March 31, 1991. These transactions were described by Turland (1990) and Forestry Corporation (1990) and are summarised in Table 1. The area figures given are estimates of the productive area as at April 1, 1990. They include the stocked area together with the area awaiting stocking. Figures exclude unproductive protection areas. Because of different definitions and sources there are differences between these areas and those given in the previous publications (which also differ).

The authors: Bruce Manley works with Forest Research Institute, Rotorua and Alan Bell is a forest consultant of Wellington.

The average value of the 12 transactions ranged from $359/ha to $5552/ha. Consequently the obvious question to ask is what were the key factors behind this range in forest value (i.e. cutting right value). The forests sold were heterogeneous with regard to:

- maturity;
- distance to port or market;
- species composition;
- terrain;
- site productivity;
- past silvicultural investment;
- strategic importance.

This paper reports on a study to determine the relationship between the prices paid for the State plantations and their inherent, measurable characteristics. Initially the prices paid in the 12 transactions were analysed. Subsequently the price paid for each of the 43 individual forests was estimated to further investigate the explanatory variables behind forest value.

ANALYSIS

Explanatory variables

Explanatory variables considered include:

Age

The measure of forest maturity adopted was an adjusted average age calculated by:

- setting the age of all stands over 45 years to 45;
- subtracting 15 years from the age of all non-radiata stands;
- and then taking the area weighted average of these adjusted ages.

These adjustments reduce the impact of old over-mature stands and assume that a non-radiata stand of a given age is equivalent in maturity (e.g. age to clearfelling) to a radiata stand which is 15 years younger.

TABLE 1 – Sales of State Plantations in 1990

Purchaser	Forest (or District)	No. of forests	Area + (ha)	Price ($ million)	Price ($/ha)
Waimea Sawmillers	Tutaki	1	974	0.35	359
Golden Bay Forest Ind.	Golden Bay	1	316	0.15	475
Winstone Pulp International	Karioi	1	9051	12	1326
Russell Synd.	Island Hills	1	181	0.305	1685
Juken Nissho	Aupouri/Otangaroa	2	20745	41.5	2000
Baigent Forest Industries	Hira/Waimea	2	7509	26.8	3569
Juken Nissho	Ngaumu	1	11003	40.55	3685
Carter Holt Harvey	Auckland/Hawkes Bay/Canterbury	21	93883	383	4080
Juken Nissho	Wharerata/Patunamu	2	10270	43.5	4236
Ernslaw One*	Whangapoua/Santoft/Tapanui	5	23193	102	4398
Fletcher Challenge	Golden Downs/Rai/Wairau	4	49684	262	5273
Wenita Forestry	Berwick/Otago Coast	2	20714	115	5552

\+ Areas are estimates of productive area as at 1.4.90.
* Assumes that Conical Hill sawmill had net value of zero.

The net effect of this weighting was to reduce the average age for forests that had substantial areas of Douglas fir and minor species particularly if stands were older than age 45. For example, the average age of Karioi forest (60% radiata) was reduced from 25.9 to 15.5 years by this weighting.

Age distribution

Forests with similar average ages can have very different age distributions. The age distribution affects the timing of future cashflows. Therefore the standard deviation of the age distribution for all stands (adjusted as outlined above) was tested as an explanatory variable.

Distance to port

The distance from each forest to the nearest port (through which the export of logs was considered feasible) was estimated. This was the distance to the closest of Whangarei, Auckland, Mt Maunganui, Gisborne, Napier, New Plymouth, Wellington, Nelson, Picton, Christchurch, Timaru, Port Chalmers or Bluff.

Species composition

Variables calculated were:

- percentage of area in radiata pine;
- percentage of area in Douglas fir;
- percentage of area in other species.

Logging difficulty

Average logging cost (including logging, loading, temporary roading and logging and sales overhead costs) was estimated for each forest.

Volume production

The total clearfell volume for radiata pine (at age 30) and for Douglas fir and other species (at age 45) was estimated from the average yield table for each species in each forest. A species weighted average clearfell volume was then calculated for each forest.

Clearfell volumes by log type were also estimated:

Radiata pine	–	pruned logs
	–	unpruned sawlogs
	–	pulp logs
Douglas fir	–	sawlogs
	–	pulp logs
Other species	–	sawlogs
	–	pulp logs

Table 2 shows the mean and range of some of these explanatory variables across the 43 forests sold. Average values of each variable were calculated for each of the 12 transactions using appropriate area weightings of the values for individual forests.

TABLE 2 – Mean and range of explanatory variables across 43 forests sold

	Minimum	Mean	Maximum
Average age	2.2	12.2	19.5
Standard deviation of age	0.9	7.0	11.6
Distance to port (km)	20	99	279
% radiata area	0	85	100
% Douglas fir area	0	9	100
% other species area	0	6	38
Logging cost ($/m^3)	14.9	21.8	30.8
Average volume (m^3/ha)	289	552	709
Radiata pruned volume (m^3/ha)	0	101	217

Correlation of value with explanatory variables

Correlations between the explanatory variables and market value ($/ha) for the 12 transactions are shown in Table 3. Age (average and standard deviation), distance and pruned volume variables are most highly correlated with the value of the 12 sales. Correlation coefficients above 0.58 are significant at the 95% level. Fig. 1 shows the relationship between value and average age while Fig. 2 shows the relationship between value and distance to port.

Fig. 1 Average forest value plotted against weighted average age for 12 transactions

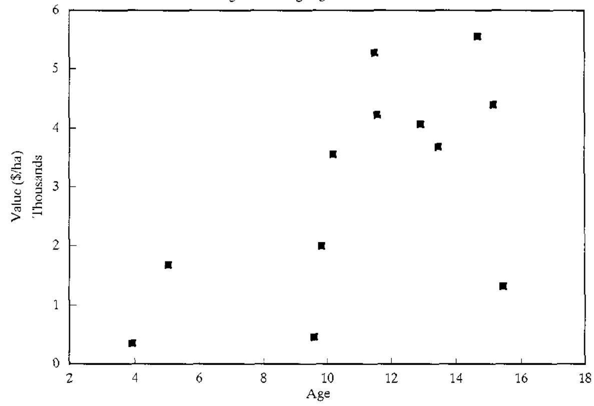


Fig. 2 Average forest value plotted against distance to port for 12 transactions

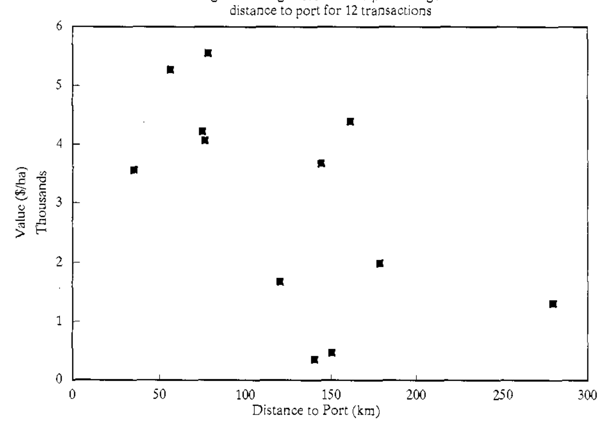


TABLE 3 – Correlation of value with explanatory variables

	Correlation with Market value for 12 sales
Average age	0.60
Standard deviation of age	0.47
Distance to port	–0.59
% radiata ore	0.18
% Douglas fir area	–0.15
% other species area	–0.06
Logging cost	0.04
Average volume	0.00
Radiata pruned volume	0.61

The best linear relationship found (highest adjusted R^2 value with significant coefficients) was:

$$\text{Value} = \beta_0 + \beta_1 \text{*age} + \beta_2 \text{*dist} \quad \text{(Model 1)}$$
($/ha)

where age is adjusted average age and dist is distance to port. Parameter estimates are given in Table 4.

TABLE 4 – Parameter estimates for multiple regression model explaining value of 12 transactions

Parameter	Estimate	Standard error
β_0	1557	801
β_1	350	64
β_2	–19.2	3.6

Model explains 85.1% of variation.

This relationship fails to account for many factors that influence forest value. Subsequent analysis therefore focused on developing an underlying hypothesis in order to provide a more comprehensive relationship.

Model hypothesis

Using the Expectation Value Method of forest valuation (see Fraser *et al.* 1985) the expectation value of a forest is the difference between discounted future returns and costs.

The value of cutting rights to a forest can be modelled:

Value = Discounted net clearfell revenues
– Discounted silvicultural costs
– Discounted annual costs

This model assumes that there are no production thinnings or other intermediate revenues and that there are no costs other than silvicultural and annual overheads. Annual costs include the annual land rental payable by purchasers of cutting rights.

This model can be simplified if, rather than considering the value of a forest, the value of a single stand is considered – in particular, if the value of the average stand in the forest is modelled. This is the approach taken here. The underlying hypothesis is that the average value of a forest can be estimated as the value of the average stand in the forest.

Under this hypothesis the valuation model can be represented as:

Average Forest Value \$/ha = [At port revenue – transport cost – logging cost]
* Discount factor
– silvicultural costs
– annual costs

where:

- At port revenue = $Rad*(\beta_1*prune + \beta_2*rsaw + \beta_5*rpulp) + Fir*(\beta_3*fsaw + \beta_5*fpulp) + Oth*(\beta_4*osaw + \beta_5*opulp)$

where:

Explanatory variables are defined as:

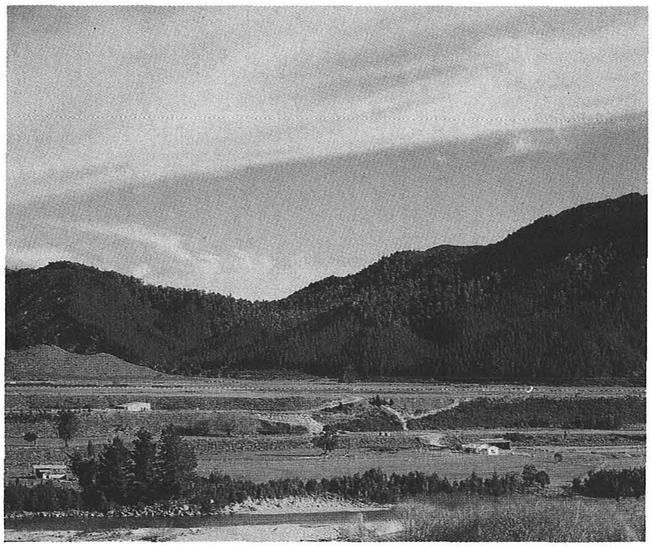
Rad	proportion of area in forest that is	radiata pine
Fir		Douglas fir
Oth		other species
prune	average age 30 volume of radiata pine	pruned logs
rsaw		unpruned sawlogs
rpulp		pulp logs
fsaw	average age 45 volume of Douglas fir	sawlogs
fpulp		pulp logs
osaw	average age 45 volume of other species	sawlogs
pulp		pulp logs

and

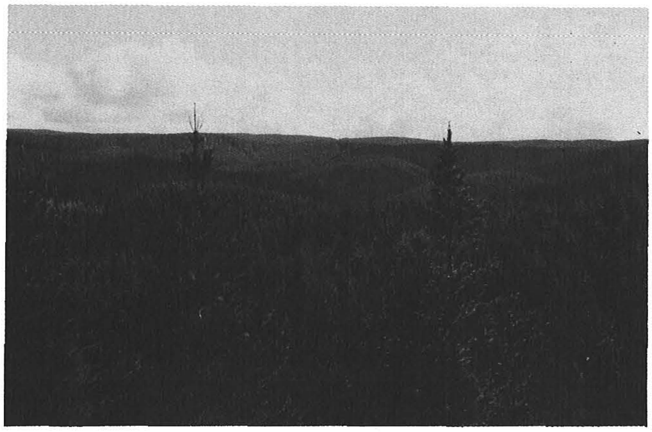
β_1 = at wharf price (\$/m^3) for radiata pruned logs (debarked)
β_2 = at wharf price (\$/m^3) for radiata unpruned logs
β_3 = at wharf price (\$/m^3) for Douglas fir sawlogs
β_4 = at wharf price (\$/m^3) for other species sawlogs
β_5 = at wharf price (\$/m^3) for all species pulp logs

- Transport cost = $\beta_6*vol*dist$

where:



Cutting rights to Tutaki forest near Murchison were sold for \$359 per hectare.



Berwick forest which, combined with Otago Coast forest, had its cutting rights sold for \$5552 per hectare.

vol = is weighted average clearfell volume for the forest
vol = $Rad*(prune + rsaw + rpulp) + Fir*(fsaw + fpulp) + Oth*(osaw + opulp)$
dist = distance to port (km)

and:

β_6 = unit transport cost (\$/m^3/km)

- Logging cost = vol*lcost

where:

lcost = average logging cost (includes logging, loading, temporary roading and logging and sales overhead costs)

- Discount factor = $\frac{1}{(1 + \beta_7)^{30-Age}}$

where:

Age is adjusted average age

and:

β_7 is discount rate (real pre-tax)

- Silvicultural costs = $\beta_{10}*young*Rad$

where:

young is a variable to denote young forests set equal to

0	if average age	over 10
10-age		between 5 and 10
5		under 5

and:

β_{10} represents the average annual cost of silvicultural operations in radiata stands between age 5 and 10.

- Annual costs = $(\beta_{11}$ + Rent)*Annuity factor

where:

Rent is annual land rental (7% of land value)

$$\text{Annuity factor} = \frac{1}{\beta_7}\left[1 - \frac{1}{(1+\beta_7)}\ \text{30-Age}\right]$$

and:

β_{11} is annual overhead cost.

The first function in the valuation model represents the discounted net clearfell revenue from the average hectare in the forest assuming radiata stands are clearfelled at age 30 and other stands are clearfelled at age 45. It consists of the clearfell volume in each log type of each species multiplied by the at-wharf log price, weighted by the proportion of each species in the forest. The coefficients β_1, β_2, β_3, β_4, β_5, represent estimates of the at-wharf log prices for the different log types.

From the at-wharf gross revenue are subtracted estimates of per hectare transport cost (β_6*vol*dist) and per hectare logging cost (vol*lcost). The parameter β_6 should approximate the unit transportation cost ($/m^3/km).

The resulting net clearfell revenue is then discounted by

$$\frac{1}{(1+\beta_7)^{\text{30-Age}}}$$

the discount factor for a period of (30-age) years. The parameter β_7 represents the discount rate while (30-age) is the time until the average aged stand in the forest is clearfelled. Note that an average clearfell age of 30 years is assumed for radiata and 45 years for Douglas fir and minor species. The older rotation age for non-radiata species is accounted for in the calculation of the adjusted average forest age.

The second function allows for the costs of silvicultural operations commonly applied to young radiata pine stands. It assumes that a cost β_{10} is incurred annually in treating young radiata stands between age 5 and 10. The function is simplistic – it ignores discounting and the proportion of radiata stands that actually get tended. However there are insufficient data to justify a more sophisticated function.

The third function allows for the overhead costs (β_{11}) and land rentals that are incurred annually (in the case of the sale of cutting rights). They are multiplied by the annuity factor to calculate the discounted value of the annuity (β_{11} + rent) incurred annually for the next (30-Age) years with a discount rate of β_7.

Estimation of the model

With only 12 data points it is not valid to statistically estimate the full nine parameters of the hypothesised model. Instead "default" values of seven parameters were assigned based on judgement. These assigned values are given in Table 5.

TABLE 5 – Assigned values of parameters used to estimate Model 2

Parameter		Assigned value
β_1	– at wharf price ($/m^3) for radiata pruned logs	125
β_2	unpruned logs	70
β_3	Douglas fir sawlogs	100
β_4	other species sawlogs	65
β_5	all species pulp logs	40
β_{10}	average silvicultural costs	200
β_{11}	annual overhead cost (excluding land rental)	50

The values assigned parameters β_1 through β_5 are ballpark estimates indicative of the range of at-wharf export log prices prevailing during the middle of 1990. For example, the assigned value of β_2 for radiata sawlogs is based on radiata K-grade (Korean Grade) prices while the value for β_4 reflects the K-grade prices for southern pines and Corsican pine. Implicit in the use of these prices is that export parity pricing prevails. That is, the price of a log used for domestic processing equals the price of an equivalent log which is exported. Also implicit is the assumption that purchasers of forests used current prices as a surrogate for future log prices.

The parameter β_{10} was assigned a value of $200 on the basis of assuming a total expenditure of $1000/ha on pruning and thinning young radiata stands. The value of $50 was assigned to parameter β_{11} to represent annual overheads.

The model therefore becomes:

$$\text{Value} = [\text{At port revenue} - \beta_6\text{*vol*dist} - \text{logging cost}]^* \frac{1}{(1+\beta_7)^{\text{30-Age}}}$$
$$- \text{ silvicultural costs}$$
$$- \text{ annual costs} \qquad \text{(Model 2)}$$

The two parameters of Model 2, β_6 (transport cost) and β_7 (discount rate) were estimated using the Systat non-linear least squares estimation package. Parameter estimates are given in Table 6. The estimated unit cost of transport is 12.4 cents/m^3/km while the estimated real pre-tax discount rate is 10.1%.

TABLE 6 – Parameter estimates for Model 2

Parameter	Estimate	Asymptotic standard error
β_6	0.124	.013
β_7	0.101	.003
Model explains 92.7% of variation		

Incorporation of standard deviation of age

A variation of Model 2 was motivated by the high correlation of value with the standard deviation of age (Table 3) and by trends observed in the pattern of Model 2 residuals when plotted against standard deviation. This variation is:

$$\text{Value} = [\text{At port revenue} - \beta_6\text{*vol* dist} - \text{logging cost}]^*$$
$$\frac{1}{(1+\beta_7)\ \text{30-Age}}{}^* \left(\frac{\text{sd}}{\text{age}}\right)^{\beta_9}$$
$$- \text{ silvicultural costs}$$
$$- \text{ annual costs} \qquad \text{(Model 3)}$$

where sd = standard deviation of adjusted age.

The term $\left(\frac{\text{sd}}{\text{age}}\right)\ \beta_9$

is recognition of the impact of the age class distribution on forest value. It allows for the fact that if two forests have the same average age, the forest with the more variable age-class distribution will (all other things being equal) have the higher value. The simple example in Table 7 illustrates this.

TABLE 7 – Illustration of the impact of variability of age-class distribution on value of discounted clearfell revenue

Age	Area Forest A	Forest B
5	100	
10		100
15	100	100
20		100
25	100	
Average age	15	15
Standard deviation	8.16	4.08
Average discounted revenue ($/ha)	6350	5157

Assumes a net clearfell revenue at age 30 of $20,000/ha and a discount rate of 10%.

Forest A has a higher value than Forest B because the relationship between value and age is non-linear and is, in the limiting case of continuous discounting, an exponential function. An additional potential benefit of a forest with a higher standard deviation is that it is generally possible to achieve a non-declining harvest with less variation of the rotation age from the optimum rotation.

The same assigned values for parameters made in Model 2 were used in estimating Model 3. Table 8 gives the non-linear least squares estimates of the other 3 parameters, β_6 (transport cost), β_7 (discount rate) and β_9 (age distribution exponent).

TABLE 8 – Parameter estimates for Model 3

Parameter	Estimate	Asymptotic standard error
β_6	.120	.012
β_7	.094	.004
β_9	.220	.113
Model explains 94.8% of variation		

Model 3 increases the proportion of the variation in forest value explained from 92.7% to 94.8%. However the coefficient β_9 has a relatively large standard error and just fails to meet the 95% significance level.

Estimation of the full model

As a final stage in the analysis the value of each of the 43 forests sold was estimated. As part of the sales process an "expected market value" (EMV) was estimated for each forest for the Crown by a team which included the two authors. This was done by:

- using a forest estate model to forecast future woodflow by species and log grade;
- estimating future revenue and cost streams;
- accounting for taxation;
- discounting net after-tax cashflows.

For the current analysis the value of each forest sold as part of a multiple-forest transaction was imputed by apportioning the total purchase price in the same proportion as the EMVs of the component forests. That is, the assumption was made that even if the sum of the EMVs differed from the actual purchase price, the relativity of the EMVs for the component forests was correct. For most of the sales this is probably a reasonable assumption. For the five single-forest sales the actual market price was used. For another four sales there were only two forests sold in the transaction. Two further sales were of four and five forests. It is the sale of 21 forests to Carter Holt Harvey where the assumption becomes most heroic. Nevertheless it was made to enable all parameters in the model to be estimated rather than being partially assigned.

The full variation model can be represented as:

$$\begin{aligned}\text{Value} = \; & [\text{Rad}^*(\beta_1{}^*\text{prune} + \beta_2{}^*\text{rsaw} + \beta_5{}^*\text{rpulp}) \\ (\$/\text{ha}) + \; & \text{Fir}^*(\beta_3{}^*\text{fsaw} + \beta_5{}^*\text{fpulp}) + \text{Oth}^*(\beta_4{}^*\text{osaw} + \beta_5{}^*\text{opulp}) \\ - \; & \text{vol}^*\text{lcost} \\ - \; & \beta_6{}^*\text{vol}^*\text{dist}]^* \frac{1}{(1 + \beta_7 + \beta_8{}^*\text{Cant})^{30-\text{Age}}} {}^* \left(\frac{\text{sd}}{\text{age}}\right)^{\beta_9} \\ - \; & \beta_{10}{}^*\text{young}^*\text{Rad} \\ - \; & (\beta_{11} + \text{Rent})^*\text{Annuity Factor}^+ \end{aligned} \qquad \text{(Model 4)}$$

This is the same as Model 3 but with the inclusion of a term for Canterbury risk premium (β_8*Cant) in the discount factor. Cant is a dummy variable set equal to 1 if the forest is in Canterbury, and set equal to 0 otherwise.

The term β_8*Cant is an allowance for the increased risk associated with forestry in parts of Canterbury. The parameter β_8 is an estimate of the additional risk premium to be added to the discount rate for Canterbury forests. Its inclusion was motivated by the explicit modelling of wind and fire risk which was incorporated in the estimation of EMVs.

Care must be taken in interpreting the Canterbury risk premium. Apart from Island Hills, all Canterbury forests were sold in a single parcel together with Auckland and Hawkes Bay forests. Therefore the risk premium is not based on observed market prices. Rather it arises from the assumptions made by the Crown valuation team in determining expected market values which were used as a basis for apportioning the observable $383 million purchase price between the 21 forests in the Carter Holt Harvey purchase. These assumptions included allowance for historical wind and fire damage in Canterbury forests.

TABLE 9 – Parameter estimates for Model 4

Parameter	Estimate	Asymptotic standard error
β_1 – at wharf price ($/m^3) for radiata pruned logs	105.4	23.1
β_2 unpruned logs	72.7	9.7
β_3 Douglas fir sawlogs	94.0	17.6
β_4 other species sawlogs	50.7	28.4
β_5 all species pulp logs	22.0	15.3
β_6 – unit transport cost	0.109	0.031
β_7 – discount rate	0.088	0.017
β_8 – Canterbury risk premium	0.012	0.009
β_9 – age variation exponent	0.253	0.080
B_{10} – average annual silvicultural costs	283.0	96.5
B_{11} – annual overhead costs	23.5	59.0
Model explains 94.6% of variation in value of 43 forests (91.9% of variation in value of 12 market transactions)		

Parameter estimates for Model 4 are given in Table 9. The standard errors associated with most parameter estimates are large. In fact the estimates for β_4, β_5, β_8 and β_{11} are not significant at the 95% level. Nevertheless the model estimates help support the assigned parameter values used in Models 2 and 3. All seven assigned parameter values compare reasonably well with, and fall within the confidence intervals of, the parameters estimated in Model 4.

The estimate of a 1.2% risk premium for Canterbury forests is not significant. In any case use of a single risk premium for all Canterbury is simplistic. Plains forests have had higher historical levels of wind damage relative to Canterbury foothills forests. However an attempt to estimate differential risk premiums for plains and foothill forests was unsuccessful.

+ *Annuity factor for annual overheads incorporates the modified discount rate ($\beta_7 + \beta_8$*Cant)*

The parameters estimated in Model 4 explain 91.9% of the variation observed in the 12 market transactions.

Prediction of value of 1992 sale

In 1992, 96,865 ha of State plantations were sold to ITT Rayonier. As a test of their predictive ability, the models developed from the 1990 sale data were used to predict the value of this 1992 sale. Area-weighted average values of explanatory variables were calculated for the plantations sold in 1992 and the models were used to predict the value of the cutting rights. The results presented in Table 10 show that all predictions are within 8% of the actual value realised.

TABLE 10 – Model predictions for 1992 sale of State plantations to ITT Rayonier

	Value ($/ha)
Actual	3778
Prediction	
– Model 1	3514
– Model 2	3600
– Model 3	3501
– Model 4	3746

DISCUSSION AND CONCLUSIONS

Of the four models presented Model 2 is most robust in that it has an underlying hypothesis, is estimated from actual market data and has parameter estimates which are statistically significant. This model provides a good explanation of the market values observed for the 1990 sale of State plantations. It does have limitations. Apart from the inherent limitation of representing a diverse forest by its average stand, the model incorporates costs in a simplistic fashion. The model also ignores factors such as production thinning revenues and capital roading costs.

The assumption that all logs are priced depending on the distance to a port ignores the impact of domestic markets on log prices. Another simplification is the assumption of common at-wharf log prices for all ports. This ignores the different wharf costs that apply at different New Zealand ports although in fact these differentials are reducing. The model also only values existing stands. The cutting rights sold give rights and obligations beyond the first rotation. The value and cost of these have been ignored.

Notwithstanding these limitations, the model provides a useful explanation of the variation in forest values observed in the 1990 sales. Results suggest that the valuation model developed successfully incorporates many of the plantation characteristics which influence forest value. It includes elements to represent:

- maturity (age)
- distance to port
- species composition
- terrain (logging cost)
- site productivity (yields)
- past silvicultural investment (relative log grade proportions).

Valuing a forest on the basis of the value of the average stand allows these factors to be incorporated in a coherent valuation model with an underlying economic interpretation.

Implicit in Model 2 (and also Models 3 and 4) is the assumption that radiata stands are clearfelled at age 30. Variations were also tested assuming radiata stands are clearfelled at (i) age 25 and (ii) age 28. (In all cases non-radiata stands were assumed to be clearfelled 15 years older than radiata stands.) These models explained (i) 85.8% and (ii) 92.2% of the variation in the value of the 12 transactions compared to 92.7% with clearfell age 30.

Model 2 estimates imply that real pre-tax discount rates in the order of 9-11% were used in valuation of the State plantations. These estimates of discount rate are linked to the rotation age assumed and the level of prices assigned. The Model 2 variations in which radiata stands were assumed to be clearfelled at (i) age 25 and (ii) age 28 had estimates of (i) 11.3% and (ii) 10.6% for the discount rate compared to 10.1% estimated in Model 2 for a 30 year rotation. The assigned prices assume export log parity although with a simplified number of export log grades. If lower assigned prices had been used then the discount rate estimate would also be lower. For example, if the prices assigned in Model 2 were 25% lower, the estimate for discount rate reduces from 10.1% to 7.5%. However the model provides a poorer fit to the data, explaining 89.6% of variation compared to 92.7% explained by Model 2.

As a final caution it must be noted that the model was developed primarily as an explanatory model. It is based on circumstances that applied at a particular point in time. It should be used as a predictive model only to provide a broad benchmark. It is certainly not a substitute for a detailed economic valuation which fully takes into account all relevant factors for a specific forest.

ACKNOWLEDGEMENTS

Carl Frejborg and Nigel Bingham were members, along with the authors, of the Crown team that calculated forest Expected Market Values used in this paper to apportion purchase price between individual sales. Stephen Wakelin assisted with data analysis.

REFERENCES

Forestry Corporation 1990: The Changing Face of the New Zealand Forestry Sector. New Zealand Forestry Corporation Ltd. Wellington. 4 pp.

Fraser, T.; Horgan, G.P.; Watt, G.R. 1985: Valuing forests and forest land in New Zealand: Principles and Practice. FRI Bulletin No. 99.

Turland, J. 1990: State Forest Sales. New Zealand Forestry 35(3), p 6.

CONSULTANT RECOGNITION

The following has applied for recognition as a general forestry consultant in New Zealand and overseas:

Geoff Thorp **Auckland**

The following has applied for recognition as specialist forestry consultant in New Zealand and overseas:

Mike Wilcox **Auckland**

The following has applied for recognition as a specialist forestry consultant in New Zealand:

Nick Bunting **Gisborne**

The following have applied for a review of recognition as general forestry consultants:

Benno Everts	**Christchurch**
Peter Keach	**Rotorua**
Jacquetta Smith	**Wellington**
Len Wilson	**Auckland**

The following have applied for a review of recognition as specialist forestry consultants:

Bruce Childs	**Mt Maunganui**
Alan Ogle	**Christchurch**

Under the NZIF constitution, any members of the Institution may send objections in writing to the Registrar of Consultants, NZ Institute of Forestry, PO Box 19840, Christchurch.