PROGRESSIVE RATES OF TAX IN AUSTRALIA.

By H. S. Carslaw, Sc.D., LL.D.

(With 15 text-figures.)

Introductory.

Heavy expenditure on war purposes has made the Federal Government obtain from income tax a much larger revenue. As the State taxes on income are far from uniform, and the Federal tax must be the same throughout Australia, the Federal authorities are seriously hampered at all points of the scale, and not least in their dealings with high incomes. It seems clear that the present position with regard to taxation of incomes cannot continue.

Both Federal and State Income Tax Schedules are based upon a progressive rate of tax whose principle is little understood. It may be helpful in present circumstances to give a simple and critical exposition of the system and of its use by Federal and State authorities. Only elementary mathematics is employed, but with the aid of mathematics a little more advanced the matter could be put more concisely and naturally.

Progressive Rates in Federal Taxes.

1. The simplest form of tax is that in which the rate is constant; e.g. 6 pence in the £. Next comes a graduated tax of which the following may be taken as an example:

<table>
<thead>
<tr>
<th>On so much of the Income as</th>
<th>The Rate of Tax per £ shall be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not exceed £500</td>
<td>0 s. 6 d.</td>
</tr>
<tr>
<td>Exceeds £500 but does not exceed £1,000</td>
<td>0 s. 8 d.</td>
</tr>
<tr>
<td>Exceeds £1,000 but does not exceed £1,500</td>
<td>0 s. 10 d.</td>
</tr>
<tr>
<td>Exceeds £1,500 but does not exceed £2,000</td>
<td>1 s. 0 d.</td>
</tr>
<tr>
<td>Exceeds £2,000</td>
<td>1 s. 2 d.</td>
</tr>
</tbody>
</table>

Let the amount of the tax on an income of £x be $T$ pence.

Then $T = 6x$, when $0 < x \leq 500$.

$T = 6 \times 500 + 8(x - 500)$, when $500 < x \leq 1000$.

$= 8x - 1000$.

$T = 6 \times 500 + 8 \times 500 + 10(x - 1000)$, when $1000 < x \leq 1500$.

$= 10x - 3000$.

$T = 12x - 6000$, when $1500 < x \leq 2000$.

and $T = 14x - 10,000$, when $2000 < x$.

The amount of the tax on an income of £x can be read off from Fig. 1, by finding the area between the axis of $y$, the "step" function, the ordinate at $x$ and the axis of $x$.

Now bisect the segments in Fig. 1. It will be seen that the middle points lie on the line whose equation is

$$y = \frac{x}{250} + 5 \quad \cdots \cdots \cdots \cdots \quad (1)$$
Referring to Fig. 2 and raising the ordinates at $x=50, 150, 250$, etc., to this line, we see that a graduated tax in which steps of $\frac{2}{5}$ths of a penny take place at intervals of £100, while the amount of the tax on incomes of £500, £1,000, £1,500 and £2,000 is the same as before, is as follows:

- On the 1st £100 there will be a flat rate of $(5+1/5)$ pence;
- on the 2nd £100 of $(5+3/5)$ pence;
- on the 3rd £100 of $(5+1)$ pence, and so on, till on the 20th

£100 there will be a flat rate of \( \left(5 + \frac{2 \times 20 - 1}{5}\right) = \left(13 - \frac{1}{5}\right)\) pence. In this case it would be natural on the excess over £2,000 to make the flat rate 13 pence in the £.

Also, if we carry the steps down to intervals of £1, we obtain again from the line (1) the following scheme:

- On the 1st £ the amount of the tax will be $(5+1/500)$ pence;
- on the 2nd £, $(5+3/500)$ pence;
- on the 3rd £, $(5+5/500)$ pence, and so on.

The amount of the tax on the $n$th £ will be \( \left(5 + \frac{2n - 1}{500}\right)\) pence, and on the 2,000th £ it will be \(13 - 1/500\) pence.

With this graduated tax it would be still more natural to have a flat rate of 13 pence in the £ on the excess over £2,000.

Then, with the above notation, on summing this arithmetical progression,

\[ T = x \left(\frac{x}{500} + 5\right), \text{ when } x \text{ is any positive integer not exceeding } 2,000 \]
and

\[ T = 13x - 8000, \text{ when } x \text{ is greater than } 2,000. \]

2. On the other hand, if we start with a formula of the type

\[ T = x(ax + b) \]
and subtract the tax on an income of £$(x-1)$ from that on an income of £$x$, we see that the $x$th £ pays

\[ x(ax + b) - (x-1)(a(x-1) + b) \]
i.e., \(a(2x-1)+b\) pence.
Thus the 1st £ pays \((a+b)\) pence,
the 2nd £ pays \((3a+b)\) pence,
the 3rd £ pays \((5a+b)\) pence,
and so on, the amounts paid by each successive £ forming an arithmetical progression whose first term is \((a+b)\) and common difference \(2a\).

Writing \(T/x=R\), it is usual in Australia to call \(R\) the rate of tax for every £ of the income of \(£x\).

Thus, when \(R=ax-b\), the amount paid by each successive £ exceeds that paid by the preceding £ by \(2a\) pence.

A progression of this sort must stop at some figure or too much would be taken from each additional £ of the income. If it stops, say, at £5,000, and there is a flat rate on the excess over £5,000, it would obviously be wrong to make each £ of the excess pay less than that paid by the 5,000th £. From the mathematical point of view it would be right to take “the rate at \(x_0\)” for the flat rate on the excess over \(£x_0\). “The rate at \(x_0\)” is \(2ax_0+b\) and can be found by reducing the steps from intervals of £1 to gradually smaller and smaller intervals.

The progressive rate, when \(R\) is of the form \(ax+b\) up to a certain value of \(x\), and there is a suitably chosen flat rate on the excess over that sum, is a natural extension of the simple graduated tax, where steps of the same size are taken at equal intervals, say of £100, up to a certain sum and there is a flat rate on the excess.

3. There is a simple graphical representation of the amount of the tax on an income of \(£x\), when \(T=x(ax+b)\).

In Fig. 3, \(OM=x\), \(OH=MK=b\), \(KQ=ax=QP\).

Then \(HQ\) is the line \(y=ax+b\) and \(HP\) is the line \(y=2ax+b\).

The area of the rectangle \(OMQN\) is \(x(ax+b)\) and the area of the trapezium \(OMPH\) is the same as that of the rectangle.

Thus the line \(y=2ax+b\), by means of the area \(OMPH\), provides a representation of the tax payable when the rate \(R\) is \(ax+b\).\(^1\) Also, the tax on the \(x\)th £ is given by the area of the trapezium \(M'MPP'\), where \(OM=x\) and \(OM'=(x-1)\), namely \([a(2x-1)+b]\).

If \(a\) is small, this tax is approximately \(2ax+b\) and is represented by the ordinate at \(x\) to the line \(2ax+b\).

In Fig. 4 the line \(P_0P_1\) is drawn through \(P_0\) parallel to the axis of \(x\). The area between this line \(HP_0P_1\), the ordinate at any point, and the axes, represents the amount of the tax, when the rate \(R\) is \(ax+b\) up to \(£x_0\) and there is a flat rate of \(2ax_0+b\) in the £ on the excess over \(£x_0\).

If the flat rate on the excess is \(c\) instead of \(2ax_0+b\), we have to use the line \(y=c\) in the diagram instead of the line \(y=2ax_0+b\).

4. In §3 we reached the flat rate by only one progression. It would be natural to introduce another in the range from \(£x_0\) to \(£x\), with a smaller common difference, and perhaps even another, with the flat rate to follow.

\(^1\)I am indebted to a referee for this way of evading the Calculus.
Such a system is illustrated in Fig. 5, where it will be noticed that the line $HP_0P_1P_2$ is continuous, and this requires that

$$2ax_0 + b = 2a'x_0 + b'.$$

The 1st £ pays $(a + b)$ pence

" 2nd £ pays $(3a + b)$ pence

" 3rd £ pays $(5a + b)$ pence

Common difference $2a$.

and the $x_0$th £ pays $[a(2x_0 - 1) + b]$ pence.

Then the $(x_0 + 1)$th £ pays $[a'(2x_0 + 1) + b']$ pence

the $(x_0 + 2)$th £ pays $[a'(2x_0 + 3) + b']$ pence

and the $x_1$th £ pays $[a'(2x_1 - 1) + b']$ pence.

Common difference $2a'$.

There is a flat rate $2a'x_1 + b'$ on the excess over £$x_1$. It will be seen that the amount of the tax on an income of £$x$ is given by the area bounded by the line $HP_0P_1P_2$, the ordinate at $x$, and the axes.

When $0 < x < x_0$, $T = x(ax + b)$.

When $x_0 < x < x_1$, $T = x(ax + b') + x_0[a_0 + b - a'x_0 - b']$.

since \(2x_0(a - a') = (b' - b)$.

5. One other remark is required before concluding this theoretical section. With the line \(y = 2ax + b\) in the first interval, it might seem proper to take the line \(y = 2a'x + b'\) in the next interval from $x_0$ to $x_1$, making $ax_0 + b = a'x_0 + b'$, with $a'$ less than $a$.

\[ \text{2 This is } (a + a') \text{ pence more than the } x_0 \text{th £ pays.} \]
But, if \( ax_0 + b = a'x_0 + b' \), and \( a' \) is less than \( a \), the line \( y = 2a'x + b' \) cuts the ordinate at \( x_0 \) as in Fig. 6, and there is a jump down at \( x_0 \) in the amount paid by the \((x_0+1)\)th £.

It will be seen that \( P_0'P_0 = (a-a')x_0 \) and that this jump down may be considerable.

However, with Fig. 6,

When \( 0 < x < x_0 \), \( T = x(ax + b) \);

and when \( x_0 < x < x_1 \), \( T = x(a'x + b') + x_0(ax_0 + b - a'x_0 - b') \)

\[ = x(a'x + b') \]

since \( ax_0 + b = a'x_0 + b' \).

The fact that \( T \) in the second interval, when \( ax_0 + b = a'x_0 + b' \), takes the simple form \( x(a'x + b') \) seems to have tempted the Federal and some of the State authorities to adopt this system instead of that described in §4.

It will be seen later how seriously this affects the continuous progression in the amounts paid by the successive £'s. There can be no question that the jumps made in these cases are as inequitable as making the final flat rate different from that indicated by the amount paid on the last £ of the progression.

6. A progressive rate, where each successive £ pays just a little more than the preceding up to a certain stage and there is a flat rate on the excess, determined by the amount which the last £ of the progression pays, was used for the first time in taxation when the Commonwealth of Australia in the financial year 1910-11, began its Land Tax. The formula was due to Sir George Knibbs, the first Federal Statistician. Residents in Australia were allowed an exemption of £5,000. In their case the taxable value of their land was the actual value less £5,000.

Particulars of the tax are given in the following table.\(^3\)

<table>
<thead>
<tr>
<th>Assessment Year</th>
<th>Taxable Value £1 to £75,000.</th>
<th>Taxable Value over £75,000.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((1 + \frac{x}{30,000}) d.)</td>
<td>First £75,000.</td>
</tr>
<tr>
<td>1910-11 to 1913-14</td>
<td>(1 + \frac{x}{30,000}) d.</td>
<td>(3.5)</td>
</tr>
<tr>
<td>1914-15</td>
<td>(1 + \frac{x}{18,750}) d.</td>
<td>5</td>
</tr>
</tbody>
</table>

\(^3\) Official Year Book of the Commonwealth of Australia, No. 32, p. 836 (1939).
The rates for 1914-15 have been the basic rates since that year, altered from time to time by certain percentages. It will be noticed that, when the progression ends, the flat rate on the excess is determined by the amount paid on the last £ of the progression.

7. The Federal Government first imposed an income tax in the financial year 1915-16. For earned income the rate of tax was of the same type as in the land tax for residents.

With the notation of this paper, in the 1915 Act the scale is given by the formula:

When $0 < x \leq 7,600$, $R = 3 + \frac{3x}{800}$;

When $7,600 < x$, on the first £7,600, $R = 3 + \frac{3 \times 7,600}{800} = 31.5$,

and on the excess over £7,600 the rate of tax per £ is 60 pence.

In Fig. 7 we have a graphical representation of this tax.

The area between the line $y = 3 + \frac{3x}{400}$ when $0 < x \leq 7,600$ and $y = 60$, $x > 7,600$ the axes of $x$ and $y$, and the ordinate at any point $x$, represents the amount of the tax on an income of £$x$; and the tax on the $x$th £, when $x$ does not exceed 7,600, is given by the ordinate at $x$ less 3/800.

From §2 we know that the 1st £ pays $(3 + 3/800)$ pence, the 2nd £ $(3 + 9/800)$ pence, the 3rd £ $(3 + 15/800)$ pence, and so on, these amounts forming an arithmetical progression with common difference 3/400. The 7,600th £ pays £ of the excess pays 60 pence.

*Absentees are not allowed an exemption.*
Unfortunately, in dealing with property income, Knibbs introduced complexities of a mathematical kind. For the first £546 of taxable income, the formula for \( R \) was of a type similar to that for earned income; the amounts paid by each successive £ formed an arithmetical progression. From £546 to £2,000 each successive £ paid just a little more than the preceding £, but the progression was not arithmetical. Here his "curve of the second degree" entered. From £2,000 to £6,500 each successive £ paid just a little more than the preceding. Here his "curve of the third degree" came in. Every £ of the excess over £6,500 paid 60 pence, this being the amount paid by the 6,500th £.

There seems no doubt that Knibbs could have got all he needed by breaking up the interval into three parts, in each of which a different arithmetical progression was used, as described in §4.

A ready reckoner was issued by the taxation authorities showing the amount of the tax on any income. Without its help the taxpayer would have been quite ignorant of what he had to pay.

When income was derived partly from personal exertion and partly from property, the rate on the earned income was that for an earned income of the whole amount, and that on the property income also that for a property income of the whole amount. This principle is to be understood as applying below to both State and Federal incomes of this kind unless otherwise remarked.

8. These rates of tax remained the basic rates for Federal income tax from 1915-16 till 1930-31. They were altered from time to time by certain percentages, sometimes over the whole income range, sometimes only over parts of the range. For some years there was a Special Property Tax at a flat rate. In this way the gradual progressions of the original formulae were interfered with; and for this as well as other reasons a new scale of rates was devised for the year 1931-32. The person responsible on that occasion was Professor Giblin. Knibbs' curves were dropped. The Integral Calculus had no longer to be used in determining the amount of the tax. The linear rate \( R = ax + b \) remained the characteristic feature of the formulae for both kinds of income.

The new scales can be stated as follows:

**Earned Income.**

(i) If the taxable income does not exceed £6,900, \( R = 3 + \frac{x}{160} \).

(ii) If the taxable income exceeds £6,900, on the first £6,900, \( R = 3 + \frac{6,900}{160} = 46.125 \), and on the excess over £6,900 the rate of tax per £ is 90d.

**Property Income.**

(i) If the taxable income does not exceed £500, \( R = 3 + \frac{x}{100} \).

(ii) If the taxable income exceeds £500 but does not exceed £1,500, \( R = 1 + \frac{14x}{1,000} \).

(iii) If the taxable income exceeds £1,500 but does not exceed £3,700, \( R = 4 \frac{1}{2} + \frac{23x}{2,000} \).

(iv) If the taxable income exceeds £3,700, on the first £3,700, \( R = 4 \frac{1}{2} + \frac{23 \times 3,700}{2,000} = 47.3 \), and on the excess over £3,700 the rate of tax per £ is 90d.

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These scales are represented on Fig. 8. That for earned income is the familiar type with the amounts paid by each successive £ up to the 6,900th forming an arithmetical progression with a common difference 0·0125 d. The flat rate on the excess is determined by the amount paid on the last £ of the progression.

In the scale for property income it will be noticed that R is continuous at £500 and £1,500. The discussion in §5, though given for the case of only two intervals, applies also to any number. The gradient in the interval 500 to 1,500 is steeper than that in the interval 1 to 500. This explains the jump up at 500 in the amounts paid by the adjacent £'s and the formulae (i) and (ii) show that this is as much as 2d., whereas the common difference in the progression from 1 to 500 is 0·02, while that in the interval 500 to 1,500 is 0·028. Again at 1,500 there is a jump down of nearly 4d.

These awkward breaks at the 500th £ and at the 1,500th are a blot on this scale. Indeed it is surprising that it was allowed to remain the basic rate from 1931-32 till 1939-40, with percentage changes over the whole range from time to time as the revenue needs demanded more or less.

It is also rather astonishing that a simpler means of discriminating between the two kinds of income has not even yet been adopted by the Federal authorities. There is much to be said in favour of the method used in England. A certain proportion is deducted from the total of the earned income, but this deduction must not exceed a certain sum. When the earned income has been reduced in this way and the deductions, as provided in the regulations, have been made from each class of income, the two are treated alike; their sum forms the taxable income and the rates of tax refer to the taxable income without any further distinction as to the way in which it is composed.

9. For the year 1939-40 the Federal Parliament passed two Income Tax Acts. The Income Tax Act (No. 1) 1940, of May, anticipated the budget for the year, which was placed before the new Parliament in November. The Federal Treasurer, then Mr. Spender, in introducing the measure, made some reference to the "income tax technique" adopted by the Commonwealth and the rates of tax designed by Sir George Knibbs. He was bold enough to assert that "for some considerable time the Commonwealth led the world on methods of income taxation and other countries followed. In particular, most of the Australian States followed the Commonwealth lead, improved on the principle, and adapted it to their own needs." This praise seems to me somewhat excessive.

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6 In Fig. 8 and later figures, the upper of the two graphs refers to Property Income.
and with regard to the so-called improvements the States made on the principle there will be something to say later.

The scheme embodied in Schedules I and II of the Income Tax Act (No. 1) 1940 was influenced by the incidence of the State taxes on income. "This practical limitation of Federal income taxation," said the Treasurer,8 "causes difficulties at present, but not of a serious order." Six months later his successor, Mr. Fadden, had a different tale to tell.

The scale of rates can be put briefly as follows:

**Earned Income.**

When $0 < x < 500$, $R = 5$.

\[500 < x < 1,000, \quad R = \frac{x}{50} - 5.\]

\[1,000 < x < 4,200, \quad R = \frac{x}{100} + 5.\]

\[4,200 < x, \text{ on the first £4,200, } R = 47, \text{ and on the excess over £4,200 the rate of tax per £ is 90 pence.}\]

**Property Income.**

When $0 < x < 500$, $R = 6$.

\[500 < x < 1,000, \quad R = \frac{3x}{100} - 9.\]

When $1,000 < x < 4,200$,

\[R = \frac{x}{80} + 8\frac{1}{2}.\]

\[4,200 < x, \text{ on the first £4,200, } R = 61, \text{ and on the excess over £4,200 the rate of tax per £ is 108 pence.}\]

These scales are represented in Fig. 9. They are again examples of the system discussed in §5, $R$ being continuous in both at 500 and 1,500. There are extremely awkward jumps at these points, and, while the flat rate on the excess over £4,200 in earned income does not differ much from that indicated by the amount the last £ of the progression pays, in the case of property income it is chosen as 108 pence per £ instead of 113.5.

The defects in these scales are so serious that one wonders how the committee of experts, with Professor Giblin as economic adviser, came to recommend them to the Federal Treasurer.

10. However, when the budget for the year 1939-40 was put before Parliament at the end of November, the increased war expenditure required that income tax provide a much greater revenue, and the Acts passed in May

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dealing with assessment and rates had to be replaced by others. The statutory exemption, about which nothing has been said so far in this paper, since 1931-32 had been £250, diminishing by £1 for every £2 by which the net income exceeded £250, and thus vanishing at £750. In the Assessment Act (No. 1) 1940 this had been replaced by £250, vanishing at £500. When Mr. Fadden introduced the new Assessment Bill, it was proposed to make the exemption £150, vanishing at £300. To this there was strong opposition and a compromise was reached so that in the Assessment Act (No. 2) 1940 it stands at £200, vanishing at £400.

It has to be remembered that in most of the States there are taxes on income in addition to the regular State income tax, called by various names (wages tax, unemployment relief tax, etc.), and that under these there is a considerable weekly levy on wages, as well as a considerable tax on low incomes which escape the ordinary State income tax of these States with their fairly liberal statutory exemptions. Where these taxes do not operate, the State income tax exemption is low, down to £100 for a person without dependants, and the revenue required for these special purposes is obtained from income tax. This explains the opposition to the original proposal to reduce the Federal statutory exemption to £150, vanishing at £300.

In addition to bringing a large number of wage earners and persons with low incomes into the income tax-paying class, the Treasurer had to raise the rates. In the Income Tax Act (No. 2) 1940, with the notation of this paper, they can be expressed as follows:

**Earned Income.**

When \(0 < x \leq 400\), \(R = 16\).

When \(400 < x \leq 1,500\), \(\frac{x}{25}\).

When \(1,500 < x\), on the first £1,500, \(R = 60\), and on the excess over £1,500 the rate of tax per £ is 120 pence.

**Property Income.**

When \(0 < x \leq 400\), \(R = 20\).

When \(400 < x \leq 1,200\), \(\frac{x}{20}\).

When \(1,200 < x\), on the first £1,200, \(R = 60\), and on the excess over £1,200 the rate of tax per £ is 120 pence.

11. These scales are represented in Fig. 10. Each £ of earned income up to and including the 400th £ pays 16 pence. The 401st £ pays 32.04 pence, a jump up of 16 pence. Then the amounts paid by each successive £ form an arithmetical progression with common difference 2/25ths of a penny up to the 1,500th £, which pays (120—0.04) pence. Every £ of the excess over £1,500 pays 60 pence.

Again for property income, each £ up to and including the 400th pays 20 pence. The 401st £ pays 40.05 pence, a jump up of 20 pence. Then the amounts paid by each successive £ form an arithmetical progression with common difference 1/10th of a penny up to the 1,200th £, which pays (120—0.05) pence. Every £ of the excess pays 120 pence.
It was to be expected that under the new scales the 1st £ of taxable income would pay more than under the No. 1 Act. It was natural too that the increments in the ascending progressions should be larger than before. But it might have been expected that the range over which the progressions hold would, as in all the earlier Acts, be a large one, so that on the high incomes a much greater part of each £ high up in the range would be taken than of a £ not so far up. Yet for earned income there is a flat rate on the excess over £1,500, while for property income the flat rate holds on the excess over £1,200. Surely with so early an application of a flat rate the principle of ability to pay is forgotten.

The Federal Treasurer told the House\(^8\) that "he had pushed taxation of higher incomes to the limit". This may be true of incomes over £8,000 in Queensland, where on the excess over £8,000 the State taxes on income take about 8s. 5d. from each £, so that on such excess the combined Federal and State taxes on income take about 18s. 5d. from each £. But it does not hold for high incomes in lower-taxed States, and it seems to me that the incidence of the rates of tax in the present Federal Act places a very heavy burden on the middle incomes and a relatively heavy burden on the low incomes, but that high incomes, and in particular very high incomes, in some States carry a burden more easily borne.

It is true that the Income Tax Act (No. 2) 1940 had to be treated as an urgent measure and passed through Parliament quickly. This fact and the obscurity of the schedules defining the rates, as well as ignorance of the principle behind the progressive rate, may explain why discussion was confined mostly to the statutory exemption. That some arrangement must be made with the States, so that the Federal taxation authorities will be able to devise a fairer scale before the next income tax measures are considered, is now generally accepted, and the Federal Government has begun discussions with the Governments of the States with this end in view.

**Progressive Rates for Income Tax in the States.**

12. For its income tax Tasmania since 1924 has used the original Federal rates, altered from time to time by certain percentages. It is possible that it finds that the ready reckoner issued in 1915 by the Federal authorities saves a good deal of trouble. In all the other States the formulae depend on a rate \( R \) of the type \( (ax+b) \). In New South Wales and Western Australia there is but one progression, followed by a flat rate on the excess over a certain sum. The same holds of the scale for earned income in Queensland. In Victoria and South Australia for both kinds of income, and in Queensland for property income, there are either two or three progressions, followed by a flat rate on the excess, when the last of the progressions ends. Suppose that the first ends at \( x_0 \) and the second goes from \( x_0 \) to \( x_1 \). In the first, let \( R=ax+b \), and in the second \( R=a'x+b' \), with \( ax_0+b \) equal to \( a'x_0+b' \). We have seen in §5 that there must then be a jump of \( (a-a')x_0-(a+a') \) at \( x_0 \) in the amount paid by the \( x_0 \)th £ as compared to that paid by the \( (x_0+1) \)th £. Serious discontinuities are introduced in this way in the progressions in these States. In Queensland the position is made still worse by an "Additional Tax" which over certain ranges increases the amount of the earlier tax by certain percentages, varying from 15% to 27½%. Further, there is an extraordinary break with the principle of the progressive tax in the scales for all the States, except Tasmania, when the flat rate is introduced at the end of the last progression. Instead of determining this flat rate by the amount paid by the last £ of the progression, or as

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\(^8\)Commonwealth of Australia, Parliamentary Debates, 16th Parliament, 1st Session, p. 88 (1940).
near that as may be, it is in all of them much lower. That this affects the tax on many high incomes is obvious. No such mistake has ever been made in the Federal rates.

Space will permit only a short reference to the scales in force for the financial year 1940-41, and we omit the provisions made for higher taxes on non-residents.


The statutory exemption is £250, diminishing by £1 for every £8 by which the net income exceeds £250 and thus vanishing at £2,250. Discrimination between earned income and property income is made by reducing the taxable earned income by one-fifth, with a maximum reduction of £900, the rate payable on the remainder being that for property.

When the taxable income is partly earned and partly from property, the earned income is reduced as above, and the remainder plus the taxable income from property is charged at the rate set out for property. This system has been in force since 1936.

The basic rate is as follows:

<table>
<thead>
<tr>
<th>Income in £</th>
<th>Rate of Tax in pence per £</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5,500</td>
<td>9 + \frac{3x}{500}</td>
</tr>
<tr>
<td>5,500-10,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>10,500-15,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>15,500-20,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>20,500-25,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>25,500-30,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>30,500-35,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>35,500-40,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>40,500-45,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>45,500-50,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>50,500-55,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>55,500-60,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>60,500-65,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>65,500-70,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>70,500-75,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>75,500-80,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>80,500-85,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>85,500-90,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
<tr>
<td>90,500-95,500</td>
<td>1 + \frac{3x}{500}</td>
</tr>
<tr>
<td>95,500-100,500</td>
<td>\frac{1}{2} + \frac{3x}{500}</td>
</tr>
</tbody>
</table>

In Fig. 11 there is a representation of this tax, and it will be seen that the flat rate on the excess over £5,500 should be 75 pence per £, instead of 60 as in the schedule.

The 1st £ pays \((9+3/500)\) pence; each successive £ up to the 5,500th £ pays \(3/250\)th of a penny more than the preceding; the 5,500th pays \((75-3/500)\) pence.


The statutory exemption is £200, vanishing at £600. There are separate formulae for the rates on earned and property income.

**Earned Income.**

The scale may be expressed as follows:

\[
\begin{align*}
\text{When } 0 &< x \leq 2,500, \quad R = 7\frac{1}{4} + \frac{3x}{1,000} \\
\text{}``, 2,500 &< x \leq 5,000, \quad R = 10\frac{3}{4} + \frac{x}{625} \\
\text{``}, 5,000 &< x \leq 10,000, \quad R = 15\frac{3}{4} + \frac{3x}{5,000} \\
\text{``}, 10,000 &< x, \quad R = 21\frac{3}{4} \\
\end{align*}
\]

At present reduced by 8%, and there is a super tax of 1/- in the £ on so much of the income as exceeds £2,000.
It will be seen that the values of $R$ given by (i) and (ii) at $x=2,500$ are the same, and that the same holds for (ii) and (iii) at $x=5,000$ and (iii) and (iv) at $x=10,000$. There are jumps at these points in the amounts paid by the adjacent £'s, as will be seen from Fig. 12, which gives a representation of this tax.

![Fig. 12.]

It will be noticed that there is a flat rate on the excess over £10,000, and that this has been determined by the value of $R$ given by (iii) for $x=10,000$. It should have been $27\frac{3}{4}$, determined by the amount the 10,000th £ pays, namely $(27\frac{3}{4} - 3/5,000)$ pence.

Property Income.

The scale may be expressed as follows:

When $0 < x < 2,500$, $R = 14 + \frac{3x}{625}$ ........................ (i)

$2,500 < x < 5,000$, $R = 19 + \frac{7x}{2,500}$ ........................ (ii)

$5,000 < x < 10,000$, $R = 26 + \frac{7x}{5,000}$ ........................ (iii)

$10,000 < x$, $R = 40$ ........................ (iv)

It will be seen that there are jumps at 2,500, 5,000 and 10,000, as in the other scale, and that the flat rate on the excess over £10,000 should have been 54 pence per £ instead of 40.

This tax is also represented in Fig. 12.

15. Queensland.

The statutory exemption is £150, vanishing at £850. There are separate formulae for earned and property income.

Earned Income.

The scale may be expressed as follows:

When $0 < x < 8,000$, $R = 6 + \frac{6x}{1,000}$

$8,000 < x$, on the first £8,000, $R = 54$, and on the excess over £8,000 the rate per £ is 60 pence.
Property Income.

The scale may be expressed as follows:

\[
\text{When } 0 < x \leq 3,000, R = 12 + \frac{4x}{1,000}.
\]

\[
\text{, } 3,000 < x \leq 8,000, R = 6 + \frac{6x}{1,000}.
\]

\[
\text{, } 8,000 < x, \text{ on the first } £8,000, R = 54,
\]

and on the excess over £8,000 the rate per £ is 60 pence.

Both these taxes are represented in Fig. 13.

In property income there is a jump up of 6 pence at the 3,000th £, and both in earned and property income the flat rate on the excess over £8,000 should be 102 pence per £, instead of 60.

There is also now a Super Tax of 20% of the amount of the tax as given by the above formulae, with some relief for incomes below £850.

Further, there is an Additional Tax which introduces very large breaks in the continuity of the progression, so carefully arranged by choosing \( R \) of the form \( (ax + b) \).

When \( 780 \leq x \leq 850 \), 15%; when \( 900 \leq x \leq 950 \), 18%; when \( 950 \leq x < 1,000 \), 20%; and when \( 1,000 \leq x \), 27\%.

There is not much use in providing a scale with each £ paying 0.012 or 0.008 pence more than the preceding £ if these steps are taken at intermediate points. The progressive principle can quite easily be adhered to and the higher incomes made to pay at desired rates, but a new formula allowing for the super tax and additional tax would have to be devised.

16. South Australia.

The statutory exemption is £100, vanishing at £1,000. There are separate formulae for earned and property income.

The scales can be expressed as follows:

**Earned Income.**

\[
\text{When } 0 < x \leq 1,000, R = 17 + \frac{2x}{1,000}.
\]

\[
\text{, } 1,000 < x \leq 7,000, R = 13 + \frac{6x}{1,000}.
\]

\[
\text{, } 7,000 < x, R = 55.
\]
Property Income.

When \(0 < x \leq 1,000\), \(R = 26 + \frac{2x}{1,000}\).

\(1,000 < x \leq 7,000\), \(R = 22 + \frac{6x}{1,000}\).

\(7,000 < x\), \(R = 64\).

These taxes are represented in Fig. 14. In both scales there is a jump up of about 4 pence at £1,000. In earned income the flat rate on the excess should be 97 pence per £, instead of 55, and in property income 106 pence per £ instead of 64.

\[\text{Fig. 14.}\]

17. Western Australia.

In 1918 this State introduced a continuous progressive tax "at the rate of twopence in respect to every pound sterling of taxable income chargeable plus an additional rate thereon of 0.006 of a penny for every pound sterling by which the income chargeable from all sources exceeds £100. Provided that the rate in the pound shall not exceed two shillings and sixpence."

The above statement, in the notation of this paper, can be put as follows:

When \(0 < x \leq 100\), \(R = 2\).

\(100 < x \leq 4,766\), \(R = 2 + \frac{6(x - 100)}{1,000}\).

\(4,766 < x\), \(R = 30\).

With some modifications, including the raising of the maximum rate to four shillings, reached at £6,672, this scheme has been in force till the present financial year, when a new scale has been adopted. The other taxes on income (hospital tax, financial emergency tax) have been dropped, and the revenue previously obtained from them is to be provided by the revised income tax.

There is, as before, no distinction between earned and property income. The statutory exemption for a single person without dependants is £100 less.
£2 for every £1 by which the income exceeds £100; for a person with dependants, £200 less £2 for every £1 by which the income exceeds £200.

The scale is as follows:

When $0 < x \leq 4,500$, $R = 9 + \frac{x}{100}$ ................. (i)

$4,500 < x$, $R = 54$ ........................................ (ii)

This tax is represented in Fig. 15.

It will be seen that (i) and (ii) give the same value at $x = 4,500$, but that the flat rate on the excess over £4,500 is much lower than the figure indicated by the amount the 4,500th £ pays. Instead of 54 pence per £, it should be 99 pence.

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