A COMPARISON OF INCOME AVERAGING PROCEDURES FOR INCOME TAX PURPOSES

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A comparison is made of a number of income averaging procedures on the basis of selected performance criteria. The main conclusion which emerges is that the Australian income averaging procedure, currently applied to primary producers, has a number of defects. Several of the alternative income averaging procedures reviewed are judged to be superior to the current Australian system.

It is well known that the interaction of an annual tax accounting period and a fixed progressive rate scale causes taxpayers with unstable annual incomes to pay more taxes over a span of years than those receiving the same total income in equal annual amounts. This fact has significant implications with respect to both equity and resource allocation, and has led to a number of proposals for supplementing the automatic averaging period of one year by some procedure for inter-period averaging [12, 14]. In Australia, due to the particular instability of income derived from primary production, primary producers may use a five-year moving average income to determine the rate of tax applicable to their current year's income [3]. This paper aims to compare this averaging system with a number of alternative procedures.

The main focus of the paper is on income averaging for primary producers. It is clearly inequitable, however, to discriminate between unstable incomes according to their source. Primary producers do not have a monopoly on earning unstable incomes, viz. authors, entertainers, Miss Worlds, etc. Some consideration is therefore given to certain aggregative effects of particular income averaging procedures, which would arise if they were applied to all taxpayers with unstable incomes.

The need for some system of averaging for unstable incomes can be argued both on the grounds of equity and resource allocation. Whilst the most widely accepted notions of equity, as embodied in the ability-to-pay concept, do not point unambiguously to an ideal time period for measuring income, most writers agree that mere irregularity of the income flow is unlikely to increase an individual's ability to pay tax. A related equity problem arises if the rates of income tax are changed from time to time, as part of a government's stabilization policy. Compared with a taxpayer with a stable annual income, a taxpayer whose income fluctuates directly with tax rate changes pays more tax, while one whose income fluctuates inversely with rate changes pays less tax.

A somewhat distinct group of problems arises from the fact that, in practice, the partitioning of a flow of income into separate annual periods is achieved by the use of a number of essentially arbitrary rules

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for determining when income from appreciating and depreciating assets is realized. This creates opportunities for taxpayers to influence the timing of their tax payments, by adjusting the date at which income is realized. For instance, a taxpayer may seek to reduce his tax burden by adopting a system of do-it-yourself averaging. Alternatively, if the scale of tax rates is changed in accordance with economic conditions, a taxpayer may speculate on these changes by realizing a higher taxable in come in years when rates have been reduced, and conversely. Finally, the assessment of income tax on realized income, rather than accrued income, provides an incentive for taxpayers to postpone the realization of income from appreciating assets, and thus their tax liability, thereby effectively obtaining the use of an interest free loan.[1]

The opportunities that taxpayers will have for influencing the timing of their tax burden are greatest when the income tax base includes realized income from all appreciating and depreciating assets. However, the present Australian income tax, which is commonly thought of as excluding most capital gains, still provides opportunities for shifting the realization of income.[2] The reduction in the tax burden achieved by shifting income over time is inequitable, as it favours taxpayers who are in a position to manipulate the timing of their taxable income.

The equity arguments in favour of some system of income averaging are reinforced by the potential distortion in the allocation of resources. Without some averaging procedure, investments yielding an unstable income flow are discriminated against. The optimum pre-tax farm enterprise combination, or farm development plan, will thus not necessarily be the post-tax optimum. Quite apart from the direct distortion of resource allocation, there is likely to be a misallocation of effort, as attempts are made to incorporate this aspect of taxation into decision making.

Criteria for Comparing Income Averaging Procedures

A necessary prerequisite for a comparison of alternative income averaging procedures is the specification of the desirable characteristics

[1] From a theoretical viewpoint, the most interesting proposal for income averaging has been made by Vickrey [13]. The proposal is for a cumulative income averaging scheme, and is based on the presumption that the correct base for an income tax is accrued income, including all capital gains and losses, and that the relevant period for averaging is the lifetime of the taxpayer. The primary objective of the scheme is to eliminate the incentive to reallocate income among years, and in particular, the postponement of the realization of capital gains. The scheme involves a fairly complicated procedure of interest rate adjustments aimed at causing taxpayers with equal earning resources to report the same total income, and pay the same discounted value of tax payments, regardless of the time that income is realized for tax purposes. From an administrative viewpoint the procedure has several major defects. Partly for this reason, and also because there is no indication that a complete capital gains tax will be introduced in Australia in the foreseeable future, Vickrey's proposal is rejected as a practical alternative to the more rudimentary 'short-period' averaging procedures discussed in this paper. None of these procedures reduce the incentive to postpone the realization of capital gains.

[2] For instance, a farmer has some degree of flexibility in timing the realization of income from appreciating assets in the form of livestock, or a farm forest. Even for products with a production cycle of less than one year, income may be shifted between accounting periods when the normal sale date coincides with the end of a financial year. Similarly, farmers may alter their timing of tax payments by adjusting maintenance expenditure on depreciating assets such as fences and farm buildings.

of an averaging system. The following criteria have been adopted as a basis for comparing the relative performance of alternative income averaging procedures.

(i) The total tax payment for an unstable annual income should be approximately equal to that for a stable income of the same average magnitude.
(ii) Annual tax payments should be responsive to current income without lag. In particular, any given annual tax payment should not exceed the tax that would have been due under a simple annual progressive tax.
(iii) Tax revenue should be responsive to modification of the rates without lag.
(iv) There should be no benefit to be gained from shifting income between years in response to actual, or expected, modification of the rates.
(v) The averaging procedure should not impose an unreasonable administrative burden, or lead to difficulty of taxpayer compliance.

The above requirements need some elaboration. First, most writers on the topic agree that, from an equity viewpoint, some kind of averaging is required for unstable incomes because the annual accounting period is too short a period on which to base tax progession.[3] There is also reasonable consensus that period equity should be the primary objective of income averaging, and that the period for measuring income should be related to the economic horizon of the taxpayer. Results from empirical work aimed at determining the economic horizon of individuals vary. Some work seems to indicate that the economic horizon of the consumer with respect to adjusting their actual consumption and savings patterns to changes in income are of the order of three to seven years. On the other hand, other work suggests that savings and consumption patterns are related to the sum of current and expected discounted earnings over a lifetime. It is not surprising, therefore, to find that proposals for income averaging fall into one of two distinct groups; lifetime averaging, and averaging over a period of three to seven years. In the present paper the comparison has been confined to 'short-period' averaging procedures. Even if averaging should ideally be over a taxpayer's lifetime, it seems to the writer that administrative considerations, particularly the problem of inflation, would make it difficult to adopt a period of greater than, say, seven years.

Second, compared with an annual progressive tax, some averaging procedures have the undesirable characteristic of substantially reducing the tax burden in high income years whilst increasing it in low income

[3] It is interesting to note that under a regressive income tax scale smaller tax payments would be made for a varying annual income than for a stable income of the same total size. Only under a proportional income tax does the way in which income is distributed over time, and thus the period over which it is measured, become unimportant. It should also be pointed out that most writers do not distinguish between different forms of unstable income. Goode [6], however, asserts that the case for averaging is strongest with respect to income received in one year for effort extending over several years, and for cyclical fluctuations. He argues that on equity grounds the case is weak with respect to movements from one normal income level to another, and for sustained upward or downward trends in income. No attempt has been made in this paper to distinguish between different forms of unstable income.

years. This reduces the counter-cyclical flexibility of an annual progressive tax, and imposes hardship on the taxpayer in years of low income. The fact that added taxes may be paid in some years, and substantially lowered taxes in other years, also creates problems when taxpayers are leaving or entering the tax jurisdiction. Ideally the proportional reduction in tax payments in low income years, resulting from averaging, should be at least as great as those in high income years.

Third, in recent years modification of the tax rates has, in a number of countries, become an important counter-cyclical device. In Australia the schedule of rates of income tax was unchanged over the period 1954-70. However, over the past decade a system of rebates and levies, expressed as a percentage of income tax, has been developed. Applying or removing this levy, or rebate, has generally been regarded as one of the most successful recent innovations in the development of counter-cyclical taxation policy in Australia. The ability of an averaging system equitably to allow a rapid and predictable response to tax rate adjustments is thus important, particularly if income averaging were to be extended to all taxpayers.

Fourth, speculative shifting of income in response to modification of the rates is clearly inequitable.[4] Moreover, it makes it more difficult for a government to predict the impact of rate changes.

Fifth, apart from computational simplicity, the administrative burden will be reduced if averaging is optional, and there is some simple eligibility rule in terms of some minimum tax saving and/or income fluctuation. A defect of optional averaging is that it can sometimes interact with rate changes to unduly favour a taxpayer. For instance, a taxpayer may withdraw from averaging in a year of low income which coincides with the imposition of a tax levy, and re-enter the following year. Any inequities that this introduces would need to be balanced against the lighter administrative burden of optional averaging, as compared with compulsory averaging.

Alternative Income Averaging Procedures

Income averaging procedures may be based on the historic income of the taxpayer, his expected future income, or both. The former are more numerous and may be grouped into three broad classes; the block average, the moving average, and the cumulative average.[5] Income adjustment accounts (IAA) provide the main system of forward averaging. In addition to these averaging procedures there is a partial averaging device in the form of carry-over of negative net taxable incomes. This is aimed at reducing the penalties imposed on income fluctuations immediately above and below zero net taxable income. It is these fluctuations that face the steepest rise in progressive rates and thus incur the

[4] The benefit to be gained by a taxpayer on a high marginal tax rate from successfully speculating on tax rate changes is greater than may be anticipated. For instance, the postponement of realization of income for one year in order to obtain a 5 per cent tax rebate, provides a taxpayer having a 60 per cent marginal tax rate, with a post-tax yield of 7·5 per cent. To achieve a post-tax yield of 7·5 per cent on an ordinary taxed investment, this taxpayer would require an investment with a pre-tax yield of approximately 19 per cent.

[5] The block average is sometimes called a simple average and the cumulative average a progressive average.

greatest tax penalty. It is considered that all averaging procedures should allow the carryover of negative taxable incomes.

The performance of each averaging procedure has been tested by applying it to a range of hypothetical, and actual, income series data. For purposes of illustration, the application of the various averaging procedures to the estimated average taxable income of sheep farms in the High Rainfall Zone of New South Wales, over the fifteen year period 1952-53 to 1966-67, are given in Table 1.[6] The averaging procedures are now considered with respect to each of the proposed desirable attributes of an averaging system given earlier. An attempt has been made to summarize the main results in Table 2. For each criterion, the performance of each averaging procedure has simply been classified as good, fair, or poor. There is, of course, an inevitable subjective element in making such a simple and explicit classification, and Table 2 should be interpreted in conjunction with the discussion on the various averaging procedures.

The Block Average

The block average is conceptually the simplest form of averaging. Taxes are paid annually upon each year's income in the usual way. At the end of the averaging period, the total income for the averaging period is determined and pro-rated equally over the period. The tax of each year is then recomputed, at the rates applicable in each year, and these taxes are totalled. This total is then subtracted from the total tax actually paid in respect of the averaging period and the difference assessed against, or refunded to, the taxpayer. Normally the taxpayers will receive a refund. With changing tax rates, however, it is possible for a taxpayer realizing a high income in low rate years, and vice versa, to pay less tax than a taxpayer with a stable income. The block of years to be averaged does not over-lap, thus each year enters the averaging computation only once.

A number of writers on this topic have proposed that taxpayers should be able to block average their incomes [2, 4]. It was usually argued that, to reduce the administrative burden, qualifying restrictions based on attaining a specified minimum income fluctuation, and/or minimum tax saving, should be imposed. In the case of the proposal made by Downing, et al. [4], averaging is restricted to taxpayers whose income in a given year is 20 per cent, or more, below his average income over the past five years.

Under a block averaging procedure the condition of period equity is completely fulfilled, irrespective of whether annual income fluctuates around a stable mean, or is characterized by a sustained upward or

[6] The net farm income data was obtained from The Australian Sheep Industry Survey (1962-67) published by the B.A.E. [1], and by private communication with the B.A.E. A sum of $2,000 covering all tax deductible items for a married man with two children, including life insurance and interest on farm debt, has been deducted from the net farm income figures to provide an approximation to taxable farm income. It should be stressed that these figures are presented for purposes of illustration only. The average variability of the individual farm net incomes would be greater than the variability of the average net farm income. However, this does not necessarily apply to taxable incomes because farmers tend to adopt a do-it-yourself averaging system by incurring, for instance, high repairs and maintenance expenditures in high income years and conversely.

TABLE 1

A Comparison of Tax Payments with Alternative Income Averaging Procedures

Year	Taxable Income	Annual Progressive Tax[a]	Five-Year Block Average	Downing's Block Average	Five-Year Cumulative Average	Five-Year Moving Averages					N.Z. Income Adjustment Account	Income Deposited in Income Adjustment Account	Seven Year Block Average
						Type I	Type II	Type III	Type III*	Type IV			
	$	$	$	$	$	$	$	$	$	$	$	$	$
1	6,192	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,626	1,005	1,548	1,626
2	4,446	933	933	933	904	1,265	933	922	922	933	576	1,056	933
3	2,224	267	267	267	95	875	267	126	126	267	312	−198	267
4	2,970	454	454	454	404	757	407	432	432	454	454	0	454
5	6,572	1,791	1,449	1,791	1,700	946	1,250	1,705	1,705	1,449	1,112	1,643	1,791
6	1,072	64	64	−165	64	596	174	−128	−192	−1,211	312	−1,350	64
7	1,086	66	66	66	66	403	157	−25	−69	−33	336	−1,433	−851
8	3,010	466	466	466	363	447	457	466	465	484	466	0	466
9	1,816	181	181	181	181	385	258	159	159	145	336	−703	181
10	1,956	209	103	209	206	176	193	206	195	405	336	−563	209
11	3,766	694	694	694	694	290	470	609	675	450	576	376	694
12	9,660	3,307	3,307	3,307	3,014	787	1,880	2,826	2,825	2,449	2,094	2,415	3,307
13	1,739	167	167	167	−223	701	322	27	27	57	280	−544	167
14	35	0	0	−1,064	−663	588	0	−442	−361	−419	280	−2,247	−1,512
15	4,312	885	−473	885	873	739	817	874	856	1,158	885	0	885
Total Tax Payments		11,110	9,304	9,817	9,304	10,581	9,211	9,383	9,301	9,304	9,360	—	8,681
(b)		19·4 (7–37)	0	5·5 (−14–8)	0	13·7 (−16–128)	−1 (−6–41)	·8 (−23–5)	·9 (−37–9)	0	—	—	—
(c)		28·0 (21–34)	7·2 (1–13)	13·1 (10–16)	7·2 (1–13)	21·9 (−6–51)	6·1 (0–12)	8·1 (7–9)	8·2 (6–10)	7·2 (7–8)	—	—	0

Notes

(a) The tax calculations are based on the schedule of rates operating for the financial year ending June, 1970.

(b) The unbracketed figure in each column is the percentage additional tax for the fifteen-year period, compared with the tax payable if annual income was constant within each of the five-year block periods. The bracketed figures are the minimum and maximum percentage amounts, respectively, by which the tax paid for a five-year block period exceeds that payable on a constant income within the block period. For instance, with the Type I moving average, the tax paid over the third five year period is 16 per cent less than for a constant income, whilst it is 128 per cent greater for the second five-year period.

(c) As for (b), except it is assumed that income should be measured over block periods of seven years.

TABLE 2

Relative Performance of Alternative Income Averaging Procedures

Performance Criteria	Annual Progressive Tax	Five-Year Block Average	Downing's Block Average	Five-Year Cumulative Average	Moving Averages				
					Type I	Type II	Type III	Type III*	Type IV
Fluctuating annual income	Poor	Good	Fair	Good	Poor	Fair	Good	Good	Good
Sustained upward income trend	Poor	Good	Poor	Good	Fair	Good	Fair	Fair	Good
Sustained downward income trend	Poor	Good	Fair	Good	Poor	Poor	Good	Good	Good
Response to current income	Good	Fair	Fair	Good	Poor	Poor	Good	Good	Fair
Response to modification of rates	Good	Fair	Fair	Good	Poor	Poor	Good	Good	Fair
Inequities and speculation arising from rate modifications	Poor	Good	Fair	Good	Poor	Poor	Good	Good	Fair
Administrative burden	Good	Fair	Good	Fair	Fair	Fair	Fair	Good	Fair

downward trend. The response of the payments to current income is the same as for an annual progressive tax, except that the taxpayer receives a refund every fifth year. From the taxpayer's viewpoint the lumpy nature of the tax rebates, and the relatively long waiting period before they are received, is undesirable. The latter defect could be met by adding an interest adjustment factor to the refund.

Staggered entry would probably be required if all, or a large proportion, of taxpayers were permitted to block average their incomes. If all taxpayers began block averaging at the same point in time, tax refunds would be bunched and would introduce an element of inflation in the years in which they were paid. Over time, however, as new taxpayers entered the jurisdiction and old ones left, the bunching problem would be reduced. With an established block averaging system, in which the bunching problem had been overcome, tax revenues would be responsive to modifications of the rates without lag. Moreover, there would no longer be any benefit to be gained from shifting income in response to modification of the rates. The administrative burden would be reasonable. For each taxpayer a record would need to be kept of the year in which his current block average began, the cumulative taxable income, the cumulative tax paid, and the tax rates ruling for each year of the averaging period.

The Cumulative Average

Under a cumulative averaging system the total sum of taxes paid over the averaging period equals the total taxes that would have been paid had the cumulative average income been received in equal annual amounts. The tax due in the current year is determined by multiplying the cumulative average income by the tax rate applicable in each year of the averaging period, summing these figures, and subtracting from this amount the total taxes already paid. Unlike the block average, the income of a particular year enters into the average repeatedly. Unlike the moving average, the most remote year in last year's average is not dropped from the current year's computation.

A cumulative averaging procedure is particularly appropriate for long averaging periods, and it is this procedure which is usually recommended by advocates of lifetime averaging. For equal averaging periods, a cumulative average gives similar results to a block average. The main difference being that an adjustment is made every year to the tax payable under the cumulative average, and not simply a lump sum adjustment at the end of the period. The present value of tax rebates to the taxpayer is thus greater.

The tax payment is particularly responsive to current income. The tax payment in any year will not exceed the tax that would have been due with no averaging. The change in tax revenue resulting from modification of the rates, in the form of a constant percentage rebate or levy, will be low in years of high income and high in years of low income, as compared with no averaging. This is due to the percentage rebate, or levy, being imposed on the cumulative average income rather than the current year's income. Providing this is realized by the government, the tax rate can be adjusted accordingly. Too, a cumulative average substantially reduces the incentive to speculate on rate modifications,

as these are based on the cumulative average income which will usually respond only slightly to changes in current income. The only information that would be required to be carried forward from the preceding year would be the cumulative income and the cumulative taxes paid. With rate modifications it would also be necessary to keep a record of the tax rates applying in each year.

Moving Averages

There are a number of types of moving averaging procedures. Their common feature is that they all utilize a moving income base.

Type I

The Type I moving average computes the tax payable each year on the basis of the average income for the current year and the preceding years of the averaging period. That is, tax on the income for the first year of the averaging period would be paid. The tax for the second year would be based on the average taxable income for the two years and so on. This procedure would be continued for the period of time established as the averaging period whereupon the first year would be dropped and the current year added. The procedure was introduced in the State of Wisconsin in the late 1920s, but due to a number of serious defects is now only of historic interest. The most notable defects are that it can result in very high tax payments being due in low income years, and that the tax paid over the averaging period may differ substantially from the tax paid on a stable income of the same total size.

Type II

This is the averaging procedure currently applied to primary producers in Australia. The moving average income is used to determine the effective rate at which current income is taxed. The effective tax rate is derived by dividing the average income for the five year averaging period into the tax payable on the average income. The tax due in the current year is computed by multiplying the current year's income by the effective tax rate. Under the present Australian system the full benefits of averaging apply only to primary producers whose current taxable income and average income over the five year period are both less than $16,000. Averaging is optional. However, under the present law once a primary producer has elected to average and then subsequently withdrawn from the scheme, he cannot elect to re-enter. Averaging can only commence when a taxpayer's taxable income of one year is equal to, or greater than, the taxable income of the previous year. That previous year then becomes the first year of the moving average. Primary producers are also currently permitted to carry forward negative taxable incomes for an indefinite period and then write them off against future income.

The Type II moving average fulfils the requirement of period equity reasonably well when differences between the average income of successive five year block periods are small. When there are significant differences between the average income of successive five year block periods, the total tax paid on the fluctuating income, over each period, will not be equal to the tax on a steady income of equal size. For income streams characterized by a downward trend, the total tax paid will

always exceed both the tax payable on a constant income of the same average magnitude, and the tax that would have been payable with no averaging.

For an upward trending income, the total tax payments under the Type II moving average will never exceed those which would have been paid with no averaging. The total tax payments may be less, or greater than, the total tax payable on a stable income. In contrast to the situation with a downward trending income, the effective tax rate applied to the current year's income will always be less than the annual progressive tax rate. The tax penalty imposed on upward trending incomes will thus always be reduced. Usually the total tax payment will still be greater than that on a stable income. It is feasible, however, when income rises rapidly from a zero or low level that the tax penalty will be overcompensated for. Other weaknesses inherent in this averaging system derive from a common cause, namely the undue lag in the responsiveness of current tax payments to changes in income. This causes the tax payments in low income years to be greater than they would have been in the absence of averaging, thus impairing the built-in flexibility of the annual progressive tax, and accentuating the hardship facing individual taxpayers in these years. Conversely, in high income years the tax payments will usually be considerably lower than with no averaging.

When rate modifications are in the form of rebates or levies based on a constant percentage of annual tax payments, as is currently the situation in Australia, the lag between current tax payments and changes in income will also cause a lag in the responsiveness of tax revenue to rate changes.. Moreover, the inequities arising from changing tax rates and fluctuating incomes, and the benefits attained from shifting income between years, are only slightly reduced under this averaging procedure. The administrative burden is slightly greater than for the block average.

Type III

With a Type III moving average the current tax payment is derived from two components. The first component is the simple moving average, that is, the tax payable on the moving average income at the current rate. The second component involves an adjustment factor. This is determined by multiplying the marginal tax rate on the moving average income by the difference between it and the current year's income. If the current year's income exceeds the moving average income the adjustment factor will be positive, and is added to the first component to derive the current tax payment. Conversely, when the current year's income is less than the moving average income, the adjustment factor is subtracted from the first component.

The Type III moving average fulfils the requirement of period equity at least as well as the Type II moving average when differences between the average income of successive five year block periods are small. This is due to the moving average income fluctuating only slightly in response to changes in current income. The marginal tax rate will, therefore, be fairly stable. Its application to deviations from the moving average income results in positive deviations being taxed at approximately the same rate as is used for computing the tax adjustments for negative deviations. Where a five year period with a low average income follows a high average income period, the total tax paid in the low income

period will usually be equal to, or less than, that paid on a stable income. This is in contrast to the undesirable feature of the Type II moving average, whereby the total tax paid in a low income period will usually be significantly greater than what would have been paid with no averaging.[7]

With trend incomes the results are the converse of those for the Type II moving average. For downward trends in annual income the total tax payments will be substantially less than with no averaging, but usually not less than the tax on a stable income of the same total size. The total tax payable on an upward trending income, whilst always less than with no averaging, will be greater than that for a constant income of the same average magnitude.

The Type III moving average maintains the built-in flexibility of the annual progressive tax to a significantly greater extent than does the Type II moving average. Generally the Type III moving average will result in a proportionately larger decrease in tax payments in low income years than in high income years. With an unchanging rate scale the tax payment in any year will never exceed the tax that would have been payable with no averaging. With a changing rate scale the current tax payment may exceed that payable with no averaging if a low income year, following several high income years, coincides with a substantial increase in the rate scale. In general, however, when the current year's income is significantly below the moving average income, the tax payment for that year will be substantially below the tax payable with no averaging. This is in direct contrast to the Type II moving average.

The inequities, and incentive to shift income, arising from the interaction between changes in the rate scale and a fluctuating income stream, can be largely overcome by applying the fluctuating component of the tax rate to the moving average income, rather than to the current income. The incentive to shift income to years in which the tax scale was expected to be lowered would be significantly reduced, since such income shifts would have a comparatively small effect on the moving average income. To achieve the same adjustment in tax revenue from the rate modification, it would be necessary to impose a higher levy in high income years and provide a lower rebate in low income years, compared with the situation where the fluctuating component of the tax rate is applied to the current year's income. The administrative burden is comparable with the Type II moving average.

*Type III**

The administrative burden of the Type III moving average could be substantially reduced by using a weighted moving average income. [8, p. 352-3]. This could be based on a system of weights which gradually decreases the influence of old income. For instance, the income for each year could be given a weight which is a constant proportion of the weight assigned to the income of the succeeding year. Each weight may, for example, be four-fifths of the weight attached to the income of the succeeding year. Under this system the older incomes

[7] For instance, over the low income years 6-10 given in Table 1, the total tax paid with no averaging is $986, whilst $1,239 tax is paid under a Type II moving average.

have a continuously decreasing influence on the average income until their effect is negligible. The weighting coefficient, which is the ratio between successive weights, can probably most easily be determined by deciding what percentage of the total weight should be attached to income of, say, the preceding five years. A weighting coefficient of between 0·70 and 0·80 gives results which approximate reasonably closely those obtained with the Type III moving average. In Table 3 the weights for a weighting coefficient of 0·70, 0·75 and 0·80 are given. A weighting coefficient of 0·75 has been used for the net income data for the N.S.W. High Rainfall Zone. This system of weighting simplifies the calculation of the average income and minimizes the data which need to be carried forward. Once the weighted average has been calculated it contains all the relevant past income data and is the only information which needs to be carried forward.

TABLE 3

Averaging Weights for Various Weighting Coefficients

Weights by Years	Weighting Coefficients		
	$w = 0{\cdot}70$	$w = 0{\cdot}75$	$w = 0{\cdot}80$
Weight for income of present year, t	0·300	0·250	0·200
Weight for income of year t_{-1}	0·210	0·188	0·160
Weight for income of year t_{-2}	0·147	0·141	0·128
Weight for income of year t_{-3}	0·103	0·105	0·103
Weight for income of year t_{-4}	0·072	0·079	0·082
Total weight for the income of the most recent five years	0·832	0·763	0·673

Type IV

This averaging procedure combines a moving income base with the block averaging procedure. Annual tax payments are calculated in each year according to the block average procedure, but the income base is now a moving average. With respect to period equity, the results are identical to those obtained with block averaging and cumulative averaging. Unlike the block average, whereby tax relief is received in a lump sum at the end of each block period, the Type IV moving average provides annual tax adjustments. This procedure, however, has the undesirable characteristic of causing tax payments in some years to be significantly greater than they would be in the absence of averaging. The cumulative average appears to give results which are at least as good in some respects, and better than the Type IV procedure in all other respects.

Income Adjustment Accounts

The foregoing averaging devices have all used the income history of the taxpayer to determine his current tax liability. Income adjustment accounts (IAA) allow a taxpayer to take into account his prospective income in the determination of his current tax liability. It permits a taxpayer to allocate part of his current income to a non-interest-bearing government account. The deposit is deductible from the tax assessable income of the year for which the deposit is made, and is added to the taxable income in the tax year in which it is withdrawn. An IAA may

currently be used by primary producers in New Zealand [11, p. 293], and was also proposed by the Canadian Royal Commission as a complement to the block average [2, 9]. The Canadian Royal Commission saw an IAA as a supplement to averaging devices based on historic income. An IAA would be inadequate as the only form of relief because it does not provide any benefit to taxpayers who are experiencing steady increases in income, or to those who suffer unexpected declines in income. Use of an IAA would thus be made mainly by taxpayers who received large lump sum receipts, and by taxpayers who could foresee sharp drops in their income in future years. IAA would be particularly relevant then when the income tax base included realized capital gains and losses, and to people with very peaked earnings.

If farmers could accurately predict their future income stream, the post-tax income stream with an IAA would be more stable than with any other form of averaging. This is because an IAA is the only averaging procedure which involves the actual transfer of income from periods of high to periods of depressed income. Part of the reason for introducing IAA would appear to be to stimulate saving in high income years. This, for example, is a clear aim of the Commonwealth Drought Bond scheme introduced in Australia in 1969. This is a form of IAA which has very restrictive eligibility rules, and is confined to primary producers who derive the bulk of their income from grazing sheep and cattle.[8]

Farmers will not usually be in a position to predict their future income stream with the accuracy required to use the IAA successfully as the only form of income averaging. Moreover, there is an opportunity cost of the interest forgone on the deposits in an IAA which is not incurred with the other averaging devices. The main argument against the payment of any interest, even at a nominal rate, is that it would provide an IAA with an unfair advantage over banks and similar institutions.[9]

It would be possible to speculate on rate modifications with an IAA. For instance, if a taxpayer predicted a reduction in next year's rates he could deposit a large sum at the end of the current financial year and withdraw it at the beginning of the following financial year. Such speculation could largely be overcome by stating that deposits cannot be withdrawn within twelve months of when they are made. The administrative burden would be reasonably light as neither the government, nor the taxpayer, would need to keep extensive records of the taxpayer's previous returns.

Concluding Comments

In the judgement of most writers on the topic, the primary function of income averaging should be to attain period equity. That is, over

[8]. An anaysis of the likely effects of the Commonwealth Drought Bond Scheme has been presented by Glau [5].

[9] The Commonwealth Drought Bonds currently carry a nominal yield of 3 per cent as they are specifically aimed at stimulating saving for drought, flood or fire, rather than as an income averaging device *per se*. However, when they are legitimately redeemed before maturity for one of the above reasons they operate in a similar fashion to an IAA. They do not operate in the same way as an IAA when the bonds are redeemed at maturity (ten years). In this case the bond holder receives the face value plus accrued interest, less an amount equal to the tax saving made when the bond subscription was allowed as a deduction from assessable income.

some specified period, equal taxes should be paid on incomes of equal total size, regardless of how the income is distributed over the period. In the absence of income averaging, the size of the additional tax payments caused by an unstable income flow is determined by the magnitude of the variance of taxable income, and its mean level [7, 10]. For the Australian progressive rate scale, the additional tax payments are proportionately greater for low mean incomes than for high mean incomes. This is because the rate of change of the marginal tax rate is greater at lower than at higher income levels.

A detailed study of the variability of individual Australian farm incomes has not been undertaken in the present study. The B.A.E. data for the sheep industry [1] suggests that, compared with stable incomes of equal total size measured over a period of five to seven years, it would be fairly common for sheep farmers to incur additional tax payments of 15 to 25 per cent if there were no income averaging. And in some instances additional tax payments of 30 per cent, or more, would be incurred. If the aim is to define an averaging period such that the average income for successive block periods is reasonably comparable, the period should not be less than five years. For the particular income data presented in Table 1, a seven-year period appears the most appropriate. The averaging procedures reviewed could all quite readily be applied over averaging periods ranging from two to seven years. One of the main problems arising with longer averaging periods is the changing real value of money.

Regardless of the relative weighting given to the performance criteria listed in Table 2, Downing's block average and Types I and IV of the moving average, are judged to be inferior forms of averaging. Also, due to the lower administrative cost, Type III* moving average appears superior to Type III. The present comparison is therefore restricted to one between the block average, the cumulative average, and Types II and III* moving average.

The condition of period equity is completely fulfilled by the block and cumulative average, and reasonably well met by the Type III* moving average. The main defect of the Type II moving average (current Australian procedure) arises when there is a sustained downward income trend, or when a block period with a low mean income follows a high mean income block period. In both of these situations the tax payments will usually be substantially above those that would have been paid with no averaging.

The response of tax payments to current income is best maintained by the cumulative average and the Type III* moving average. It is also fairly well maintained by the block average, the main disadvantage being the lumpy nature of the tax rebate. The Type II moving average performs badly on this count. It will be fairly common for a given annual tax payment to significantly exceed that paid under the simple annual progressive tax. Moreover, in contrast to the other procedures, the Type II moving average provides only a small reduction in the incentive to speculate on rate modifications.

On the basis of the performance criteria adopted in this paper, and given any reasonable weighting of the desirable attributes of an averaging system, the block average, cumulative average, and Type III* moving average are all considered to be superior to the current Australian

averaging procedure. The overall difference in performance between the former three averaging procedures is comparatively small. The main disadvantage of the block average compared with the other two procedures is the lumpy nature of the tax rebate. The cumulative average is slightly better than the Type III* moving average with respect to period equity, but has a greater administrative burden.

With respect to forward averaging procedures, it is desirable that a taxpayer should be allowed to carry forward negative taxable incomes and balance them against future positive taxable incomes. It is unlikely that primary producers would be able to predict fluctuations in their future income stream with sufficient accuracy to make an IAA adequate as the sole form of averaging. However, it would be a useful supplement to an averaging procedure based on historic income, if a government seeks to stimulate savings in high income years and to reduce annual fluctuations in farmers' spending income; or if income averaging was extended to all taxpayers with variable incomes.

References

[1] Bureau of Agricultural Economics, Canberra, The Australian Sheep Industry Survey. Various reports, 1962-67.
[2] Canadian Report of the Royal Commission on Taxation, Vol. 3, pp. 261-281, 1966.
[3] Commonwealth Government Printer, Canberra, *Income Tax for Primary Producers*, 1970.
[4] Downing, R. L. et. al. *Taxation in Australia: Agenda for Reform*. Melbourne University Press, p. 64, 1964.
[5] Glau, T. E. 'The Commonwealth Drought Bond', *The Australian Journal of Agricultural Economics*, Vol. 14, No. 2, pp. 121-130, 1970.
[6] Goode, R. *The Individual Income Tax*. The Brookings Institution, pp. 251-255, 1964.
[7] Hinkley, F. and Taplin, J. 'A Comparison of the Tax Savings Effects of Averaging and Income Equalization when Rural Incomes are Highly Variable', *Quarterly Review of Agricultural Economics*, Vol. 14, No. 4, pp. 193-205, 1966.
[8] Holt, C. C. 'Averaging of Income for Tax Purposes: Equity and Fiscal—Policy Considerations', *National Tax Journal*, Vol. 2, pp. 349-361, 1949.
[9] 'Income Averaging: A Canadian Suggestion', *Yale Law Journal*, Vol. 77, No. 6, pp. 1223-1234, 1968.
[10] McArthur, A. T. G. 'Extra Tax Resulting from Income Variation with Particular Reference to New Zealand', *The Australian Journal of Agricultural Economics*, Vol. 13, No. 1, pp. 68-73, 1969.
[11] Report of the Taxation Review Committee: Taxation in New Zealand, Government Printer, Wellington, 1967.
[12] Steger, W. A. 'Averaging Income for Income Tax Purposes', *U.S. Tax Revision Compendium*, Vol. 1, pp. 589-620, 1959.
[13] Vickrey, W. 'Averaging of Income for Income Tax Purposes', *Journal of Political Economy*, Vol. 47, No. 3, June, 1939. Reprinted in Musgrave, R. A. and Shoup, C. S. (Eds.) *Readings in the Economics of Taxation*, American Economic Association Series, pp. 77-92, 1959.
[14] Wiegner, E. A. 'Income Averaging for Federal Personal Income Taxation', unpublished Ph.D. dissertation, University of Wisconsin, 1969.