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FORMULA AVERAGING OF PERSONAL
INCOMES IN CANADA

Gordon W. Davies

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FORMULA AVERAGING OF PERSONAL

INCOMES IN CANADA[*]

1. Introduction

Prior to 1972 there were a variety of provisions available to

Canadian taxpayers to ease the effect of progressive tax rates on lump-sum

payments of income from pension funds, profit sharing plans, death benefits,

retirement bonuses, stock options, and the sale of copyrights by authors,

etc. Most of these provisions, which were defined in disparate sections of

the pre-1972 income tax legislation, reduced the effective rate of tax on

these types of income by relating the rate payable to some average of the

rate paid by the taxpayer in previous years, by apportioning the payment

backwards and taxing it at rates applicable to those years, or by other

special devices.[1] In addition, a form of block averaging was available for

farmers and fishermen at intervals of, at most, five years.[2]

The Royal Commission on Taxation recommended in 1966 that the tax

base be broadened to include capital gains, gifts and inheritances, and

damage payments,[3] which are sources of income that occur more irregularly

than earned income. With increasing marginal tax rates, a taxpayer who has

a changing income over some period of time will pay tax at a higher average

rate than a taxpayer who has the same average, but constant, income over the

same period. Horizontal equity demands that individuals with the same

average income over time should pay tax at the same average rate; this

principle is obviously violated to a greater extent when more volatile

sources of income are included in the tax base. There are other reasons to

allow individuals with irregular incomes to average them in some way:

resources are wasted if taxpayers spend time and effort to change the natural timing of their income receipts, there are inequities between those who are able to do so and those who are not, and there is a misallocation of resources between occupations which have stable earning streams and those which do not. The Commission therefore recommended the introduction of two distinct averaging schemes without restriction as to the type of income eligible: forward average by the use of deposits in income adjustment accounts and five-year block averaging.[4] These averaging proposals received brief mention and varying degrees of support in a number of subsequent commentaries on the Commission's work: Brazer [1967], Harberger [1968], Moore [1968], Musgrave [1968], and Pechman [1967]. In addition, Merkies [1968] has analyzed, under various assumptions, the optimal strategy for a taxpayer when both forms of averaging are available.

Apparently in response to the Commission's recommendations, two new forms of averaging were introduced in the new Income Tax Act (December 1971): forward averaging by the purchase of an income-averaging annuity contract, similar in effect to the income adjustment accounts described above, and more universal provisions applicable to all taxpayers regardless of the source of income. The forward averaging provisions apply to lump-sum payments from a number of different sources and they consolidate and replace most of the separate provisions which had been applicable to different types of income. They also cover other types of income as well, such as from activities as an athlete, musician, or entertainer.[5] The previous provisions have been temporarily retained under special transitional rules.[6] The formula provisions, known as General Income Averaging, are not a true form of block averaging which is commonly defined to be a scheme in which the

individual _periodically_ may elect to have his tax liability calculated on the basis of his average taxable income in the current and prior tax years. Under General Income Averaging, the taxpayer's previous income stream, relative to his current income, is considered in the tax calculation in _each_ year and the tax calculation is only remotely similar to block averaging in only a subset of the conditions under which a taxpayer may benefit. Block averaging for farmers and fishermen was also retained in the new Act;[7] in addition, there are a variety of _ad hoc_ devices which unintentionally serve an averaging function.[8]

The first proposal for an averaging scheme of this type was made in Benson [1969]. This proposal required that an individual's current income be at least one-third greater than his average income in the previous four years for any benefit to be given. This proposal was criticized as being too restrictive; more liberal provisions were presented in Benson [n.d.]. These provisions are identical to the ones which were enacted in the new Income Tax Act. The General Income Averaging provisions are discussed in Salyzyn [1971 and 1974]. Salyzyn only considers two of the four cases in which a taxpayer may benefit from averaging, implying that there are no other conditions which may give rise to a benefit. In addition, there is some ambiguity and one error in his statement of the provisions in the first study.[9] The provisions are also described in an elementary textbook on Canadian public finance (Strick [1973]), but no other discussion or analysis of them appears in the literature. The Canadian provisions bear a striking resemblance to ones introduced in the United States in 1964. The U.S. provisions are discussed briefly in the Report of the Royal Commission on Taxation [1966, Vol. III, pp. 253-254], Pechman [1971], and Goode [1964],

and they are analyzed in detail in David, Groves, Miller and Wiegner [1970].

The lack of analysis of the Canadian averaging provisions is explained in part by the fact that they have been introduced only recently, but also because a taxpayer does not normally make the averaging calculations himself: they are done by computer _after_ the individual files his normal tax return. The typical taxpayer is therefore completely unaware of the nature of the averaging calculations, unless he elects to file a supplementary form (T 2077) at the same time he files his tax return. The vast majority of taxpayers leave the calculation to Revenue Canada because the form must be specially requested and is very difficult to complete and because the only advantage in doing so results from a saving of, typically, a very small amount of interest over a brief period on the benefit which arises from averaging.

The first goal of this paper is to describe the complete averaging provisions in correct algebraic terms in order that they may become more widely known. The second objective of the paper is to analyze in some detail how the provisions work--the conditions under which a taxpayer may benefit from formula averaging and the extent of the benefit which arises from the provisions, for different hypothetical streams of income. We also evaluate the averaging provisions in terms of their assumed goal, show their effects on marginal tax rates, and illustrate their effects on the distribution of income. The averaging provisions are shown to be almost totally ineffective in achieving their goal, to have a moderate effect on marginal tax rates, and to have a progressive incidence pattern on one comparison and no clear incidence pattern on another comparison. Finally, some concluding and further remarks on this form of averaging are also offered.

The rest of the paper follows the above outline. We consider next the calculations which determine the extent of the benefit from General Income Averaging and illustrate the actual benefit which may arise under various conditions.

2. How General Income Averaging Works

The enabling legislation for General Income Averaging is Section 118 of the Income Tax Act of Canada (1971). This legislation is reproduced in full in Appendix I. We first define H_t, a "threshold" level of income. H_t^* is equal to the greater of H_t' and H_t'', defined as follows:

$$H_t' = 1.1 \ Y_{t-1}$$

$$H_t'' = 1.2 \left(\frac{Y_{t-1} + Y_{t-2} + Y_{t-3} + Y_{t-4}}{4} \right) = 1.2 \ \bar{Y}_t$$

where Y is the taxpayer's <u>net</u> income.[10] Net income in any previous year $(Y_{t-i}, \ i=1,...,4)$ is defined to be the greater of \$1600 and the individual's actual net income in that year (Y_{t-i}^A), i.e., $Y_{t-1} = \text{Max} < Y_{t-i}^A, \ \$1,600 >$.[11]

An individual may potentially benefit from averaging if $Y_t - H_t^*$ is positive. The extent of the potential benefit from averaging depends on the size of H_t' relative to H_t'' and of D_t relative to H_t^* where D_t is the amount of deductions an individual may claim. These conditions and the formula applicable to each are shown in Table I in which τ is the tax function, i.e., the function that relates an individual's Federal income tax liability to his taxable income.[12] These formulae are reduced forms derived from the legal statement of the averaging provisions in Appendix I; Appendix II describes the derivation of the formulae in relation to the provisions described in the Income Tax Act. The final stipulation in the averaging

TABLE I

CALCULATION OF TAX LIABILITY WITH GENERAL AVERAGING

	$H'_t > H''_t$	$H''_t > H'_t$
$D_t > H^*_t$	I.1 $5\tau[.2(Y_t - D_t)]$	I.3 $5\tau[.2(Y_t - D_t]$
$H^*_t > D_t$	I.2 $5\tau[.88\, Y_{t-1} + .2\, Y_t - D_t] - 4\tau[1.1\, Y_{t-1} - D_t]$	I.4 $5\tau[.96\, \bar{Y}_t + .2\, Y_t - D_t] - 4\tau[1.2\, \bar{Y}_t - D_t]$

Source: Appendices I and II.

calculation is that an individual's actual tax liability is taken to be the lesser of the tax liabilities calculated with and without averaging.

To illustrate one of the formulae, suppose that an individual's net income has been $14,000 for four years, that his deductions are constant at $4,000, and that his net income increases by 50 per cent to $21,000 in year t. Then 120 per cent of his average net income in the previous four years (H_t'') is greater than 110 per cent of his net income in the previous year (H_t') and his deductions are less than H_t'', so that formula I.4 applies. The tax liability is therefore:

(1)   <u>five</u> times the tax on

        (a)   96 per cent of $14,000 = $13,440

    plus (b)   20 per cent of $21,000 = $ 4,200

    less (c) $4,000

    or $13,440 + $4,200 - $4,000 = $13,640

minus (2)   <u>four</u> times the tax on

        (a)   120 per cent of $14,000 = $16,800

    less (b) $4,000

    or $16,800 - $4,000 = $12,800.

In other words, if an individual's net income increases from $14,000 to $21,000 and his deductions in the current period equal $4,000, his tax liability with averaging is five times the tax on $13,640 minus four times the tax on $12,800. In effect, the individual is paying <u>five</u> times the tax on $13,640 - $12,800 = $840 or $840 ÷ $17,000 = 5.25 per cent of his current <u>taxable</u> income, which tax is calculated at the full <u>marginal</u> rates applicable to the range of income between $12,800 and $13,640. The same logic applies

to formula I.2: if $(Y_t - H^*)$ is positive, the tax liability is in effect calculated as five times the tax, at the full marginal rates applicable to an upper range of his income, on some small per cent of his taxable income. If $D_t > H_t^*$, the tax is simply five times the tax on one-fifth of his current taxable income.

Provided that $Y_t - H_t^*$ is positive, the choice of the formula used to calculate the tax under averaging depends only on past income levels, irrespective of the taxpayer's current net income. The condition $H_t' > H_t''$ can be reduced to

$$ Y_{t-1} > 1.125 \left(\frac{Y_{t-2} + Y_{t-3} + Y_{t-4}}{3} \right) $$

which says that either I.1 or I.2 is used if the individual's net income in the previous period is greater than 112.5 per cent of his average net income beginning two periods back and ending four periods back. In other words, if the individual's net income was constant in t-2, t-3, and t-4, it would have had to increase by more than 12.5 per cent in period t-1 for I.1 or I.2 to apply in period t, regardless of his net income in period t.

Formula I.1 is chosen over formula I.2 if the individual's deductions are greater than $1.1\ Y_{t-1}$ which, in the normal case, occurs if the individual's net income in t-1 was low. The same logic applies to the choice of formula I.3 over formula I.4.

To illustrate the conditions under which a taxpayer may benefit from averaging and the extent of the benefit from averaging, we first consider the effect on the tax liability if the individual's net income has been constant for four years but then increases by a certain per cent in year five. In Table II we show the benefit from averaging as a per cent of net

TABLE II

BENEFIT FROM AVERAGING AS PER CENT OF NET INCOME FOR VARIOUS
ONE-TIME PER CENT INCREASES IN NET INCOME

Net Income in Year 5 (in thousands)	One-Time Per Cent Increase in Net Income				
	20.5	25.0	30.0	35.0	45.0
4					2.2000
5		.0200	.0200	.0200	.0200
6		.0083	.0083	.0083	.0083
7		.0214	.0214	.0214	.1111
8					.3938
9		.0222	.0222	.0222	.0222
10				.0978	.4200
11		.0182	.0182	.0182	.0182
12				.3500	.3500
13	.0061	.0192	.0192	.0192	.2548
14				.3750	.3750
15	.0163	.0167	.0167	.0167	.7000
16			.2260	.3281	.3281
17					.6029
18	.0139	.0139	.0139	.0139	.0733
19			.2763	.2763	.2763
20				.1722	.5125
21					.5435
28	.0089	.0089	.0089	.0089	.0089
29		.0759	.1810	.1810	.1810
30			.1718	.3417	.3417
31				.2545	.4919
32					.6328
33					.3877
43	.0058	.0058	.0058	.0058	.0058
44		.1193	.1193	.1193	.1193
45			.2278	.2278	.2278
46			.2124	.3315	.3315
47				.4309	.4309
48				.1181	.5260
49					.6173
50					.6283
51					.2914

income in year five for a number of net income levels. Each column gives
the following:

$$x = \frac{TN_5 - TA_5}{Y_5} \cdot 100$$

where TN_5 is the tax liability of the individual in year five in the absence
of any averaging calculations and TA_5 is the tax liability in year five
assuming that the averaging provisions discussed above are in effect. Y_5 is
the individual's net income in year five. Net income in the previous four
periods is assumed to equal $Y_5/(1+r)$, where r is the assumed one-time
increase in net income. Deductions in year five are assumed to equal $2,950,
which is the amount allowable in 1971 for a taxpayer with a dependent spouse,
two dependent children (one under age 16 and one over age 16), and a
standard medical deduction of $100. The calculations all make use of the
1971 Federal Income Tax rate schedule which is shown in Table III. Deduc-
tions of $2,950 and the 1971 tax schedule are also used in Tables IV
through VII in this paper.

The calculations in this table all involve the use of formulae I.3 or
I.4 since, when net income has been constant for four years, H'' will be greater
than H'. This table includes all cases in which a benefit arises from the
averaging calculations for net incomes in year 5 ranging from $1,000 to
$60,000: the cases excluded in this range imply a zero benefit from
averaging. The first result of interest from this table is that a benefit
from averaging only arises if the increase in net income is 20.5 per cent
when the benefit is calculated as a per cent of net income, to the fourth
decimal place. Second, a benefit from averaging only arises when the
taxpayer moves to a higher tax bracket: for example, the net income levels
at which a benefit from averaging arises for a 20.5 per cent increase in
net income are $13,000, $15,000, $18,000, $28,000, and $43,000. Assuming

TABLE III

1971 FEDERAL PERSONAL INCOME TAX RATES

Taxable Income	Marginal Tax Rate
≤ 500	.00
500 - 2,000	.16
2,000 - 3,000	.18
3,000 - 4,000	.19
4,000 - 6,000	.22
6,000 - 8,000	.26
8,000 - 10,000	.30
10,000 - 12,000	.35
12,000 - 15,000	.40
15,000 - 25,000	.45
25,000 - 40,000	.50
40,000 - 60,000	.55
60,000 - 90,000	.60
90,000 - 125,000	.65
125,000 - 225,000	.70
225,000 - 400,000	.75
> 400,000	.80

that deductions had been the same in the previous four years, taxpayers with these net incomes would have all moved from a lower to a higher tax bracket in year five. Third, the greater the change in net income, the greater is the number of income levels at which taxpayers may benefit from averaging, for the simple reason that more taxpayers are moved to higher tax brackets for larger increases in net income. Fourth, and finally, the benefit from averaging is quite small as a per cent of net income, at a maximum 2.2 per cent and at a minimum .0058 of one per cent. Using the above definition of x, we can calculate the dollar benefit from averaging as

$$TN_5 - TA_5 = \frac{x \cdot Y_5}{100}$$

which implies that the benefit from averaging in absolute dollar terms is $88 for the highest benefit from averaging, relative to income, and $2.49 for the lowest benefit from averaging, again relative to income.

To illustrate the effect of formulae I.1 and I.2, we next consider a case in which the taxpayer's net income has increased by the same per cent in each year from year one to year five. In Table IV we show the benefits from averaging as a per cent of net income which arise if the individual's net income in year five is as shown in the first column and had increased by a constant per cent in each of the previous periods. That is, we assume that

$$Y_i = \frac{Y_5}{(1+r)^{5-i}}$$

for i=1,2,3,4.

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TABLE IV

BENEFIT FROM AVERAGING AS PER CENT OF NET INCOME FOR VARIOUS
CONTINUING PER CENT INCREASES IN NET INCOME

Net Income in Year 5 (in thousands)	Continuing Per Cent Increases in Net Income				
	11.0	15.0	20.0	25.0	30.0
4					.8371
5		.0200	.0200	.0200	.0200
6		.0083	.0083	.0083	.0083
7		.0214	.0214	.0214	.0237
8					.2319
9		.0222	.0222	.0222	.0222
10				.1835	.4200
11		.0182	.0182	.0182	.0182
12				.3500	.3500
13	.0136	.0192	.0192	.0192	.0192
14			.0900	.3750	.3750
15	.0167	.0167	.0167	.0167	.2949
16			.2775	.3281	.3281
17					.5998
18	.0139	.0139	.0139	.0139	.0139
19			.2763	.2763	.2763
20				.2793	.5125
21					.1068
28	.0089	.0089	.0089	.0089	.0089
29		.0619	.1810	.1810	.1810
30			.2233	.3417	.3417
31				.3616	.4919
32					.4803
43	.0058	.0058	.0058	.0058	.0058
44		.1193	.1193	.1193	.1193
45			.2278	.2278	.2278
46			.2639	.3315	.3315
47				.4309	.4309
48				.2252	.5260
49					.5422
50					.1916

Before examining this table we make use of one further result. If an individual's net income was $\$y$ in year one and increased by a fixed per cent in each of the following four years, H'' would be greater than H' for continuing increases in net incomes less than or equal to 6.1 per cent, but $Y_t - H''_t$ would be negative, so that no benefit from averaging could arise. For per cent increases in net income ranging from 6.2 to 10.0 inclusive, H' is greater than H'', but $Y_t - H'_t$ would be negative, so that no benefit from averaging could arise. For continuing increases in net income greater than or equal to 10.1 per cent, H' is greater than H'' and $Y_t - H'_t$ is positive, so that there is a potential benefit from averaging.

As Table IV reveals, no benefit from averaging arises as a per cent of net income calculated to the fourth decimal place for continuing increases in net income less than or equal to 11.0 per cent. General Income Averaging may therefore serve a partial indexing function: if a taxpayer's net income increases by 11.0 per cent or more and the rate of inflation is equal to the per cent increase in his money income (i.e., his _real_ income is constant) then averaging serves to partially reduce the impact of increasing marginal tax rates on his real after-tax income. This is discussed in more detail in the final section of this report. The other results that are of interest in this table are similar to those discussed above for Table III: taxpayers benefit only when they move to higher tax brackets, the greater the per cent increase in net income the greater is the number of income levels at which taxpayers benefit, and the benefit from averaging is quite small as a per cent of net income and in absolute dollar terms.

This completes our detailed discussion of the averaging provisions; we now turn to an evaluation of General Income Averaging.

3. Effectiveness of Averaging Provisions

In this section we evaluate the extent to which General Income Averaging accomplishes its goal. We choose, as a basis for comparison, an averaging scheme which makes the taxpayer liable for income tax on a five-year moving average of his taxable income. Such a scheme would be administratively feasible and an approximation to true lifetime averaging.

The assumed income stream is the same as the one used in Table II, i.e., a one-time per cent increase in net income in year five over a constant income in years one through four. We first define

$$w = TN \left\{ [\, 4 \cdot \left(\frac{Y_5}{(1+r)} - D_5 \right) + (Y_5 - D_5)]\, / \, 5 \right\} - TA \left\{ Y_5 - D_5 \right\}$$

where TN gives the tax liability in year five on the taxpayer's average taxable income over the five-year period, without General Income Averaging, and TA defines the tax liability on the individual's taxable income in year five given his income history, but with General Income Averaging. For each assumption about the per cent increase in net income, Table V shows

$$\frac{w}{[4 \left(\frac{Y_5}{(1+r)} \right) + Y_5]\, / \, 5} \cdot 100$$

which is the difference between the tax liability for the two averaging schemes as a per cent of the taxpayer's net income averaged over the five-year period. The table also shows the value of the average net income over the five-year period, for each assumption about the per cent change in income. In this table, only selected income levels in year five are shown. The difference in tax liabilities is zero for all incomes in year five up to and including $3,000 and is negative and decreasing as income in year five

TABLE V

DIFFERENCE BETWEEN TAX LIABILITIES WITH POSTULATED AND ACTUAL

AVERAGING AS A PER CENT OF FIVE-YEAR AVERAGE OF NET INCOME

Net Income in Year 5 ($ thousands)	Per Cent Increase 10.0	Average Income ($ thousands)	Per Cent Increase 20.0	Average Income ($ thousands)	Per Cent Increase 30.0	Average Income ($ thousands)
3	0.0	2.782	0.0	2.600	0.0	2.446
4	-1.25	3.709	-2.46	3.467	-2.70	3.262
8	-1.73	7.418	-3.38	6.933	-4.78	6.523
12	-2.35	11.127	-4.40	10.400	-6.32	9.785
16	-3.10	14.836	-5.76	13.867	-8.05	13.046
20	-3.53	18.546	-6.75	17.333	-9.69	16.308
24	-3.53	22.255	-6.92	20.800	-10.19	19.569
28	-3.54	25.964	-6.93	24.267	-10.19	22.831
32	-3.92	29.673	-7.65	27.733	-10.96	26.092
36	-3.92	33.382	-7.69	31.200	-11.32	29.354
40	-3.92	37.091	-7.69	34.667	-11.32	32.615
44	-4.05	40.800	-7.83	38.133	-11.32	35.877
48	-4.31	44.509	-8.30	41.600	-11.97	39.139
52	-4.31	48.218	-8.46	45.067	-12.39	42.400

increases, for all assumed rates of change of net income from at least 10.0 to 50.0 per cent and all terminal net incomes ranging from $4,000 to $60,000.

The first item of interest from Table V is that the order of magnitude of the differences between the two tax liabilities, as a per cent of average net income, is much larger than in Tables II or IV. This arises precisely because General Income Averaging has only a very small effect on taxpayers with the income streams which we have assumed; in the absence of averaging the percentages shown in Table V would be roughly the same, for the simple reason that, with increasing marginal tax rates, an individual's average tax rate will be higher if his income has increased than if he had the same average, but constant, income over the period, in spite of the working of General Income Averaging. General Income Averaging therefore fails the simple test which we have given it: the difference in tax liabilities, with our better averaging scheme and General Income Averaging, is large, ranging from 1.25 per cent for a ten per cent increase in net income to $4,000 in year five up to 12.39 per cent for a thirty per cent increase in net income to $52,000 in year five.

Table V will be referred to again in section 5 of this paper and more will be said about the effectiveness of General Income Averaging in the final section. We next turn to a discussion of the effect of the provisions on marginal tax rates.

4. Effect on Marginal Tax Rates

Since General Income Averaging under some circumstances will reduce an individual's tax liability if his income increases, it will therefore, under the same circumstances, reduce his effective marginal tax rate. In

this section we consider the effect of the actual averaging provisions on marginal tax rates.

Again we assume that the taxpayer's net income has been constant for four years and that it increases by r per cent in year five. Each column in Table VI gives the following

$$\frac{TN_5 - TA_5}{Y_5 - Y_5/(1+r)}$$

where the numerator is the difference in the individual's tax liability as a result of the established averaging provisions, as in Table II, and the denominator is the dollar increment in the taxpayer's net income from year four to year five. (If deductions are constant the increment in net income is the same as the increment in taxable income.)

Table VI shows all non-zero differences in tax liabilities for all net incomes in year five ranging from $0 to $49,000 and for all per cent increases ranging from zero to 40.0. The table reveals that the averaging provisions have a moderate effect on marginal tax rates, ranging up to a reduction of 1.8411 per cent for the $48,000 level of net income, for which the marginal tax rate is 55 per cent (from Table III). The existing averaging provisions therefore result in a smoother progression in the rate schedule than is implied by the legal schedule of marginal tax rates.

The importance of this feature of General Income Averaging is diminished by the fact that very few taxpayers would be aware of the effect of averaging on their future tax liabilities, because of the complexity of the provisions. Also, most of the available evidence indicates that even severely increasing marginal tax rates do not deter work effort.

TABLE VI

REDUCTION IN EFFECTIVE MARGINAL TAX RATES

AS A RESULT OF AVERAGING

Net Income in Year 5 ($ thousands)	One-Time Per Cent Increase in Net Income				
	20.5	25.0	30.0	35.0	40.0
4					1.3061
5		.1000	.0867	.0771	.0700
6		.0417	.0361	.0321	.0292
7		.1071	.0929	.0827	.0750
8					.4875
9		.1111	.0963	.0857	.0778
10				.3771	1.4700
11		.0909	.0788	.0701	.0636
12				1.3500	1.2250
13	.0356	.0962	.0833	.0742	.0673
14			.1667	1.4464	1.3125
15	.0959	.0833	.0722	.0643	.4917
16			.9792	1.2656	1.1484
17					1.5588
18	.0816	.0694	.0602	.0536	.0486
19			1.1974	1.0658	.9671
20				.6643	1.7938
28	.0525	.0446	.0387	.0344	.0313
29		.3793	.7845	.6983	.6336
30			.7444	1.3179	1.1958
31				.9816	1.7218
32					1.1406
43	.0342	.0291	.0252	.0224	.0203
44		.5966	.5170	.4602	.4176
45			.9870	.8786	.7972
46			.9203	1.2787	1.1603
47				1.6619	1.5080
48				.4554	1.8411
49					1.3571

5. Incidence

In this section we illustrate the effect of averaging on the distribution of net incomes, for an assumed time path of net incomes. Without access to micro data, it is not possible to determine the actual effect on the distribution of income, since the incidence will depend on the difference in the variance in incomes by income class in addition to the width of the tax brackets and the increase in marginal tax rates, etc. To assess the incidence of the provisions we make two alternative comparisons. For the first of these we assume that the relevant basis for comparison is the tax liability which the individual would have if no general averaging scheme were in effect (the situation prior to 1972). For the second assessment we assume that the relevant basis for comparison is the tax liability which would arise if our postulated better averaging scheme were in effect. In both instances we assume that incomes are constant for four years and then increase by r per cent.

Table VII gives the following:

$$\frac{TN_5 - TA_5}{[4 \cdot \frac{Y_5}{(1+r)} + Y_5] / 5} \cdot 100$$

which is the benefit from averaging as a per cent of a five year average of the individual's net income. The table shows all non-zero differences in tax liabilities for all net incomes in year five ranging from $0 to $48,000 and for all per cent increases ranging from zero to 35.0. Also shown are the averages of net incomes corresponding to the different terminal incomes and the different percentage increases in incomes. Table VII therefore illustrates the incidence of the averaging provisions when the basis for

TABLE VII

DIFFERENCE BETWEEN TAX LIABILITIES WITH AND WITHOUT AVERAGING

AS A PER CENT OF FIVE-YEAR AVERAGE OF NET INCOME

Net Income in Year 5 ($ thousands)	Per Cent Increase 20.5	Average Income ($ thousands)	Per Cent Increase 25.0	Average Income ($ thousands)	Per Cent Increase 35.0	Average Income ($ thousands)
5			.0238	4.200	.0252	3.963
6			.0099	5.040	.0105	4.756
7			.0255	5.880	.0270	5.548
9			.0265	7.560	.0280	7.133
10					.1234	7.926
11			.0216	9.240	.0229	8.719
12					.4416	9.511
13	.0070	11.231	.0229	10.920	.0243	10.304
14					.4731	11.096
15	.0189	12.959	.0198	12.600	.0210	11.889
16					.4140	12.682
18	.0161	15.550	.0165	15.120	.0175	14.267
19					.3486	15.059
20					.2173	15.852
28	.0103	24.189	.0106	23.520	.0113	22.193
29			.0903	24.360	.2284	22.985
30					.4311	23.778
31					.3211	24.570
43	.0067	37.148	.0069	36.120	.0073	34.082
44			.1420	36.960	.1505	34.874
45					.2874	35.667
46					.4183	36.459
47					.5436	37.252
48					.1489	38.044

comparison is the absence of any averaging scheme. It is readily apparent from this table that there is no clear pattern to the incidence of the provisions when assessed in this way: over some ranges of income the incidence is progressive, over others regressive, and over the remaining ranges it is proportional (the case of zero difference in tax liabilities).

A more meaningful assessment uses a practical and more effective averaging scheme as a basis for comparison. Table V supra shows the difference in the tax liability with our postulated better averaging scheme and with General Income Averaging. In all cases the tax liability with the existing provisions is greater than the tax liability under our postulated scheme; also, the difference increases uniformly in absolute value as income increases. On this basis, the provisions are therefore quite progressive since higher income taxpayers get proportionally less relief from the averaging calculations than do lower income taxpayers.

This completes the detailed discussion of the averaging provisions and their effects. We now summarize the results and offer some further comments.

6. Summary and Further Observations

We have analyzed in some detail the nature of the averaging calculations and illustrated the conditions under which a taxpayer may benefit from General Income Averaging and the extent of the benefit which may arise. Also, an attempt has been made to assess the effectiveness of averaging and the effect of the provisions on marginal tax rates; the incidence of the averaging scheme has also been illustrated for an assumed time path of net income. The averaging provisions were shown to be only

very partially effective, to smooth the effective rate schedule, and to have no clear effect on the distribution of income on one comparison and a clear progressive effect on another comparison.

There are a number of other issues related to the provisions which warrant discussion. First, it is obvious that General Income Averaging entails some loss in income tax revenues to the Federal and Provincial governments. Any assessment of it must therefore take this revenue loss into account. Since averaging is only now being phased in, there are no actual figures for this loss. The loss might also be estimated from micro tax data.

Second, as suggested earlier in this paper, the averaging provisions are exceedingly complex and are therefore typically done on the computer by Revenue Canada after the individual files his normal tax return. Many taxpayers therefore receive a subsequent rebate without expecting it or knowing anything about the source of the benefit, which gives the averaging refund a gratuitous quality. There is something to be said against a tax provision to which taxpayers only have very indirect access and which involves calculations which are at least slightly mysterious. Such a scheme impedes rational planning of one's tax position, to the extent that such planning is possible. In addition to the confusion which almost necessarily arises, such a setup also raises the possibility of tax administrators disallowing certain exemptions or deductions which a taxpayer may have claimed and hiding the change by reducing the apparent benefit from averaging, although the author has no reason whatsoever to believe that this in fact happens in Canada.

Third, averaging may give rise to a benefit in cases which, it might

be agreed, no such benefit is justified. For example, a student who completes school in June of year t and works for the next six months of that tax year will benefit from averaging in years t and t+1, solely as a result of having a zero income prior to year t and a partial income in period t. Whether such a benefit is justified on the conventional arguments for income averaging is indeed questionable.

Fourth, if a taxpayer's net income increases at exactly the rate of inflation, then averaging provides a partial indexing function for rates of inflation equal to or greater than 11.0 per cent because it provides some rebate for the taxpayer based on the increased marginal tax rates which he will be subject to as his income increases. Equivalently, it may be said that indexing performs a partial averaging function, at least when the tax-payer's income is increasing. We have restricted the analysis in this paper to one period, although the actual benefit from averaging will be affected (lessened) as a result of indexing. It may be noted that all dollar figures in the Income Tax Act are indexed, including the $1600 minimum discussed in section 2 of this paper. When H_t'' is the relevant threshold, this means that some taxpayers may be disadvantaged by the indexing of the minimum income since the income minimum in all four previous years is uniformly indexed to the rate of inflation, rather than only the income in the previous tax year.

Fifth, the averaging provisions do not provide benefits for one-time increases in income of 20 per cent or less over constant incomes and for continuing increases in income of less than 11 per cent; nor do they always provide full benefits when a taxpayer is eligible to benefit; nor can they ever benefit a taxpayer whose income has decreased. Although the objective

of this paper is not to propose an ideal averaging scheme, our postulated

averaging scheme used as a basis for comparison would approximate an ideal

averaging scheme much more closely than does General Income Averaging.

Moreover, the postulated scheme would only require information on the

taxpayer's deductions in the previous four years, in addition to the data

which are necessary to complete the calculations; also, the calculation of

the tax liability would be no more complicated than it is under the existing

general provisions; and the scheme would also benefit taxpayers whose

incomes decreased. The postulated scheme is a simple form of block

averaging in which the taxpayer would have the option of averaging in every

year. Since block averaging is already an accepted practice for farmers

and fishermen there is no reason in principle to not extend the privilege

to other taxpayers whose incomes have changed.

Sixth, and finally, it should be recognized that General Income

Averaging lessens the automatic stabilizing function of progressive tax

rates if incomes are increasing. A form of averaging which allowed benefits

to taxpayers whose incomes had decreased would improve the stabilizing

function of the rate schedule if incomes were decreasing, since this form

of averaging must cause the individual to pay a lesser total amount of

tax over the period during which his income has decreased.

We have analyzed in some detail the new provisions for the formula

averaging of personal incomes in Canada. It would be interesting to see

other research in this general area, for example, on a comparison of the

provisions which exist in different countries. Another useful study would

be to analyze the formula provisions using longitudinal micro tax data.

Appendix I

General averaging

118. (1) Notwithstanding section 117, where, in the case of an individual who was resident in Canada throughout the taxation year immediately preceding a particular taxation year (which particular taxation year is hereafter in this section referred to as the "year of averaging"), any excess remains when

(a) the greater of 110% of his income for the immediately preceding taxation year and 120% of the quotient obtained when

(i) the aggregate of all amounts each of which is the individual's income for a taxation year in the period of such of the consecutive taxation years (not exceeding 4) immediately preceding the year of averaging as were years throughout which he was resident in Canada

is divided by

(ii) the number of years in the period described in subparagraph (i)

is deducted from

(b) the individual's income for the year of averaging,

(which excess is hereafter in this subsection referred to as the "averaging excess"), the tax payable by the individual under this Part upon his amount taxable for the year of averaging is the aggregate of

(c) the amount that would be determined under section 117 for the individual for the year of averaging if his amount taxable for the year were the remainder, if any, obtained when the averaging excess is deducted from the individual's amount taxable for the year computed without regard to this subsection, and

(d) 5 times the amount, if any, by which

(i) the amount that would be determined under section 117 for the individual for the year of averaging if his amount taxable for the year of averaging were the aggregate of the remainder described in paragraph (c) and an amount equal to 1/5 of the lesser of the averaging excess and the individual's amount taxable for the year of averaging

exceeds

(ii) the amount determined under paragraph (c).

Non-resident individuals

(2) Notwithstanding section 117, where, in the case of an individual who

(a) at no time during a taxation year (in this section referred to as the "year of averaging") and the immediately preceding taxation year was resident in Canada, and

(b) in each of those years, performed the duties of one or more offices or employments in Canada or carried on one or more businesses in Canada,

any excess remains after

(c) the greater of 110% of his income for the immediately preceding taxation year and 120% of the quotient obtained when

(i) the aggregate of all amounts each of which is the individual's income for a taxation year in the period of such of the consecutive taxation years (not exceeding 4) immediately preceding the year of averaging as were years

(A) throughout which he was not resident in Canada, and

(B) for which he has filed a return of income under this Part

is divided by

(ii) the number of years in the period described in subparagraph (i),

is deducted from

(d) the individual's income for the year of averaging,

(which excess is hereafter in this subsection referred to as the "averaging excess"), the tax payable by the individual under this Part for the year of averaging is the aggregate of

(e) the amount that would be determined under section 117 for the individual for the year of averaging if his amount taxable for the year were the remainder, if any, obtained when the averaging excess is deducted from the individual's amount taxable for the year computed without regard to this subsection, and

(f) 5 times the amount, if any, by which

(i) the amount that would be determined under section 117 for the individual for the year of averaging if his amount taxable for the year of averaging were the aggregate of the remainder described in paragraph (e) and an amount equal to

1/5 of the lesser of the averaging excess and the individual's amount taxable for the year of averaging

exceeds

(ii) the amount determined under paragraph (*e*).

Rules applicable in determining income

(3) For the purposes of this section the following rules apply:

(*a*) the income of an individual for a taxation year, at no time during which he was resident in Canada, shall be deemed to be the amount that would be determined under Division D to be his taxable income for the year if subsection 115(1) were read without reference to the words following paragraph (*c*) thereof;

(*b*) a taxpayer's income for any taxation year described in paragraph (1)(*a*) or (2)(*c*) as a taxation year preceding a year of averaging shall be deemed to be an amount equal to the greater of $1,600 and his income for the year otherwise determined for the purposes of this Part;

(*c*) any taxation year included in an "averaging period", within the meaning assigned that expression in section 119, pursuant to an election made by him under that section that was not revoked by him, shall not be included in the period referred to in paragraph (1)(*a*) or (2)(*c*), as the case may be; and

(*d*) where a taxpayer has died in a year of averaging,

(i) paragraphs (1)(*a*) and (2)(*c*) shall be read as if the references therein to "110%" and "120%" were read as references to "100%", and

(ii) subsections (1) and (2) are not applicable in respect of the year if the taxpayer's legal representative has made an election under subsection 70(2) in respect of the taxpayer's income for that year.

Appendix II

In this appendix we derive the formulae shown in Table I.

Sections 118.(1)(a) and (b) define the "averaging excess", E_t, as follows:

$$E_t = \text{Max} < 0 \,, (Y_t - H_t^*) >$$

where Y_t and H_t^* are as defined in section 2 of this paper.

Formulae I.1 and I.3

Section 118.(1)(c) defines the remainder R_t as follows:

$$R_t = \text{Max} < 0 \,, (Y_t - D_t) - E_t >$$

We take the case where $(Y_t - D_t) - E_t < 0$ (i.e., $R_t = 0$). Using the definition of E_t, this case arises when $D_t > H_t^*$.

Section 118.(1)(d)(i) defines the tax payable on the sum of the remainder, R_t, plus $\frac{1}{5}$ Min $< E_t \,, (Y_t - D_t) >$. If $R_t = 0$, $\frac{1}{5}$ Min $< E_t \,,$ $(Y_t - D_t) > = \frac{1}{5} (Y_t - D_t)$ since R_t is zero by definition when $(Y_t - D_t) - E_t < 0$ or $(Y_t - D_t) < E_t$.

Section 118.(1)(d)(ii) refers to the amount determined in 118.(1)(c), which is zero in this case.

Section 118.(1)(d) therefore defines the individual's tax liability as follows:

$$5\tau [.2(Y_t - D_t)]$$

which applies when $D_t > H_t^*$. This is our I.1 and I.3.

Formulae I.2 and I.4

These formulae are relevant if $R_t = (Y_t - D_t) - E_t$,

i.e., $(Y_t - D_t) - E_t > 0$ or $H_t^* > D_t$. Section 118.(1)(c) defines the tax

on the amount R_t: using the definitions for R_t and E_t the amount of tax

payable under this section is therefore

$$\tau[R_t] = \tau[H_t^* - D_t]$$

The amount determined in 118.(1)(d)(i) is $\tau[R_t + \frac{1}{5}\text{Min} < E_t , Y_t - D_t >]$

or $\tau[R_t + \frac{1}{5} E_t]$, since $E_t < (Y_t - D_t)$ when $R_t > 0$. Using the definitions

of R_t and E_t, the amount determined in 118.(1)(d)(i) is therefore

$$\tau[R_t + \frac{1}{5} E_t] = \tau[.8 H_t^* + .2 Y_t - D_t]$$

The amount determined in Section 118.(1)(d)(ii) is the same as the

amount determined in 118.(1)(c), i.e.,

$$\tau[H_t^* - D_t] .$$

Sections 118.(1)(c) and (d) together define the taxpayer's liability

when $H_t^* > D_t$ as

$$\tau[H_t^* - D_t] + 5\{\tau[.8 H_t^* + .2 Y_t - D_t] - \tau[H_t^* - D_t]\}$$

$$= 5\tau[.8 H_t^* + .2 Y_t - D_t] - 4\tau[H_t^* - D_t] .$$

If $H_t' > H_t''$, $H_t^* = H_t' = 1.1 \cdot Y_{t-1}$, and we have our I.2:

$$5\tau[.88 Y_{t-1} + .2 Y_t - D_t] - 4\tau[1.1 Y_{t-1} - D_t] .$$

If $H_t'' > H_t'$, $H_t^* = H_t'' = 1.2\ \overline{Y}_t$, and we have our I.4:

$$5\tau\,[.96\ \overline{Y}_t + .2\ Y_t - D_t] - 4\tau\,[1.2\ \overline{Y}_t - D_t]\ .$$

FOOTNOTES

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[1] The relevant sections of the former Act are 35, 36, 37, 43, 80, 85 A(2)(3), 85 E(4), 64 (2)(4), 85 F(5), and 43 A. (See Commerce Clearing House [1974, p. 12068].)

[2] The relevant legislation was Section 42 of the former Act.

[3] Royal Commission on Taxation [1966, Vol. III, pp. 59-116].

[4] Ibid. [1966, Vol. III, pp. 241-280].

[5] The relevant legislation for forward averaging is Section 61 of the new Act.

[6] The regulations are defined in Revenue Canada, Income Tax Application Rules, 1971, Sections 39-48.

[7] The relevant legislation for block averaging for farmers and fishermen is Section 119 of the new Act.

[8]For example, up to sixty days after a given tax year an individual may contribute, within limits, to a Registered Retirement Savings Plan and deduct the amount of his contribution from his income for the given tax year. The contribution may then be withdrawn from the plan in the following tax year at which time it is taxed as income received.

[9]These issues are discussed in more detail in footnote 12 below.

[10]
As General Income Averaging is being phased in, the period used in the calculation of H_t'' is being extended from one to four years, so that the formula shown for H_t'' will not apply until 1976. The regulations covering the implementation of the provisions are defined in Income Tax Application Rules (1971), rule number 38.

From Section 118.(2)(c) of the Income Tax Act (1971), the number of years included in the calculation of H'', if the taxpayer was not resident in Canada but "performed duties of one or more offices or employment in Canada or carried on one or more businesses in Canada", is equal to the number of consecutive taxation years ($\leq$ 4) immediately preceding the year of averaging in which the taxpayer was not resident in Canada and in which he carried on the activities described above.

By Section 118.(3)(d), if a taxpayer died in a year of averaging, the factors 1.1 and 1.2 both become 1.0.

[11]Under Section 117.(1) of the Income Tax Act (1974), any dollar figures are indexed to take account of inflation. This indexing applies to the minimum income figure specified in Section 118.(3)(d) so that, for 1974, the

$1600 minimum has been raised to $1700 and, for 1975, to $1806. Note that the revised minimum values apply to <u>each</u> of the four preceding tax years, which means that averaging cannot perform an indexing function for tax-payers whose incomes are close to the minimum, as it does for taxpayers with higher incomes. This indexing function is illustrated later in this section and discussed again in the final section of this paper.

Under Section 118.(3)(a), "the income of an individual for a taxation year, at no time during which he was resident in Canada, shall be deemed to be the amount that would be determined under Division D to be his taxable income for the year if subsection 115(1) were read without reference to the words following paragraph (c) thereof...."

[12]In Salyzyn [1971, p. 30] the tax liability (T_t) with averaging is defined to be either

$$T_t = 5 \ [T_2 \ (0.96a + 0.2c)] - 4 \ [T_1 \ (1.2a)]$$

or

$$T_t = 5 \ [T_2 \ (.88a + 0.2c)] - 4 \ [T_1 \ (1.1p)]$$

where a is defined as average income, p income of the previous year, and c current <u>taxable</u> income. T_1 and T_2 are not specified but are intended to be the average rate of tax on <u>net</u> income (implicitly in Salyzyn [1974] and explicitly in a letter [1975]). These formulae are incorrect if T_1 and T_2 are the rate of tax on net income <u>and</u> if c is current taxable income. In Salyzyn [1975, p. 28], c is correctly defined to be simply current income (net income).

More important, in neither study does Salyzyn show formulae for the case when $D_t > H_t^*$ (in our notation). This case arises when the quantity

specified in Section 118.(1)(c) is less than zero (i.e., there is no "remainder" obtained when the averaging excess is deducted from the individual's taxable income). Our derivation of this case is given in Appendix II. Since Salyzyn ignores this case in both studies, the reader is led to believe that the formulae he presents describe the provisions fully which, we show, is incorrect.

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