1881.

NEW ZEALAND.

GOVERNMENT LIFE INSURANCE DEPARTMENT

(REPORT BY THE CONSULTING ACTUARIES ON THE NET SURPLUS OF PROFITS OF THE).

Presented to both Houses of the General Assembly in pursuance of Section 45 of "The Government Insurance and Annuities Act, 1874."

REPORT by the Consulting Actuaries, Mr. BAILEY and Mr. HARDY, on the Net Surplus of Profits of the Government Life Insurance Department, made under Section 45 of "The Government Insurance and Annuities Act, 1874."

SIR,—

London, 12th July, 1881.

1. In September last we had the honor to receive from the Agent-General for New Zealand a communication, on behalf of the Government of the colony, inquiring whether we would make an independent valuation and report upon the financial condition of the Government Insurance Department as at the close of the quinquennial period ending 30th June, 1880; and detailing the specific points proposed for examination, and the general duties involved in the investigation. In reply, we expressed our readiness to undertake the task upon being furnished with the particulars of the policy and other contracts then in force, with a statement of the corresponding assets.

2. A portion of the necessary data reached us early in February, but it was not until the 23rd of that month that we were in possession of the whole of the papers required for the investigation.

The following is a summary of these papers:—

(1.) Data. Sheets containing particulars of all policy and annuity contracts in force, as at 30th June, 1880, and effected under Tables I., II., III., IV., V., VI., VII., VIII., IX., X., and A.

(2.) Accounts. (*a.*) Copies of the reports and accounts of the department for the five years 1875–80. (*b.*) Copy of the last quinquennial report and valuation.

We lost no time in putting the valuation in hand, and the work was maintained uninterruptedly until completion.

We take leave here to remark that the valuation of so large a number of policies, so many of which were effected under Tables II. and III., is a very laborious operation. And, further, that, having regard to the responsibility involved in the results, it was necessary to adopt a series of frequent and systematic checks, as well as test-valuations for the more important groups of the risks. Hence we have found it impracticable to present our report at an earlier period; and we trust that the care bestowed at every stage of the processes, and the close examination to which the results have been subjected, will be more appreciated than an earlier, but perhaps less maturely weighed, report.

3. The following is a summary, in a convenient form, of the financial transactions of the department in the quinquennial period ending on the 30th June, 1880:—

	£ s. d.	£ s. d.
Fund, 30th June, 1875		109,967 12 1
Add Income from—		
Premiums	482,392 15 1	
Annuity purchase-money ...	12,228 7 5	
Interest	66,238 7 3	
Sundries ...	99 8 8	
		560,958 18 5
		670,926 10 6
Deduct Outgo for—		
Claims	114,850 0 0	
Surrenders	11,058 18 6	
Annuities	8,716 16 6	
Expenses, including commission ..	76,964 17 8	
		211,590 12 8
Fund, 30th June, 1880		£459,335 17 10

Comparing the interest brought to account each year with the mean between the fund at the beginning and end of the year, we find that the rate of interest realized in the quinquennium has been as follows, viz.:—

	£ s. d.	
1875–76	5 1 3	Per cent. per annum.
1876–77	4 17 11	
1877–78 ..	4 18 5	
1878–79	5 0 10	
1879–80	5 1 7	

The question of the rate to be assumed in the valuation will be discussed in Article 6.

4. The sheets containing the data for valuation were subjected to a very complete analysis; and, for Table I., the facts were re-scheduled for males and females separately, and again, so as to show the amounts at risk, with corresponding premiums at each year of birth, distinguished for yearly, half-yearly, quarterly, &c., payments of premium.

The following statement gives a summary of the most interesting facts elicited in the course of this examination, and derived from the risks under Table I.:—

ANALYSIS of the Risks shown under Table I.

PREMIUM PAYABLE	MALES (6,542).			FEMALES (202).		
	Average Sum Assured.	Proportionate Distribution.		Average Sum Assured.	Proportionate Distribution.	
		Number of Policies.	Sums Assured.		Number of Policies.	Sums Assured.
	£			£		
Yearly ..	414	21·17	23·43	286	21·78	21·78
Half-yearly . ..	372	45·11	44·78	275	43·56	43·53
Quartely	356	27·22	25·91	268	34·66	33·76
Monthly	339	6·50	5·88	..	..	
All Classes	£374	100·00	100·00	£275	100·00	100·00

From a further grouping of the sums assured, according to the ages at entry, we ascertained that the mean age at entry was—for males, 36·74 years; for females, 38·77; the mean present age being —for males, 40·45 years; females, 42·07

It will be seen, therefore, that the number of females is too small to justify their being treated separately; also the average duration of the contracts is too short, and the average age of the lives too low, to enable us to arrive at any trustworthy conclusions as to the rate of mortality that will prevail in future among the assured.

For Tables II. and III. no distinction of the sexes was attempted; but the facts were rearranged in groups, according to the number of premiums remaining to be paid, in order to obtain some idea of the period during which the assumed rates of mortality and interest might be affected, and of the time when the contributions for expenses in Class II. would expire.

5. As on the occasion of the last valuation, there is no definite information respecting the death-rate that may be expected to prevail amongst assured lives in New Zealand, nor any mortality statistics for the colony generally, available for the purposes of the present investigation.

From such tests as we have been able to make, there would not appear to be any great difference between the general rate of mortality experienced in the last quinquennium amongst the lives assured under Table I., and similar lives in this country We do not, upon general grounds, see much reason for expecting a contrary result, but we consider that it would be wise to collect and tabulate all available information on this head, especially in regard to the death-rate of the older lives.

After full consideration, we think that the Institute of Actuaries' H^m Table is the most suitable table of mortality to adopt for the present valuation.

Nevertheless, we have thought it prudent (as will be hereafter shown) to make a further provision beyond what an estimate on this basis would provide.

We observe that, in a large number of cases, additional premiums have been charged, the lives having been assumed to be a certain number of years older, upon the ground that they were deemed to be below the average in point of future longevity In these cases the risks have been classified according to the true, and not the assumed, ages, which we consider to be the most suitable method of procedure. The effect is that the surcharges, taken in the aggregate, form an annual fund applicable to meet the additional claims arising from the expected increased mortality in this class of lives.

6. At the last valuation the rate of interest assumed was 4½ per cent. per annum; and, from Article 3, it will be seen that rather more than this rate was realized in the last five years. The question for consideration, however, is not what has been or is, but what will be the rate of interest realized by the fund during a period of time covered by the present generation. This point has

received our very full consideration, and we have come to the conclusion that it would not be consistent with prudence to assume that the fund will earn a higher rate than 4½ per cent., which is fully ½ per cent. beyond that obtained in the mother-country Indeed, we do not consider it free from doubt whether in after years this rate will not be too high, having regard to the marked and inevitable tendency to an equalization of the rate of interest throughout the world.

Bearing in mind, however, that a fall in the rate of interest must be gradual, and that, if a reduction of ½ per cent. were made on the present occasion, the difference in the net liability would not be great, we think that this valuation, like the last, may be made upon a 4½ per cent. basis.

7 Appended hereto is a summary of the several assurance and annuity contracts in force as at 30th June, 1880, with a valuation at 4½ per cent. interest, of the assurances by the H^{m} Table of Mortality and of the annuities by the Carlisle Table.

An additional reserve, amounting to £19,302, has been made, because the sums assured are payable one month after death, and also in respect of the 817 assurances under Table II., where the premiums are payable for a limited term only, so as to make provision for the expenses of management and for profits after the premiums have ceased to be payable.

The financial position is as follows:—

The realized assets on the 30th June, 1880, were	£459,335
The estimated net liability, as per valuation, was ..	381,740
Surplus	£77,595

8. Having regard to all circumstances, and especially to the necessity of proceeding cautiously for some time until the prevailing rates of mortality and interest have been better ascertained, we suggest that the whole of this amount be not divided on this occasion, but that the distribution should be restricted to a sum not exceeding £60,000.

Apart from other considerations, we feel satisfied that some portion of the surplus has arisen through the operation of what is sometimes termed "suspended mortality," or the lightened death-rate resulting from the recent selection of so large a proportion of the lives.

Experience has shown that an acceleration of the rate of mortality exhibited by any general table takes place when the lives are no longer of recent selection, and we think it is expedient that some further reserve should be made on this account.

This, we recommend, should on the present occasion be done by leaving undivided some portion of the estimated surplus, rather than by assessing a part of the liabilities by another table of mortality

9. The next matter submitted to our consideration is "the best and fairest system by which the divisible profits should be distributed."

Various methods, more or less elaborate, have been suggested and adopted by several companies, the applicability of which to the present case has received our full consideration.

There can be little doubt, however, that the surplus proposed for division has been derived mainly from what is called the "loading," upon the premiums having been found to be more than sufficient for the expenses incurred; and, therefore, we consider that it will do substantial justice to the policy-holders, without a needless amount of labour in calculation, to divide that surplus in proportion to the accumulated "loading." We deem it an unnecessary refinement to introduce the element of interest in this process, and that it will be sufficient to ascertain the amount of "loading" on the premiums received on each policy

This being the first division of profits, the accumulation, on this occasion, should be taken as from the dates of the policies.

It should be noted that the "loading" used for this purpose in the case of the whole-term policies should be that corresponding to the annual premiums under Table I., taking the increased age where the lives are under average; so that, *cæteris paribus*, the sum apportioned as the bonus in cash will be the same, whether the policy be effected under Tables I. or II., or the premiums be receivable by annual or more frequent instalments.

The same principles are applicable to endowment assurances, and to policies of other classes.

10. If, as is commonly the case, it is desired to convert the cash bonuses into corresponding additions to the sums assured, a lower rate of interest than that adopted in the valuation should be assumed for the purpose.

11. We have examined the tables of rates given in the prospectus, and we consider them to be sufficient under the present circumstances. They are undoubtedly low, and especially so at the older ages; and, if the rate of interest in the colony were to fall materially, we think that the rates in question would require revision before new transactions were entered into. We notice, however, that the rates for single premiums given in Table II. appear to be inconsistent with the other rates shown in the same table, and with those in Table I., being relatively higher.

We have also tested the Table of Surrender Values, given on page 6 of the prospectus; and we consider that on the basis of the present valuation the amounts promised to be allowed, whether in cash or as paid-up policy, can be granted with safety We do not think that either should be increased; and we recommend that, in applying them, the real, and not the increased, ages of the lives assured be taken.

As both rates of premium and amounts of surrender-allowance must be ultimately determined by competition on the spot, we consider that, so long as the first are sufficient, and the second not too high, it is not necessary to propose, upon purely theoretical grounds, any revision of either, on the present occasion, beyond the rates for single premiums above adverted to. Theoretical perfection on such points as these must be subordinated to the practical considerations involved in meeting the public demands.

12. The results of our valuation show that the finances of the department are in a sound condition; and, considering the low rates of premium paid by the assured, the amount of the divisible

surplus appears to us very satisfactory, and the business of the department to have been well conducted, and in such a manner as to reflect great credit on those who have been responsible for its management.

We have, &c.,

ARTHUR H. BAILEY.
RALPH P HARDY.

The Hon. the Colonial Secretary, New Zealand.

P.S.—We have taken no account of the policies in the Industrial Branch, which we did not consider was included in the reference to us. The liability under these is, however, merely nominal.

GOVERNMENT INSURANCE DEPARTMENT OF NEW ZEALAND.

Summary and Valuation of the Assurance and Annuity Contracts as at 30th June, 1880.

Table.	Description of Transaction.	Particulars of the Policies for Valuation.				Valuation. Assurances: "Institute of Actuaries," Hm. 4½ per cent. Annuities Carlisle Table of Mortality, 4½ per cent.			
		No. of Policies	Sums Assured.	Annual Premiums. Office.	Annual Premiums. Net Hm. 4½ p. cent.	Value of Sums Assured.	Value of Annual Premiums. Office.	Value of Annual Premiums. Hm. 4½ p. cent. Net.	Net Liability.
	ASSURANCES.		£	£	£	£	£	£	£
I.	Whole term: Uniform annual premiums	6,744	2,504,775	69,863	53,405	893,182	975,885	741,264	151,918
II.	Ditto: Limited and commuted premiums	817	417,199	14,786	11,524	144,147	106,827	83,775	60,372
III.	Endowment assurances at various ages...	3,916	1,221,845	45,720	37,098	553,091	533,387	431,004	122,087
IV.	Joint lives	14	5,150	200	172	2,470	2,266	1,957	513
V.	Children's endowments, without return of premium	5	1,500	76	...	575 5,314	...	...	575 5,314
VI.	Ditto, with return of premium ...	113	13,585	682	...				
A.	Temporary risks	11	6,950	123	..	62	...	...	62
	Extra premiums	...	...	607	...	...	304	...	304
	Additional reserve for payment of claims one month after death, and for profits and expenses of assurances under Table II.	...	...	...	...	...	..	...	19,302
	Total amount of assurances ...	11,620	4,171,004	132,057	102,199	1,598,841	1,618,669	1,258,000	360,447
	ANNUITIES.								
VII.	Immediate	30	2,074	...	...	18,948	...	..	18,948
VIII.	Contingent	2	335	9	8	1,303	113	94	1,209
IX.	Deferred: Without return of premium	2	200	70	70	926	181	181	745
X.	Ditto: With return of premium ...	2	85	11	...	391	..	...	391
	Total amount of annuities ..	36	2,694 p. annum	90	78	21,568	294	275	21,293
	Total of results	11,656	4,171,004 2,694 p. annum	132,147	102,277	1,620,409	1,618,963	1,258,275	381,740

ARTHUR H. BAILEY
RALPH P HARDY.

By Authority: G. DIDSBURY, Government Printer, Wellington.—1881.