AN ESTIMATE OF DEPRECIATION OF FARM MACHINERY AND STRUCTURES BASED ON HISTORICAL COST

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The Statistician's estimate of depreciation of farmers' vehicles, machinery and structures represent "in the main amounts allowed under income tax legislation" and "are not necessarily a measure of what might be termed the 'annual consumption' of fixed capital assets in the economic sense".[1] There have been substantial variations in tax law regarding the amounts of investment which could be written off. Thus in 1948-49 a special initial depreciation allowance was allowed on the value of plant and machinery acquired. In 1949-50 and in 1950-51 this rate of initial allowance was raised to 40 per cent at the option of the taxpayer. After 1950-51 assets bought wholly and exclusively for agricultural or pastoral pursuits were depreciable at 20 per cent a year for five years. (There was some limitation on the amount which could be written off at this accelerated rate in the case of housing provided for employees or sharefarmers). In the current financial year farmers are allowed to deduct an additional 20 per cent in the first year of purchase—i.e., forty per cent in the first year and 20 per cent a year for another four years. In other words farmers are allowed to write off 120 per cent of the total value of their investments. The additional 20 per cent which can be written off in the first year is termed an "investment allowance".

These changes in the tax law—designed to encourage capital investment—affect the amount of depreciation allowed for tax purposes. But they have little or no relevance to "the annual consumption of fixed capital assets". On the basis of a variety of sources (given in more detail below) I have attempted to provide an alternative estimate of depreciation. While any estimate of depreciation contains some arbitrary elements, I have felt that it was desirable to attempt an estimate of depreciation on the basis of historical cost to compare with the estimate of taxable depreciation allowances. One reason why this seems desirable is that taxable depreciation has grown so rapidly—the 1961-62 estimate is five times as large as the 1948-49 figure.

The alternative estimates are derived from two sources:

(i) the Statistician's estimate of the amount of private expenditure on fixed capital equipment in primary industry. While this includes forestry, fishing and trapping which we would like to exclude, it is clear that over 95 per cent of total expenditure on fixed capital was made in the farming industries proper. Thus depreciation for all primary industry in 1959-60 was £137·2 million, compared with £137·0 million, given as the amount of depreciation in the Farm Income Table (No. 40) of the *National Accounts.*

[1] *Australian National Accounts,* Bureau of Census and Statistics, Canberra, July 1963, p. 116.

(ii) The second source used is a publication of the Bureau of Agricultural Economics: *Capital Expenditure in the Sheep Industry. An interim report: 1957-58—1959-60.* This provides us with a break-up of farm investment into broad items, e.g., tractors, fencing, tillage equipment, etc., to which different rates of depreciation should be applied.

The procedure I have adopted is to assume that the composition of total farm investment (i.e., as between different items of plant and structures to which different rates of depreciation apply) is the same as the composition of investment by that section of farmers represented in the Sheep Industry Survey. The depreciation rates applied are those allowed by the Income Tax authorities prior to the introduction of the special concessions. These have been applied on a straight-line basis—i.e., where an item of plant costs £100 and is depreciable by 10 per cent a year, £10 a year depreciation has been allotted for ten years.

A number of questions arise. First, can the Sheep Industry Survey investment be regarded as representative of all farming? The industry represented by the survey accounts for a large part of total farm investment; if one compares the B.A.E. estimate of total gross Australian investment by the sheep industry with the Statistician's estimate of gross capital expenditure by primary industry, one obtains a figure of 58 per cent of all expenditure being made by the sheep industry. Less is known of the remaining two fifths. Perhaps the biggest proportion of the remaining capital expenditure would occur in the dairying industry (most wheat farms being included in the Sheep Industry sample). We have a five year old B.A.E. survey of capital expenditure on 168 dairy farms throughout Australia which can be compared with the figures from the Sheep Industry Survey. As shown in Table I below, the composition of investment with regard to rates of depreciation on these farms was similar to that on Sheep Survey farms.

I have no information whether the Sheep Industry Survey figures—which are an average for the years 1957-58—1959-60—are representative of earlier years. In as far as they are not, the estimates below will be inaccurate. An organization like the Bureau of Agricultural

TABLE I

Proportion of Capital Investment Depreciable at Different Rates

Rates of Depreciation	Sheep Industry Survey 1957-8 — 1959-60	Dairy Survey* 1953-4-1955-6
%	%	%
15	32	26
10	30	36
7½	4.7	9
5	4.1	
3	17.9	18
2½	5.3	10
2	5.1	

* From F. H. Bollman, *Quarterly Review of Agricultural Economics,* January, 1958. Bollman's figures are given in less detail than the Sheep Industry Survey. Land improvements were classified as eligible for 2½% depreciation, water improvements 5%, buildings 3% and all plant other than cars, trucks and utilities at 10%.

Economics may be able to obtain more reliable estimates on the basis of unpublished survey information.

Second, the *National Accounts* figure is an estimate of gross expenditure; some allowance must be made for sales of second-hand plant and equipment. The procedure I adopted was to deduct 15 per cent from gross expenditure before obtaining depreciation. The size of the deduction can be justified in the following way: in the Sheep Industry Survey sales represent 15 per cent of gross capital expenditure. Taxation data for companies engaged in primary industry for the years 1953-54 to 1959-60 and for Trusts and Partnerships in one year give disposals as varying from 12 per cent to 18 per cent of purchases.

The actual procedure used then to obtain these estimates was to deduct 15 per cent from gross capital expenditure by primary industry for every year from 1948-49 to 1960-61; the remainder was depreciated at the rates suggested by the Sheep Industry Survey. These were: 9·1% of the original depreciable amount for the first 6 years; 7·6% for the 7th year; 4·3% for the 8, 9 and 10th year; 1·3% for the 11, 12th and 13th year; 0·9% for the succeeding years used.[2]

This leaves one item—the depreciation of the original year—1948-49. How is this to be reduced? The assumption was made that this represents depreciation on a straightline basis which reduces at the rate resulting from a constant level of capital expenditure in the relevant preceding years. This figure is not of major importance in the total calculations; it declines to £10·4 million in 1954-55 and to £5·3 million in 1959-60.

A comparison of the estimates with the official figures is given in Table II.

TABLE II

Two Estimates of Depreciation

Year	Official estimate of taxable depreciation	My estimate of straight line depreciation of historical cost
	£m	£m
1948-49	28.0	28.0
1949-50	52.0	32.0
1950-51	66.0	40.0
1951-52	54.0	49.0
1952-53	71.0	57.0
1953-54	92.0	67.0
1954-55	108.0	75.0
1955-56	122.0	82.5
1956-57	121.0	90.0
1957-58	131.0	97.0
1958-59	133.0	102.0
1959-60	137.0	108.0
1960-61	143.0	113.0

[2] These percentages are obtained by assuming that of each £1000 of capital expenditure £320 is depreciable at 15% (for six years and 10% in the seventh year); £300 at 10% (for ten years) £47 at 7½%; £41 at 5%, £179 at 3%, £53 at 2½% and £51 at 29% (cf. Table I).

It may be desirable to take one year and spell out in some detail the way the above estimate is arrived at. Thus for 1959-60:

$$85\% \text{ of } [(181 + 170 + 174 + 161 + 152 + 149) \times 0{\cdot}091 + 151 \times 0{\cdot}076 \; (129 + 152 + 121) \times 0{\cdot}043 + (88 + 59) \times 0{\cdot}013] + 5{\cdot}3 = 107{\cdot}7.$$

The £5·3 million is obtained by using the expression

$$23{\cdot}4\left(\frac{L_1 - t}{L_1}\ .32 + \frac{L_2 - t}{L_2}\ .30 + \frac{L_3 - t}{L_3}\ .047 \ldots\right) = \ldots \text{ (5·3 for 1959/60)}$$

where L is the life of equipment, t is number of years since 1948-49 (if $L < t$ the expression $L - t$ is given zero value) and the weights (e.g. .32, .30 etc.) are the same as those given in Table I. £23·4 million is the depreciation in year 1948-49 of assets bought in years prior to 1948-49.

What conclusions are to be drawn from this exercise? The first conclusion might be that net farm income in recent years has been understated by 2-10 per cent (varying from year to year) by the use of the taxable depreciation concept.

Of course any measure of depreciation must be regarded as somewhat arbitrary; however the estimation of depreciation at rates used above would be more consistent with the rates used—until recently—throughout the rest of the economy. Second, to estimate depreciation on a historical cost basis seems to me a necessary pre-requisite to the estimation of depreciation on a replacement cost basis; perhaps a more valid economic concept of depreciation than depreciation on a historical cost basis.