

# A Financial Decision Framework For Life Insurance Policy Replacement

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*For most consumers, life insurance is an essential component of long-term financial planning. Although life insurance is designed as a long-term contract, replacement of policies remains high. This study illustrates an analytical tool (marginal yield analysis) that provides insight on the life insurance replacement decision. For a sample of whole life contracts, results demonstrate that up to 93% of policies should not be replaced during policy years 4 through 10 (based on a hurdle rate of 5%). The methodology and findings are relevant to financial service professionals, consumers, insurers, regulators, and educators.*

**Key Words:** *Life insurance, Policy replacement, Sunk costs, Retirement planning*

Life insurance holds an important position as a fundamental building block of most financial plans. During 1999, over \$13 trillion of life insurance coverage was in force (American Council of Life Insurers, 1999). In particular, consumer policy cash values are used as sources of income during retirement. To the extent that policy replacement adversely affects cash value growth, wealth adequacy for retirement is impaired (Yuh, Montalto & Hanna, 1998).

Although life insurance generally is regarded as a long-term purchase, lawsuits in the 1990s related to churning suggest that replacement of life insurance policies has been and remains at a high level. Data support this notion, indicating that approximately one-third of cash value policies lapse within the first five years (Society of Actuaries, 1998). In addition, of cash value policies that are replaced, 55% are whole life, 28% are universal life, and 9% are variable life.<sup>a</sup> Essentially, life insurance replacement occurs when a policyowner surrenders or materially changes an existing policy and contemporaneously purchases a new life insurance policy (or other financial instrument).

Reason and observable phenomena—sharp decreases in term insurance prices and claims of superior performance for new types of policies (e.g., variable life)—suggest that it is prudent to evaluate periodically the performance of existing policies versus alternatives. The primary issue is: assuming an in-force policy and a continued need for coverage, should the policyowner retain the current

policy or replace it with an alternative? Despite loads for acquisition costs and surrender charges, wide variance in the price (performance) of life insurance (Belth, 1968; Carson & Forster, 1997) suggests that policy replacement may be proper in some cases.<sup>b</sup> However, replacement often is not in a policyowner's best interest, and several factors (below) should be considered in the replacement decision.

The goal of this paper is to illustrate and discuss an analytical tool that provides insight on the decision of whether or not to replace an in-force traditional participating whole life policy.<sup>c</sup> The next section examines important issues in the replacement decision. The paper then discusses related literature; describes the methodology, sample, and data; and presents results of the study. The paper ends with a discussion and conclusions.

## The Life Insurance Replacement Decision

This section examines issues related to the replacement decision.

### *Financial Service Professionals, Insurers, and Policyowners*

In the life insurance policy replacement decision, financial service professionals and policyowners often consider several factors, including: improved mortality charges on newer policies, credited interest rates, dividend yields, perceived agent quality, and the solvency status of the existing insurer.<sup>d</sup> A financial service

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professional acting as a fiduciary should recommend replacement only if such action is beneficial to the client. It is important to recognize, however, that compensation systems (e.g., high first-year commissions) generally provide an incentive to replace an existing life insurance policy, especially if the professional is gaining a new client, i.e., not replacing a policy from the professionals own book of business. In addition, the financial professional often has a financial incentive to conserve a policy and stymie the replacement efforts of a competing professional, perhaps to the detriment of the policyowner (in cases where replacement is appropriate).

From the insurer's viewpoint, conserving existing policies generally is beneficial in terms of improved persistency and lower expenses. The expenses imposed on insurers due to high lapsation, in general, are negatively related to policy performance in that insurers must attempt to pass along the costs associated with low persistency (Carson & Dumm, 1999).<sup>e</sup>

Although replacement may be beneficial, reasons not to replace the existing policy also should be considered. A new suicide and/or incontestability period may be imposed. Also, if the health of the insured has deteriorated, higher rates may apply to the new policy under consideration. Surrender charges may apply to the in-force policy, and new acquisition/surrender charges likely will apply to a new policy. Taxes also are a consideration in any analysis of policy replacement.

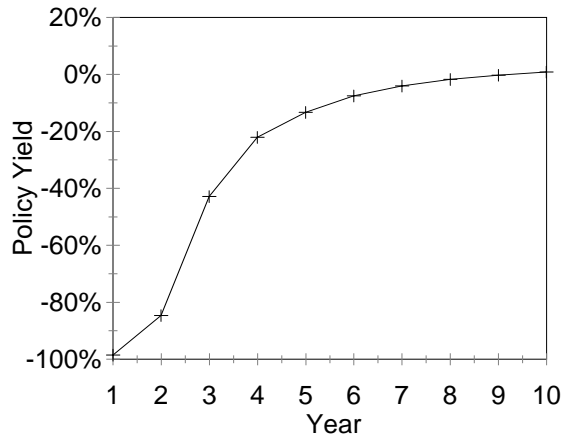
#### *The Nature of Life Insurance Policy Performance and Policy Replacement*

Cash value life insurance contracts generally are considered long-term contracts, in the sense that surrender/acquisition charges during the first five to 15 years typically make the use of cash value policies inadvisable for relatively short holding periods. For example, the one-year annual yield (rate of return) of a cash value policy can be as low as -100%. Figure 1 shows the policy performance profile of a typical cash value (participating whole life) policy.<sup>f</sup>

The average annual yield is negative for the first several years, but then becomes positive and remains fairly constant for longer holding periods. Carson and Forster (2000a) report that the mean five-year (1988 to 1993) and ten-year (1988 to 1998) average annual yields of a sample of whole life policies were -13.2% and 1.3%, respectively. The policy performance profile in Figure 1 indicates that the policyowner saddled with continual

policy replacement (e.g., every five years) likely pays far more over time than if they had simply "bought-and-held."

**Figure 1**  
Average Annual Policy Yields, Typical Participating Whole Life Policy



Based on Table 1

*Importance of Replacement Issue*

Replacement of life insurance is a significant issue to the life insurance industry. Replacement can lead to disintermediation whereby a life insurance policy lapses and is replaced with a non-life insurance product, resulting in capital flowing out of the life insurance industry. Reducing inappropriate replacement would reduce lapse rates and would benefit insurers by reducing overall insurer costs. While economic factors and overall mortality rates essentially are beyond the control of individual insurers, lapse rates largely are within the control of insurers. If a large proportion of replacement activity is not warranted, the introduction and use of a sound financial method for the policy replacement decision likely would reduce inappropriate lapses, reduce insurer costs, and improve consumer welfare by reducing overall life insurance costs.

The National Association of Insurance Commissioners (NAIC) adopted the Life Insurance and Annuities Replacement Model Regulation (June 1998) to address the policy replacement issue. The NAIC Model Regulation does not, however, include a financial framework that provides a measure of the performance of the existing policy, upon which insurers, financial service professionals, and consumers can base the policy replacement decision. Thus, interested parties are without a quantitative method based on financial theory with

which to evaluate the appropriateness of a policy replacement.

**Literature Review and Discussion of Average Annual Yield Method**

Financial service professionals generally focus on one or more of the following key issues in the policy replacement decision, in addition to the aforementioned important factors that should be considered. Currently-illustrated investment returns (e.g., for variable life and variable-universal life), especially in favorable market environments, are ready-made for use as sales tools to initiate replacement. However, the emphasis on potential investment returns leads to improper replacement in many situations.

Various cost comparison methods can be adjusted to compare an existing policy with a proposed new policy. These alternatives include the interest-adjusted method, equal outlay method, cash accumulation method, and comparative interest rate method (Linton Yield). Black and Skipper (2000) provide a discussion of these methods, their limitations, and appropriate use. In addition, cost indexes such as the Net Payment Index and Surrender Cost Index likely are used to aid in the replacement decision. Cho (1997) presents these indexes that may be provided with life insurance illustrations and policies and discusses their limitations.

Previous research has examined policy replacement and cost disclosure, including Auxier (1974), Society of Actuaries (1974), Scheel and VanDerhei (1978), Auxier and Dotterweich (1979), and Skipper (1980). One serious limitation of the various cost indexes is that they are averages calculated over several years (e.g., 5, 10, or 20), and generally mask important short-term aspects of policy performance. For example, the policyowner who is at the end of the third policy year might view the information in Figure 1 and decide to replace the policy immediately since the projected ten-year average annual yield (rate of return) is only 0.9%. However, due to various intra-policy attributes (e.g., declining surrender charges), the policyowner may be wise to hold the policy for another year or more. Popular methods do not provide sufficient detail on the appropriate course of action.<sup>5</sup>

In particular, the Linton Yield method (Linton, 1964) provides the investment rate of return that would be required for a separate investment fund, along with term insurance, to match the cash value accumulation in a life insurance policy. The "Linton Yield" is named after the actuary, M. A. Linton, of the Provident Mutual Life

Insurance Company, who devised and used the method. Describing his methodology, Linton states:

The analysis must show how the life insurance policy may, in effect, be duplicated by establishing an investment fund and supplementing it with renewable term insurance bought in the open market on which the amount of term insurance will decrease as the investment fund accumulation increases. Assuming that the amounts to be invested in each program are equal, the figure we are seeking is the net rate of compound interest that must be earned on the investment fund so at the end of a given period, such as twenty years, the fund will equal the twentieth-year guaranteed cash value of the life insurance policy.

As a tool to compare one policy to another or to evaluate the investment performance of a life insurance policy, yield (rate of return) methods received considerable attention in the mid-1980s and 1990s. Mehr and Gustavson (1987) report that "early in 1986 the NAIC's Yield Index Advisory Committee submitted its report on the feasibility of developing an index that would be useful to prospective purchasers of interest sensitive life policies.....the committee recommended that if such a requirement were enacted, the best index would be the Linton Yield." Bartlett (1995) reviews the advantages of the policy yield as a form of life insurance cost disclosure. Carson and Forster (1997) calculate ten-year average annual policy yields for a sample of universal life policies and provide a review of the literature on policy yields. For the policy yield mathematical formula, see the Appendix.

**Description and Illustration of Methodology**

Table 1 shows information for a typical participating whole life policy related to the yields shown earlier in Figure 1. Assume the policyowner purchased this contract three years ago, and is considering whether or not he should pay the fourth annual premium. Premiums (less dividends)<sup>b</sup> of \$3,110 have been paid during the first 3 years, and the policy has a cash surrender value of \$900. A financial service professional proposes immediate replacement with an alternative cash value life insurance policy (or other financial instrument), and the policyowner is unsure of the proper course of action.

Column F of Table 1 shows the average annual yields for this policy (shown earlier in Figure 1).<sup>i</sup> Note that since

the year 1 surrender value and dividend equals only \$15, the year 1 policy yield equals -98.5%. Today, at the end of the third year, the policy shows an average annual yield (cumulative yield since policy inception) of -42.8%. Looking forward, average annual yields increase so that by the end of the tenth policy year, the 10-year average annual policy yield equals 0.9%. Based solely on the above information of traditional Linton Yields, the policyowner might be inclined to replace immediately (especially in comparison to the stellar stock market returns of the 1990s). Before taking this action, however, information derived from a variation of the policy yield, discussed below, should be considered.<sup>j</sup>

Financial theory suggests that the premiums and past performance (policy years 1 through 3) of the existing policy should be viewed as sunk costs. Thus, the financial analysis of this decision should ignore these factors in the replacement decision. Rather, it is the projected future performance of the in-force policy that should be compared to the projected future performance of some alternative policy (or other financial instrument). Such is the conceptual foundation of an alternative policy replacement decision framework known as the marginal annual policy yield.

**Table 1**  
Average Annual Yield Example

A	B	C	D	E	F
Year	Premium B.O.Y.	Dividend E.O.Y. \$	Cumulative Net Premium E.O.Y. \$	Cash Surrender Value E.O.Y. \$	Average Annual Yield(a) E.O.Y. %
1	\$1,113	\$15	1,098	0	-98.5
2	1,113	76	2,135	100	-84.6
3	1,113	138	3,110	900	-42.8
4	1,113	167	4,056	1,900	-22.0
5	1,113	196	4,973	2,800	-13.3
6	1,113	211	5,875	3,855	-7.5
7	1,113	254	6,734	4,910	-4.0
8	1,113	299	7,548	5,964	-1.7
9	1,113	343	8,318	7,019	-0.2
10	1,113	388	9,043	8,074	0.9

*Information Based on Typical Policy, Average Annual Policy Yields, Male, Age 35, Non-smoker, \$100,000 Participating Whole Life. Policy yields are based on assumed term insurance costs of 50% of 1980 Commissioners' Standard Ordinary Table (CSO) Table.*

The marginal annual policy yield is similar to the average annual policy yield. However, the marginal annual policy yield is most applicable to the decision of whether or not to pay another premium and keep the policy in force. The marginal annual yield is the annual yield from one policy year to the next policy year. Thus, the marginal annual yield method correctly views sunk costs as irreversible. The general motivation for such an approach is rooted in recognition of the internal pricing structure of the majority of cash value policies--namely, the existence of up-front acquisition charges and declining surrender charges.

Thus, a particular cash value policy might have poor performance to date, and might provide a modest average annual yield as measured from policy inception and looking forward (e.g., 0.9% over ten years in the example above). However, in any given year (e.g., the fourth, fifth, or sixth year) the marginal annual yield may be substantially higher. If the marginal annual yield is sufficiently high, the analytical tool would suggest holding the policy (at least for another period) rather than replacing it.<sup>k</sup>

The equation for the marginal annual yield is shown in equation (1).

$$i = \{ (CSV+D) / [CSVP+(P - (TR*(DB - (ACSV) \times .001)))] \} - 1 \tag{1}$$

where,<sup>l</sup>

- CSV = cash surrender value, end of current year,
- D = dividend, end of current year,
- CSVP = cash surrender value, end of previous year,
- P = premium
- TR = assumed term insurance rate per thousand,
- DB = death benefit
- ACSV = average cash surrender value during policy year, = { (CSV+CSVP)/2 }.

The sections that follow discuss the application of the marginal annual yield method to the life insurance policy replacement decision.

**Application of Methodology to Typical Whole Life Policy**

Continuing with the example using a typical participating whole life policy, the marginal annual yield for the upcoming policy year 4 is computed as follows:

$$i = \{ (1900+167) / [900+(1113 - (1.29*(100,000 - ((1900+900)/2))*0.001))] \} - 1$$

$$i = 9.6\%$$

In essence, paying the next premium and keeping the policy in-force during the fourth year is projected to provide a return of 9.6% over the next year. Applying financial theory and the principle of sunk costs—i.e., focusing solely on the performance of the policy today and one year forward in time--the year 4 marginal annual yield indicates that replacement with an alternative financial product faces a hurdle rate of 9.6%.<sup>m</sup> Thus, given the policy's projected marginal annual yield, relatively few policyowners would choose to replace this policy with another cash value policy (or other financial instrument) at the beginning of the policy's fourth year, especially since any new life insurance contract also likely would provide negative average policy yields in the first several years. Marginal annual yields are shown in Table 2 and are illustrated in Figure 2.

Recognition of the policy performance profile based on marginal annual yield analysis suggests that surrender of this policy may be an imprudent decision, at least at this particular point in time (end of third policy year). Based solely on traditional methods (including average annual yield analysis), some policyowners may have decided to replace this policy immediately (at the end of the third year), given the policy's 3-year average annual yield of -42.8%, and the policy's projected 10-year yield of 0.9%. However, such a decision would have suffered from a failure to apply the principle of sunk costs.

**Table 2**  
Marginal Annual Yields

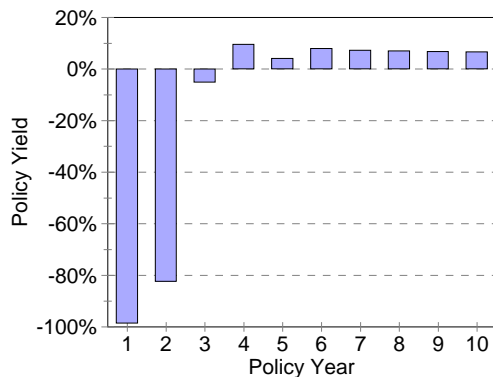
A	B	F	G
Year	Premium B.O.Y.	Average Annual Yield E.O.Y. %	Marginal Annual Yield E. O. Y. %
1	\$1,113	-98.5	-98.5
2	1,113	-84.6	-82.4
3	1,113	-42.8	-5.1
4	1,113	-22.0	9.6
5	1,113	-13.3	4.1
6	1,113	-7.5	7.9
7	1,113	-4.0	7.3
8	1,113	-1.7	7.0
9	1,113	-0.2	6.8
10	1,113	0.9	6.6

*Information Based on Typical Policy, Average Annual and Marginal Annual Policy Yields, Male, Age 35, Non-smoker, \$100,000 Participating Whole Life.*

*Columns A-F are identical to Table 1, so columns C-E have been omitted here.*

Moving ahead one more year (to the end of year 4) and applying financial theory and the principle of sunk costs, the year 5 marginal annual yield indicates that replacement with an alternative financial product faces a hurdle rate of 4.1%. The marginal annual yield provides additional insight that contrasts sharply with information derived solely from average annual yield analysis regarding the decision to replace, especially in terms of timing. Thus, by not appropriately treating sunk costs, replacement analysis bereft of marginal annual yield information can be biased toward replacement and does not provide sufficient information for policy replacement decisions.<sup>9</sup> The next section describes the sample and data to which marginal yield analysis will be applied.

**Figure 2**  
Marginal Annual Policy Yields, Typical Participating Whole Life Policy



Based on column G, Table 2.

**Sample and Data**

The methodology is applied to historic (actual) data from *Best's Flitcraft Compend* (1988) and *Best's Policy Reports* (Whole Life), 1998. The sample consists of all participating whole life policies issued in 1988 with complete data (n = 29) over the 10-year period from 1988 to 1998. Policies have annual premiums ranging from \$985 to \$1,731 and are based on \$100,000 face amount issued to age-35 nonsmoking males.

**Results**

Applying the methodology to the sample of whole life policies produces the marginal annual yields shown in Table 3. For every year from policy year 1 through policy year 10, marginal annual yields range from highly negative to highly positive. For example, in policy year 3, marginal annual yields for the sample range from -70% to 44%.

**Table 3**  
Marginal Annual Policy Yields Based on Three Hurdle Rates (9%, 7%, and 5%), Sample of Participating Whole Life Policies (n=29)

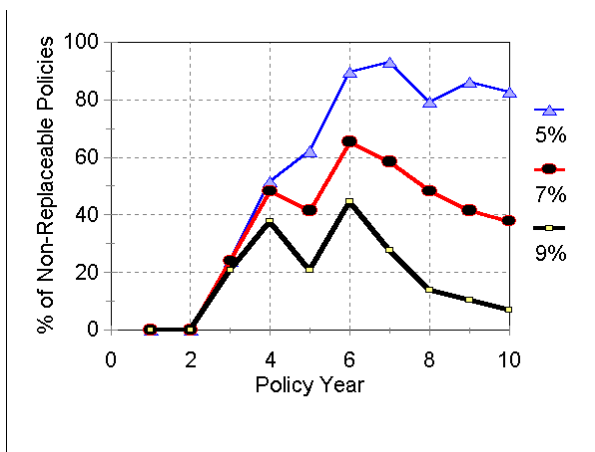
Year	Min. Marg. Annual Yield %	Mean Marg. Annual Yield %	Max. Marg. Annual Yield %	% of Sample Non-Replaceable		
				Hurdle Rate 9%	Hurdle Rate 7%	Hurdle Rate 5%
1	-100.0	-97.1	-86.0	0.0	0.0	0.0
2	-100.0	-75.0	-0.2	0.0	0.0	0.0
3	-70.0	-7.8	44.0	20.7	24.1	24.1
4	-4.9	6.1	18.5	37.9	48.3	51.7
5	-21.4	5.7	15.9	20.7	41.4	62.1
6	0.4	8.8	18.5	44.8	65.5	89.7
7	0.5	7.6	14.0	27.6	58.6	93.1
8	0.9	7.0	11.1	13.8	48.3	79.3
9	1.0	6.6	10.7	10.3	41.4	86.2
10	1.4	6.5	11.6	6.9	37.9	82.8

*Information Based on Typical Policy, Average Annual Policy Yields, Male, Age 35, Non-smoker, \$100,000 Participating Whole Life Policy yields are based on assumed term insurance costs of 50% of 1980 CSO Table.*

Table 3 also shows the percent of "non-replaceable" policies, based on three hurdle rates. The intuition here is that if a policy's marginal annual yield is at least as high as some hurdle rate, then the policy should not be replaced that year. Thus, the lower the hurdle rate, the more likely it is that a policy would be "non-replaceable." For three hurdle rates (9%, 7%, and 5%), the percentage of "non-replaceable" policies, by year, is shown in Table 3 and in Figure 3. Assuming a hurdle rate of 5%, over 50% of the sample policies are "non-replaceable" for policy year 4 through policy year 10. Naturally, as the hurdle rate decreases, the percent of "non-replaceable" policies increases.

If replacement of an existing life insurance policy is seriously considered, it is important that the alternative life insurance policy (or alternative financial instrument) is analyzed to determine its proposed yield/return. The initial return and long-term return of the proposed instrument should be compared to the marginal annual yield of the existing policy.<sup>o</sup>

**Figure 3**  
Percent of "Non-Replaceable" Policies  
Based on Three Hurdle Rates (9%, 7%, and 5% )  
Sample of Participating Whole Life Policies (n=29)



Based on columns E, F, and G of Table 3.

**Discussion and Implications**

The marginal annual yield method illustrated here indicates that, given a 5% hurdle rate, the vast majority of sample policies are "non-replaceable" during policy year 4 through policy year 10. The conclusion of "non-replaceable" refers only to the marginal yield aspect of the replacement decision. As discussed earlier, other factors such as financial strength of the insurer, etc., may suggest that the policy should be replaced despite a relatively high marginal annual yield. Conversely, the fact that a policy's marginal annual yield is less than the hurdle rate does not necessarily imply that the policy should be replaced (e.g., especially during policy years 1 and 2).

Wide variation in policy performance suggests that consumers would benefit from marginal annual yield analysis in the policy replacement decision.<sup>p</sup> To the

extent that consumers rely on financial service professionals, these professionals can help to reduce inappropriate replacement activity by encouraging the use of appropriate marginal yield information. In addition, financial service educators and academics can use the findings of this study to inform consumers of the importance of proper financial analysis in the life insurance replacement decision.

Marginal yield analysis reveals and highlights the benefits of holding a policy, as opposed to switching to a new policy. As such, marginal yield analysis should help to reduce inappropriate replacement activity and help to reduce insurer costs associated with policy replacement. Insurers with lower replacement and lapse activity are able to offer policies with superior performance.

In addition to the marginal annual yield's year-by-year approach, a longer-range view of future policy performance would add to the quality of the replacement decision. A measure of this longer-range view is readily available in the form of a forward-looking (i.e., today forward, as opposed to policy inception and forward) 10-year average annual yield. Such a measure is consistent with the principle of sunk costs, and yet would provide a longer-range perspective of future policy performance (compared to the marginal annual yield).

**Summary and Conclusions**

This study illustrates an analytical tool (marginal yield analysis) that provides insight on the life insurance replacement decision. The marginal yield method incorporates the financial principle of sunk costs and thus is an important addition to widely-used methods that do not treat past premiums and past policy performance as irrelevant.

This study finds that replacement analysis bereft of marginal annual yield information can be biased toward replacement and does not provide sufficient information for the policy replacement decision. For a sample of whole life policies, results demonstrate that up to 93% of sample policies should not be replaced during policy years 4 through 10 (based on a hurdle rate of 5%).

Results suggest that, in the replacement decision, life insurance analysis is needed that includes marginal yield information (as well as an examination of other factors such as strength of insurer, etc.). While this study utilizes whole life insurance contracts to examine the policy replacement decision, the methodology and results are generalizable to other types of insurance contracts such as variable life, universal life, and other forms of life insurance. The methodology and findings are relevant to financial service professionals, consumers, insurers, regulators, and academics.

### Appendix

The life insurance policy yield formula (Linton Yield) is shown in Equation (2).

$$\sum_{t=1}^n (P_t - D_{t-1}) (1+i)^{n-t+1} - \sum_{t=1}^n (\text{YRT}_t) (F_t - \text{CV}_{t-1}) (1+i)^{n-t+1} = \text{CV}_n + D_n \quad (2)$$

where:

- $P_t$  = policy premiums in policy year t
- $D_t$  = policy dividend in policy year t
- $\text{YRT}_t$  = assumed term insurance rate per \$1,000 of insurance in year t
- $F_t$  = policy face amount in policy year t
- $\text{CV}_t$  = policy cash value at end of policy year t
- $D_n$  = policy dividend in year n, plus terminal dividend, if any, at policy surrender at end of year n
- $i$  = rate of return (yield) needed to make equation (2) hold



### Endnotes

- a. These percentages are derived from data in *Best's Policy Reports* (May), p.8, 1997.
- b. Some variance in policy price/performance would be expected due to differences in policy options and quality of insurers. However, Carson and Forster (2000a) find that policy price (performance) varies widely, even for a homogeneous sample of whole life policies from A/A+ rated insurers, as well as for a homogeneous sample of universal life policies from A/A+ rated insurers (also see Carson & Forster, 1997).
- c. Policy replacement is examined from a regulatory perspective for universal life insurance in Carson and Forster (2000b).
- d. Although beyond the scope of this paper, these factors can be quantitatively weighted and aggregated via an analytical hierarchy process (AHP) to reach a unified decision regarding choice of policy in a multi-attribute contract choice model conditional on the preference set of the individual (Puelz, 1991).
- e. Lapse-supported policies, in contrast, are constructed such that future policy values are assumed to incur gains from surrender charges associated with policies that lapse.
- f. Policy surrender values to construct Figure 1 are derived from *Best's Flitcraft Compend, 1988* and *Best's Policy Reports (Whole Life), 1998*. The sample and data are described in more detail later. While some policies will provide higher or lower yields over time, Figure 1 is representative of the typical path of policy yields for whole life policies. The policy with the median 10-year yield is used in Figure 1 to represent the typical policy.
- g. Transactions involving high degrees of asymmetric information are apt to lead the consumer to choose a professional in which they place a high level of trust. In these consumer-purchase trust-relationships, form often supersedes substance, since the consumer is unable to differentiate on the basis of other factors. This aspect of the insurance purchase/replacement transaction makes it paramount that insurers and financial service professionals employ a sound method for the replacement decision.
- h. Dividends are used to reduce premiums.
- i. The source for term insurance rates (indeterminate premium) is *Best's Review* (1985). The lowest (projected and actual) 10-year term insurance rates of listed policies paralleled the 1980 Commissioners' Standard Ordinary Table (1980 CSO), at approximately 50% of the 1980 CSO rates. Thus, for simplicity, this analysis employs 50% of the 1980 CSO.
- j. Policy yield information provides insight into the nature of policy performance over time that is not apparent using other methodologies. Yet, policy yield information generally is not provided to consumers by insurers, and is not required as part of any cost disclosure regulation. Therefore, few consumers actually come in contact with policy yield information of this nature.
- k. Note that marginal annual yield analysis is based on the supposition that the decision to replace a policy at the end of a given policy year is independent of the policy's past performance. The marginal annual yield method focuses on the policy's expected performance over the next one year.
- l. In Equation (1), .001 appears in the equation to remain consistent with the term insurance rates that are stated as costs per thousand of coverage.
- m. "Hurdle rate" is used as a term analogous to an individual's minimum required rate of return. Thus, by its nature, the choice of a particular hurdle rate is highly individual, and the paper does not impose any particular hurdle rate, but rather, presents a flexible methodology.
- n. Note, however, that marginal annual yield analysis should not be taken too far into the future, since that would implicitly treat future premiums as sunk costs, which they are not. Further, once

the marginal annual yield is calculated, it should not be assumed that "dump-ins" of extra premium dollars would earn the calculated marginal annual yield.

- o. Projected results of financial instruments often are not guaranteed and actual results often vary significantly from those projected. See Carson and Forster (1997) for an empirical study of projected versus actual universal life insurance policy yields. Also, it is important that the marginal yield not be compared to the gross yield/return of an alternative investment (Carson, 1996). A discussion of ethical issues related to life insurance illustrations is in Carson and Forster (1998).
- p. Investment returns have a significant impact on retirement wealth. Yuh, Montalto, and Hanna (1998) discuss retirement wealth adequacy.

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