

Alternative Method Of Calculating The Interest-Adjusted Methods Of Determining The Cost Of Life Insurance

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In the introductory text books of insurance there are examples of how to calculate the Interest-Adjusted methods of calculating the cost of life insurance. There are two methods, the Surrender Cost Index and the Net Payment Cost Index. In the first case it is assumed that the insured will surrender the policy at some point in the future, with the second case it is assumed that the policy will not be surrendered but the cost is based on keeping the policy in force for some number of years.

The calculations used in the textbooks are somewhat cumbersome and could be made more easy to understand by making minor adjustments. The method which was developed by the National Association of Insurance Commissioners (NAIC) in 1970 involves taking all of the cash payments to be received in the time period to a future value, and then dividing this future number by the future value of an annuity due factor to determine the present value of the cost of insurance. Most business students in an insurance class understand the concept of present value and know how to make such a calculation, they are not as familiar with the idea of projecting into the future and then bring that number back to the present by dividing by the future value of an annuity due factor, and then determining the annual payout. It is more straight forward and understandable to simply calculate the present value of the cash flows. An example of the NAIC method is as follows:

Premiums of \$132.09 per year for a \$10,000 policy
Dividends of \$ 24.92 per year
Maintain the policy for 20 years and then cash it in for \$2,294
Assume an interest rate of 5%

Surrender Cost Index

Total premiums for 20 years, each accumulated at 5%	\$4,586
Subtract dividends for 20 years, each accumulated at 5%	- 824
Net premiums for 20 years	\$3,762
Subtract the cash value at the end of 20 years	-2,294
Insurance cost for 20 years	\$1,468
Amount to which \$1 deposited annually at the beginning of each year will accumulate to in 20 years at 5%	\$34.719
Interest -adjusted cost per year (\$1,468/ \$34.719)	\$ 42.28
Cost per \$1,000 per year (\$42.28/10)	\$ 4.23

A suggested alternative is to bring all of the numbers to the present rather than to the future and then back to the present.

Present Value of premiums for 20 years At 5%	\$1,728
Present value of dividends for 20 years at 5%	<u>- 311</u>
Present value of net premiums for 20 years	\$1,417
Present value of cash value received in 20 years	<u>- 865</u>
Interest-adjusted cost per year	\$ 552
Divide by the present value of an Annuity Due factor (13.0853)	42.26
Divide by 10 to obtain the cost per thousand	\$ 4.23

A still easier method is to simply start with the numbers per thousand dollars of coverage rather than per ten thousand dollars of coverage.

Premium of \$13.21/year	\$13.21
Present value of the dividend of \$2.49 which is received at the end of the year so it must be discounted for one year $1/1.05 \times \$2.49 = 0.9524 \times \2.49	- 2.37
Present value of the cash value received at the end of year 20. 20	
$(1/1.05) \times \$229.40 = 0.3769 \times \229.40	<u>- 6.61</u>
Cost per \$1,000 per year	\$ 4.23

The second method, the Net Payment Cost Index, is even more simple. In the textbooks they calculate it the same way as with the Surrender Cost Index but omit the cash value. They take the premiums and dividends out to the future and then bring them back to the present. It is much easier to simply subtract the present value of the annual dividend from the premium. The NAIC method is as follows:

Total premiums for 20 years, each accumulated at 5%	\$4586
Subtract dividends for 20 years, each accumulated at 5%	<u>- 824</u>
Insurance cost for 20 years	\$3762
Amount to which \$1 deposited annually at the beginning of each year will accumulate to in 20 years at 5%	\$34.719
Interest-adjusted cost per year $\$3762/\34.719	\$108.36
Cost per \$1,000 per year $(\$108.36/10)$	\$ 10.84

The simplified way is,

Premium of \$13.21/year	\$ 13.21
Present value of the dividend of \$2.49 which is received at the end of the year so it must be discounted for one year. $(1/1.05) \times \$2.49 = 0.9524 \times \2.49	<u>- 2.37</u>
Cost per \$1,000 per year	\$ 10.84

These alternative and simplified methods provide exactly the same answer but are calculated in a manner familiar to the students. The NAIC method was developed in 1970, before the hand held calculator came to be. At that time it was necessary to use the present and future value tables, today with the ready availability of the personal calculator it is easier to calculate the present value formulae, and therefore, these simplified methods should be considered.

END NOTES

1. Athearn and Pritchett, pp 306-310; Dorfman, pp373-375; Dorfman and Adelman, pp115-126; Greene and Thieschmann, pp 122-125; Mehr, pp 533-535; Rejda, pp 379-381; Vaughan and Vaughan, pp302-304; Williams, Smith and Young, pp 382-383.
2. Rejda

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2. Dorfman, Mark S. (1991). *Introduction to Risk Management and Insurance*, Prentice Hall, Fourth Edition.
3. Dorfman, Mark S. And Saul W. Adelman (1992) *Life Insurance: A Financial Planning Approach*, Dearborn Financial Publishing, Inc. Second Edition.
4. Greene, Mark R. And James S. Trieschmann (1981). *Risk and Insurance*, Southwestern Publishing Co., Fifth Edition.
5. Mehr, Robert I (1983). *Fundamentals of Insurance*, Richard D. Irwin, Inc.
6. Rejda, George E. (1995) *Principles of risk Management and Insurance*, Harper Collins College Publishers, Fifth Edition.
7. Vaughan, Emmett J. And Therese Vaughan (2001). *Essentials of Risk Management and Insurance*, John Wiley & Sons, Inc. Second Edition.
8. Vaughan, Emmett J. And Therese Vaughan (1999) *Fundamentals of Risk and Insurance*, John Wiley & Sons, Inc. Eighth Edition
9. Williams, C. Arthur, Michael L. Smith, and Peter C. Young (1995). *Risk Management and Insurance*, McGraw-Hill, Inc. Seventh Edition.

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