



# TECHNICAL RELEASE

Vol. 10 No. 8 1988

NEW ZEALAND

## THE EFFECT OF INFLATION AND EXCHANGE RATE MOVEMENTS ON LOGGING COSTS IN AUSTRALIA

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### INTRODUCTION

Since 1985, there have been large changes in the rate of exchange between the Australian dollar and the currencies of the countries which supply logging machinery. It has also been a period when the level of sophistication (and cost) of logging equipment imported into Australia has increased. Coincidentally, over this period CSIRO have been developing a computer program which is designed to help set contract logging rates (Rawlins, MacArthur and Garden, 1985). The program can be used to examine how the changing exchange rates might be converted to higher contract rates in the logging industry. This paper describes the data that has been collected and illustrates the use of the program in analysing the effects of inflation.

### ACKNOWLEDGEMENTS

LIRA acknowledges the permission of Appita to reproduce a copy of this paper which was first presented at the 41st Appita meeting, 27 April - 1 May 1987.

### PRICE MOVEMENTS BETWEEN JANUARY, 1985 AND JANUARY, 1987

Table 1 shows the movements in prices which affect the logging industry. This data has been collected mostly in our work with the hardwood logging industry of New South Wales: the data is not claimed to be representative and this analysis should be regarded as simply illustrative and exploratory.

There are three points to note in the table :

1. The relatively high real interest rates; Figure 1 shows a longer term view of what has been happening. Kingma (BAE, 1987), stated that real rates on government bonds have averaged 3.1% per annum over the period 1950 to 1986. Currently, these rates are 5.5% per annum.

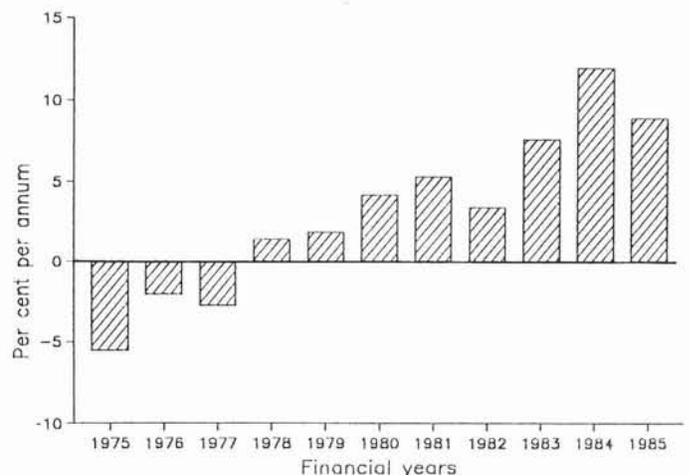


Figure 1 : Real Interest Rates

Source : Bureau of Agricultural Economics, personal communication. The real interest rates are calculated by dividing the overdraft rates on sums greater than \$100,000 by the Consumer Price Index of the previous year. The years are financial years, 1975 refers to financial year 1975/76.

**TABLE 1 : PRICE MOVEMENTS RELEVANT TO THE LOGGING INDUSTRY**  
(Index 1985=100)

	PRICE 1985	INDEX 1986	INDEX 1987
1 CPI (DEC PREV YEAR)	135.90	108.24	115.45
2 INFLATION RATE (%)	2.50	238.00	264.00
3 INTEREST RATE (%)	15.25	135.28	130.49
4 REAL INTEREST RATE (%)	12.44	92.35	100.30
5 EXCHANGE RATES (JAN)			
(A\$/US\$)	1.2237	117.01	122.92
(A\$/YEN)	0.0048	148.35	195.94
(A\$/SWEDISH KR)	0.1344	139.76	167.78
6 WAGE RATE	340.10	107.06	109.88
7 NEW MACHINE PRICES (\$)			
USA: SKIDDER + LOADER + DOZER	479,700	125.38	134.77
JAPAN: FELLER BUNCHER + PROCESSOR	305,000	114.75	144.26
SWEDEN: FORWARDER + HARVESTER	564,000	128.55	152.48
8 FUEL PRICE BEFORE REBATE (\$/L)	0.2980	111.81	118.84
9 OIL PRICE (\$/L)	1.4800	120.27	128.38
10 TYRE & TRACK PRICE FOR MACHINES			
USA AVERAGE FOR 3 MACHINES	9,396	117.06	128.13
JAPAN AVERAGE FOR 2 MACHINES	9,000	117.78	132.22
SWEDEN AVERAGE FOR 2 MACHINES	6,000	121.33	143.33
11 TIMBER BOARD & JOINERY	521.90	109.27	113.93
12 KRAFT, BLEACHED HARDWOOD PULP (\$/T)	599.61	84.77	105.36
13 EXPORT PULPWOOD (\$/GREEN TONNE)	46.93	108.35	118.13
14 HARVESTING COST (\$/TONNE)	11.47	115.00	121.80

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| <p>1: CPI (Dec quarter previous year)<br/>SOURCE: ABS Monthly Summary of Statistics Aust Cat no. 1304.0 (page 9, table B)</p> <p>2: Inflation rate is calculated as the percent difference between two consecutive December CPI figures</p> <p>3: Interest Rate - Trading Banks Overdraft &gt;\$100,000 (mean of published value) SOURCE: Australian Canegrower (various issues)</p> <p>4: Real Interest Rate is <math>[1 + (\text{Interest Rate}/100)] / [1 + (\text{Inflation Rate}/100)] - 1</math></p> <p>5: Exchange Rates (Buying) SOURCE: ABS Banking Aust Cat no. 5605.0 &amp; ABS Balance of Payments, Aust Cat no. 5301.0</p> <p>6: Wage Rate 2 - Average weekly earnings of all employees (Feb 85, 86; Aug 86) SOURCE: as 1 (page 7, table B)</p> | <p>7: New Machine Prices USA, Japan &amp; Sweden SOURCE: AUST Distributors</p> <p>8: Fuel Price (\$/L) SOURCE: Aust Distributors</p> <p>9: Oil Price (\$/L) SOURCE: Aust Distributors</p> <p>10: Tyre &amp; Track Price for Machines SOURCE: Aust Distributors</p> <p>11: Timber Board &amp; Joinery - Price index of materials used in house building. Jan 1987 Figure author's estimate of ABS figure</p> <p>12: Kraft Bleached Hardwood from Southern USA, these are contract prices on delivery basis from USA SOURCE: Paper Trade J (various issues)</p> <p>13: Export Pulpwood SOURCE: BAE Forest Products Trade J (various issues)</p> <p>14: RATESETTER ESTIMATE of logger costs "on truck" calculated using above figures in the CSIRO logging costing program</p> |
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2. Figure 2 shows the large movements in exchange rates between the Australian dollar and the currencies of the countries from which the logging industry traditionally buys equipment. There has also been considerable variation between the different countries. Between January 1985 and January 1987, the yen depreciation has been four times the US dollar depreciation and one and a half times the Swedish kroner depreciation. According to the logging machinery prices available to us, some machinery from the USA has risen in price faster than might be expected from the currency depreciations while prices of machinery coming from Japan have risen more slowly than currency depreciations.

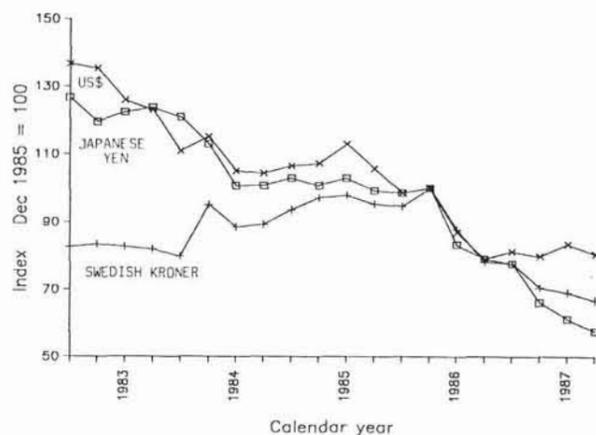


Figure 2 : Indices of Exchange Rates

SOURCES: ABS Banking, Australia Cat no. 5605.0; ABS Balance of Payments, Australia Cat no. 5301.0.

3. The relatively low growth rate in labour cost over the period. This is evident in average weekly earnings and "on-costs" (Business Council of Australia Bulletin, Jan 1987).

**SETTING CONTRACT RATES AND INFLATION**

The problem of setting contract rates is one of spreading costs

which occur unevenly in timber to a rate per tonne which can be set for a number of months, provides a satisfactory rate of profit to the contractor and a satisfactory cost and level of service to the organisation buying the wood. The major irregular expenditure is the purchase of the new logging machine. Tyre costs and repairs and maintenance are also irregular by nature. In recent times, wages increased irregularly through arbitration procedures, fuel prices have been changing irregularly because of OPEC decisions, and interest and inflation rates have been changing unpredictably. In setting contract rates, it is customary that inflation is treated by negotiating, through a pricing formula, annually or in response to an unexpected major price raise such as that caused by OPEC.

**THE "RATESETTER" COMPUTER PROGRAM**

The computer program uses :  
 - The financial methods of discounted cash flow analysis  
 - an explicit treatment of inflation

The user specifies the details of the logging operation to be analysed and sets a financial rate of return that he or she wishes to make on funds invested. The program then estimates monthly cash flows for the operation over a five year period and calculates the price that must be received in order that the contractor earns the specified rate of return on his or her investment. This is the method of discounted cash flow analysis.

All of the costs associated with the cash flows are inflated using a single specified rate of inflation but using patterns of price rises which are best estimates of the pattern which occurs. For example, wages are expected to increase bi-annually, fuel prices monthly and calculated price is forecast to rise at the inflation rate but increase annually. Prices are received one month after costs to accommodate the need for working capital.

The expectation is that the program would be run annually to help in the rate determining process. It is only a guide and aid to this process as rates will be determined by a wider range of factors than are explicit in the program. But the program does make obvious which data is significant to the rate level and gets rid of time-consuming hand calculations.

**LOGGING RATES FROM THE RATESETTER PROGRAM USING INPUT DATA FROM JANUARY, 1985 TO JANUARY, 1987**

The results presented in Table 2 are based on a skidder, dozer and loader system which originates from the USA working in hardwood. The rates of interest that have been used have been calculated by adding 6% per annum to the real interest rates on overdrafts greater than \$100,000 that have occurred in the past three years. The real rates are then inflated by the annual inflation rate. In reality, it is likely that those involved in rates setting would do some smoothing of the data but calculations based on the recent past are still of considerable interest.

The inflation rate in 1985 is low because the CPI series includes a peculiar medical insurance adjustment. The rate quoted is that calculated using official CPI estimates but it is suspect because of the insurance adjustment.

The interest rates which preserve a 6% rate of return over overdraft rates result in prices which have increased by approximately 22% in the past two years. This compares with machinery prices in the calculation which have increased by 35% and labour costs which increased by 10% over the two year period.

In terms of logging costs per tonne of wood produced, the rise in costs between January 1985 and January 1987 which can be related to capital cost is three times the rise which can be related to wages. Capital costs have grown from 34% of total costs per tonne to 38% of total costs in 1987.

**THE EXTENT TO WHICH INCREASED PRODUCTIVITY CAN REDUCE RATES**

The most obvious approach to reducing costs in businesses with large capital investment is to try to obtain more output. If the output per time period is simply increased with no other changes to costs then one set of reduced costs results. If, in response to increased production, machine hours worked per year increase proportionally the resale price of the machine declines, then the cost savings are not so great. Table 3 shows the effect on most likely result is that this change could yield a 10% saving on the rate paid.

TABLE 2 : ESTIMATED LOGGING RATES 1985 TO 1987 (\$/TONNE)

	1985	1986	1987
INTEREST RATE (% PA)	21.40	25.36	27.10
INFLATION RATE (% PA)	2.50	8.20	6.60
WAGES	4.79	5.13	5.25
CAPITAL	3.92(34.18%)	4.90(37.15%)	5.28(37.08%)
OTHER*	2.76	3.16	3.44
TOTAL RATE	11.47	13.19	13.97
INDEX OF TOTAL RATE	100.00	115.00	121.80

\* Includes overheads, insurance, tyres or tracks and repairs.

TABLE 3 : THE EFFECT OF INCREASING PRODUCTIVITY ON ESTIMATED LOGGING RATES

PRODUCTION T/DAY	RATE \$/TONNE	INDEX OF RATE
140	13.97	100
168	12.16	87
168 (1)	12.52	90

(1) AFTER INCREASING MACHINE HOURS WORKED AND REDUCING RESALE PRICE

Double shifting is considered to be a feasible option in pine operations and Table 4 is based on a system of a harvester and forwarder imported from Sweden.

The recent price rises are calculated to result in an increase in rates per tonne of 40% over the period January 1985 to January 1987. Introducing double shift is calculated to reduce that increase to 15%. We are not advocating double shifting, only demonstrating the magnitude of likely effects. The computer program has been used to generate more results than those presented here, examining the outcomes of various changes that a move to double shifting might bring about but about which there is uncertainty. The results presented are a conservative estimate of the cost savings of double shifting. The computer program can not accommodate the reduced flexibility and reliability that is likely to accompany a move to more intensive use of machinery.

TABLE 4 : THE EFFECT OF DOUBLE SHIFTS ON SOFTWOOD THINNING RATES

	SINGLE SHIFT		DOUBLE SHIFT
TONNES PER DAY	150	150	240
MACHINE HOURS/DAY	6.4	6.5	10
<b>YEAR</b>	<b>1985</b>	<b>1986</b>	<b>1987</b>
RATES PER TONNE (\$)			
WAGES	1.22	1.35	1.68
CAPITAL	4.48	6.85	4.33
OTHER	3.00	4.01	4.03
TOTAL RATE	8.70	12.21	10.04
INDEX OF TOTAL RATE	100	140	115

DISCUSSION

In summary, since January 1985 there have been appreciations in the currencies of the countries from which logging machinery is imported of 20 to 95% and rises in machinery prices of between 30 to 50%. It has been calculated that these might flow through to logging rate rises of 20 to 40% for some systems. Examples of productivity and double shifting have been given which reduce these rates increases to 10 to 15% but there is little knowledge of the likelihood that these changes can be made.

There is no doubting the threat of rising prices; but the devaluation of the Australian dollar is also expected to create export opportunities for the Australian pulp and paper industry and make local timbers more competitive with imported timber and perhaps raise local prices. Figure 3 shows indices or recent movements in pulp and timber prices and the indices of the logging rates that have been calculated.

Pulp prices declined between 1985 and 1986 but have increased more recently in both US and Australian dollar terms. However, the Bureau of Agricultural Economics reported at the recent Agricultural Outlook conference that recent price rises "were forced by Scandinavian producers closing production units" (BAE 1987).

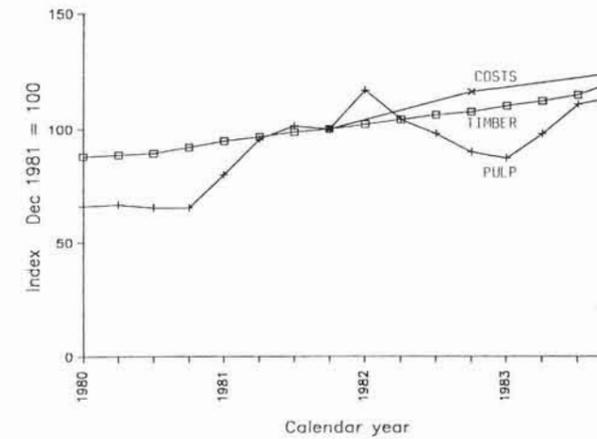


Figure 3 : Price Indices for Timber, Pulp and Logging Rates

SOURCES: Kraft bleach hardwood from Southern USA, Paper Trade Journal: Timber board & joinery used in house building, ABS Monthly Summary of Statistics, Australia, Cat no 1304.0.

The outlook for sawn timber prices is dominated by the outlook for the building industry and the effect of the devaluations on timber imports. The BAE Outlook Conference paper suggests an increase in housing starts in 1988/89 but a fairly flat period prior to that. This paper suggests that high import prices could increase the demand for local timber supplies and increase prices.

It is difficult to assess the effect of the dollar devaluation on new investment prospects for wood users and their ability to pay higher logging rates but it does seem that the devaluation is all that is happening in an otherwise depressed local timber and work pulp market.

The absolute logging rate increases needed to recover the cost increases are quite large. Our most immediate interest in rising logging costs comes from our major research program, concerned with whether young naturally regenerated eucalypt forests can be profitably thinned.

Trials have been conducted with large imported machines and our initial enthusiasm for results might be taken away by the rises in machine prices. The higher prices must exert pressure for greater efficiency in the logging industry through higher productivity or less capital/import intensive technologies. The wood using industries (and the forest owner) need to be aware of these incipient increases. As analyses are made of new investments in export or import substitution, the wood-using industries must anticipate paying more for logging in the future. The fact that logging machinery will be replaced over a number of years could lull the wood-using industries into a false sense of their own prospects.

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