UNIT-LINKED ASSURANCE POLICIES: CATEGORY B

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The purpose of this note is to summarize and draw attention to the references in the actuarial literature to Category B unit-linked assurance policies.

2. The designation ‘Category B’ was first used by A. T. Grant and G. A. Kingsnorth. In paragraph 53 of their paper the authors define this type of unit-linked policy as one where the policy is linked to a unit trust and dividends distributed by the unit trust are retained for the benefit of the life office and corresponding adjustments are made in the premium scale and in the form of benefit. It is stated that the more usual type of contract in this category takes the form of an endowment assurance under which the sum assured is payable in the units of a unit trust, the amount deemed invested in units each year being equal to the sum assured divided by the original term of the policy. At maturity the policy-holder receives the units (or their cash value) subject to any deduction for capital gains tax. On death before maturity the benefit consists of the sum of:

(a) the units purchased (or their cash value) subject to any capital gains tax deduction, and

(b) the balance of the nominal sum assured not at that time invested in units.

It is stated that most of the contracts in this category guarantee a minimum payment on death or maturity equal to the nominal sum assured, and it is further stated that variations of the policy allow for reversionary bonuses. The authors state that under Category B contracts the life office effectively guarantees interest, mortality and expenses; and also capital if a guarantee of a minimum sum assured is allowed. For these reasons, the life office is dependent on the dividend income received from the unit trust since it requires an adequate dividend yield to support the interest assumptions in the premium basis.

3. Since this paper was written, Category B type contracts have been issued linked to an internal fund of the life office rather than an outside unit trust. The linking to an internal fund gives the life office greater control over the investment policy and hence enables it to ensure that the requisite dividend yield is maintained. A further development is one where all net (after tax) interest and dividends are re-invested in the internal fund but the life office has the power to extract a recurrent management charge from the fund, irrespective of the level of investment income. The management charge is chosen so that the yield is at least equal to the interest yield built into the premium rate. In this way, this latest development of the Category B contract does not involve the life office in an interest guarantee but the product design remains the same as the earlier Category B designs where there is an interest guarantee.
4. The first reference to these contracts was in a paper by W. G. Bailey.\(^{(2)}\) This paper considered the whole field of equity-linked assurance and annuity business as it existed at the time (1962), and contracts were defined by the nature of the life office's guarantees; that is, whether the life office guaranteed capital, interest, mortality or expenses. The Category B policies were referred to in this paper as Type 2 policies, which were in turn sub-divided into versions Type 2(a), 2(b) and 2(c) policies. The distinction was as follows. The Type 2(a) design was such that a level amount was deemed invested in units each year, whereas under Type 2(b) the amount invested in the first year of the contract was lower than the amounts deemed invested in later years. The Type 2(c) version was distinguished by reason of capital guarantees on death and maturity. The paper concentrated on problems associated with fixing elements of the premium rate basis, with the determination of paid-up values and surrender values and with the determination of actuarial reserves. The basic principles were clearly stated but the mathematical theory was not developed.

5. The next relevant paper is that referred to above by Grant and Kingsnorth, and the Categories A and B defined in this paper are in general use at the present time.

6. Following the paper by Grant and Kingsnorth, the next reference is a paper by A. Ford.\(^{(3)}\) This paper referred to Category A contracts as the 'decreasing term assurance group', and referred to Category B contracts as the 'endowment assurance group'. Appropriate formulae for premiums and reserves and the equation of equilibrium are stated. Practical problems associated with the fixing of premium rates, actuarial reserves and surrender values are discussed. A with-profits version of Category B is considered, and the paper analyses surplus where the actual yield differs from the assumed yield but expenses and mortality exactly match the assumptions. Practical problems relating to a design of a bonus system are considered.

7. The next important paper is one by J. C. Fraser, W. N. Miller and C. M. Sternhell.\(^{(4)}\) This American paper is an extremely important one in the annals of unit-linked insurance, since it presents the complete analysis of the basic actuarial theory for variable life insurance. The paper should be considered in conjunction with the discussion thereon, particularly that by D. D. Cody. The Category B product may be thought of as a particular case of the generalized product discussed in this paper.

8. Following the aforementioned American paper, S. Benjamin,\(^{(5)}\) in a paper for the 19th International Congress of Actuaries, systematically analyses the actuarial theory for the Category B product and refers to certain practical problems associated with the product, particularly relating to the setting up of zillmered reserves and the problems associated with cash strains. The results established algebraically in this paper might be considered to be surprising.

9. The final reference is a recent paper by A. F. Wilson.\(^{(6)}\) This paper is concerned with the practical problems encountered with these policies rather than a rigorous actuarial analysis of the products. Consideration is given to develop-
ment of a zillmered reserving basis, and the reserve is broken down into a cash reserve and a units reserve. Difficulties associated with negative cash reserves are discussed, and the paper discusses concepts of matching, strain and financing. Bases for surrender and paid-up values are considered, and problems associated with guaranteed discontinuance values for these products are referred to.

REFERENCES

(3) FORD, A. Assurances Linked to Unit Trusts. J.S.S. 1969, 19, 87–102.
(5) BENJAMIN, S. Formulae for an Equity-Linked Policy Commonly Sold in U.K., Transactions of the Nineteenth International Congress of Actuaries 1972 (Subject 1).