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Are Discounted Accelerated Benefits Cost Neutral?

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Discounted accelerated benefits, where the accelerated benefit paid is a present value of expected claims less a present value of future premiums, are often believed to be cost neutral. But maybe that is not necessarily the case.

To see why, consider two level premium term products, A and B, which both provide coverage to age 100 and are also identical in every other respect, except that Product A includes a provision which gives the policyholder the option to receive a discounted benefit payment upon diagnosis of a critical illness.

Assume that the way Product A's discounted benefit works is:

- A policyholder is diagnosed with a covered critical illness;
- The policyholder then has the option to elect to receive a fraction, F, of the total face amount on a discounted basis, where F can range from, say, 5 percent to 90 percent;
- Based on evidence provided and, perhaps, a medical exam, the company makes an estimate of the insured's remaining life expectancy;
- Based on the estimated life expectancy and a specified mortality table, an impaired (or rated) age, y, is determined where the life expectancy for the impaired age equals the estimated life expectancy;
- The discounted benefit payable is then equal to BEN – PREM – EXP, where:
    - BEN = present value of projected claims from attained age y to the end of the coverage period (i.e., for 100 – y years) based on the specified mortality table and a discount rate determined by the policy's contractual language. The discount rate is subject to limits prescribed by regulations. For purposes of this exercise, assume that the discount rate is currently 4 percent.
    - PREM = present value of actual current gross premiums payable for the next 100 – y years. These will depend on the actual issue age and duration of the contract when the claim is made. In practice, companies may use current premiums, guaranteed maximum premiums or something in between.
    - EXP = an administrative expense charge, which we will take to be $300.

To illustrate how there might be a cost for such a benefit, suppose:

- A 20 year level premium term plan with a face amount of $100,000 was issued at age 50 to a male, nonsmoker, a critical illness was diagnosed at the end of policy year 15, and the estimated life expectancy after diagnosis is 7–8 years, which translates into an impaired age of 80 based on 2001 VBT, male, ALB, nonsmoker, ultimate mortality rates.
- Current premium rates per $1,000 are those shown in Table 1.
- Prospective company expenses are:
    - Commission. 2.0 percent of premium
    - Premium Tax. 2.5 percent of premium
    - Maintenance Expense. $59.38 per policy ($45 at issue with 14 years of inflation), inflated at 2 percent per year.
- Lapse rates after diagnosis of a critical illness for policyholders without the accelerated benefit (viz., those with Product B) are:
    - Alternative 1: 0 percent in all years; or

Table 1

Current Premium Rates per $1,000 (before reflecting a $30 policy fee)

Policy Year	Rate	Policy Year	Rate	Policy Year	Rate
16	5.40	28	103.20	40	450.90
17	5.40	29	115.10	41	572.60
18	5.40	30	128.50	42	632.10
19	5.40	31	143.40	43	641.40
20	5.40	32	159.70	44	683.40
21	47.90	33	176.80	45	728.20
22	56.00	34	195.60	46	788.60
23	62.30	35	216.50	47	844.60
24	69.00	36	239.70	48	904.10
25	76.20	37	299.20	49	960.00
26	84.10	38	379.20	50	960.00
27	92.90	39	402.90		

- Alternative 2: 0 percent for the remainder of the level premium period (policy years 16-20) and then 10 percent, 15 percent, 20 percent, 25 percent and 30 percent in policy years 21, 22, 23, 24 and 25+, respectively; or
- Alternative 3: 0 percent for the remainder of the level premium period (policy years 16-20) and then 10 percent per year, thereafter.

- Expected mortality after diagnosis is 2001 VBT, male, ALB, nonsmoker, ultimate for attained ages equal to the impaired (or rated) age and older.

Then Table 2 shows the present value (per $1,000 of insurance and using the assumed 4 percent discount rate), as of the end of policy year 15 when the diagnosis is made, of benefits and premiums for someone with Product A vs. someone with Product B.

Note that:

- The lapse rate pattern is not relevant for Product A because lapse rates are not reflected in the calculation of the accelerated benefit amount.
- If policyholders without the accelerated benefit provision would never lapse after diagnosis of a critical illness (Alternative 1), then offering the accelerated benefit is cost effective for the company because they don't incur future premium tax, commissions, or marginal maintenance expense. These illustrative calculations assume the maintenance expense factors are all marginal.
- On the other hand, if some policyholders with an otherwise identical policy but without an accelerated benefit provision are likely to lapse, then the benefit provided by the

Table 2

Lapses	PV Claims*		PV Premiums**		PV (Claims-Premiums)		A(t) – B(t)
	Product A	Product B	Product A	Product B	Product A (A(t))	Product B (B(t))	
Alternative 1	727.99	751.40	239.40	243.89	488.60	507.51	(18.91)
Alternative 2	727.99	536.37	239.40	128.01	488.60	408.36	80.24
Alternative 3	727.99	605.71	239.40	164.68	488.60	441.03	47.57

*The PV of Claims for Product B includes the present value of commissions, premium tax and maintenance expense for policy years 16-35. Those would not be incurred for Product A if the benefit is accelerated.

**The PV of Premiums for Product A includes the $300 administration charge ($3 per $1,000 for a $100,000 policy) assessed when the accelerated benefit amount is determined.

accelerated benefit provision is more generous than the actual expected cost of remaining coverage. Comparing the results for Alternatives 2 and 3 you can see that the assumed lapse rates impact the expected cost of Product B relative to Product A.

It is hard for me to believe that nobody diagnosed with a critical illness, but without an accelerated benefit provision in their policy, would lapse, particularly when there are large increases in premiums after the level premium period. But in the absence of experience, that is a judgement call on the part of the pricing actuary. As the results for Alternative 3 show, the lapse rates do not have to be extremely high for this cost differential to emerge.

More generally, to calculate the cost of the accelerated benefit, for a given combination of issue age, sex, risk class, face band, etc.:

1. Develop assumed Incidence Rates, I(t), for a (potential) claim in policy year *t* due to a contractual critical illness.
2. Let F1(t) = fraction of the total death benefit to be paid (before discounting), for those who have a claim and elect some payment in policy year *t*. There may be contractual limits on how large F1(t) can be and policyholders may be able to choose a value for F1(t) within certain limits.
3. Let F2(t) = fraction of people eligible for a (discounted) payment in policy year *t* who actually make a claim. Given how heavily discounted the accelerated benefit might be, some people who could make a claim might choose not to make a claim. Although not reflected in the formula here, the pricing actuary should at least consider the possibility that there is some effective anti-selection involved in that decision—i.e., the average remaining life expectancy of those opting not to make a claim is greater than what the company would estimate, particularly if the rated age is assigned without any underwriting at the time of the claim.
4. Cost = $\sum I(t)*F1(t)*F2(t)*(v^t)*({}_{t-1}p_x)*[A(t) - B(t)]$, where:

   a. ${}_{t-1}p_x$ is the probability of surviving/persisting to the beginning of policy year t and perhaps should treat the incidence rates, as well as lapse and mortality, as a decrement.

   b. A(t) = [PV (as of the beginning of policy year t) of Future Claims – Premiums] – 300 per policy.

   The PV is calculated using an assumed Accelerated Benefit discount rate and assumed impaired life mortality for 100 – (Impaired Age) years, but using premiums applicable to the policyholder's actual issue age/duration during that period.

   Note that for a given claim, the Impaired Age might vary from person to person depending on how severe the illness is, etc. So, it is necessary to make some sort of assumptions about that, as well.

   Also note that:

   - Mortality is the only decrement reflected in calculaing A(t)
   - The Product A difference of 488.60 in Table 2 is A(t) for the assumptions used in the numerical examples.

   c. B(t) = PV Claims + PV Expenses – PV Premium as of the beginning of year t where these PV's:

   - Use discount rates equal to anticipated earned rates.
   - Claims reflect assumed impaired life mortality.
   - All PV's reflect plausible lapse rates for someone diagnosed with a critical illness (but for a cohort of otherwise identical policies without a critical illness benefit).
   - Expenses would be those that the company would incur if this was an otherwise identical cohort of policies without the critical illness benefit, such as commissions, maintenance expense, and premium tax.
   - The PV's are calculated over the remaining actual coverage period, which is 100 – (Actual Attained Age at Claim) years under our assumptions.

Table 3
Rated Age = 70

Premiums per $1,000	Discount Rate	Lapses	A(t)	B(t)	A(t) − B(t)
Table 1	4 percent	Alternative 2	(119.05)	60.60	(179.65)
Level $15	4 percent	Level 5 percent	424.07	245.38	178.69
Level $70	4 percent	Level 5 percent	(157.92)	(158.26)	0.34
Level $70	6 percent	Level 5 percent	(186.79)	(168.09)	(18.70)

In this case:

- Both mortality and lapse rates are decrements when calculating B(t).
- The Product B differences of 507.51, 408.36 and 441.03 in Table 2 above are the values of B(t) for the alternative lapse assumptions in the numerical examples.

I tested the impact of changing the premium pattern and rated age to get some additional insight into what factors affect the cost:

1. In my illustrative example, where the impaired age is 80, costs (positive values of A(t) – B(t)) seem to emerge if lapse rates for Product B are non-zero even if gross premium rates are level. For example, if a level premium of $70 per $1,000 is assumed instead of the level premium of 5.40 followed by ART rates and Product B lapse rates are assumed to be 5 percent per year, then for the assumed product design, A(t) becomes 243.97 and B(t) is 178.08 with A(t) - B(t) = 65.89.
2. But, if the impaired (rated) age is changed from 80 to 70, with no change to other assumptions, then there are negative costs with the premium rates in Table 1. In other words, A(t) < B(t). However, level premiums and a 5 percent lapse rate can still result in positive costs, depending on the discount rate and how large the level premium is.

A few sample results illustrating these two points are shown in Table 3.

If this analysis is correct, then there is obviously a fair amount of work involved in developing assumptions and doing the calculations necessary to quantify the expected cost, if any, associated with offering a discounted accelerated benefit. An iterative approach might be necessary in order to set premium rates to meet profit objectives measured as either a ratio of present value of profit to present value of premium or as a desired IRR. ■

The views expressed in this article are those of the author and do not necessarily reflect the views of Milliman.

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