Buy Term and Invest the Difference Revisited

by David F. Babbel, PhD
Oliver D. Hahl, PhD

ABSTRACT

The decision whether to buy term or permanent life insurance, or some combination of both, is among the most challenging elements of the purchasing process for many people. This study demonstrates that financial analyses which purport to show that the Buy Term and Invest the Difference (BTID) concept dominates the combination of permanent life insurance supplemented with term life are deficient in many ways and incapable of establishing this dominance. It also shows that the assumed financial discipline necessary to successfully implement the BTID approach is an unrealistic expectation for many consumers. Accordingly, it should not be claimed that one approach necessarily dominates the other for all consumers.

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Introduction: Traditional Roles of Term and Whole Life Insurance

Life insurance has been available in the United States since shortly before it became a nation. Whole life and term insurance have been and continue to be important, basic products.[1] Naturally, these two insurance products have been compared and purchased as complements to each other, and sometimes substitutes, depending upon the stage of life or differing needs.

The venerated Professor Dan McGill examined in depth these two types of policies and identified their traditional uses.[2] To provide some background to this analysis, the authoritative analysis he provided is outlined briefly here.

Term Insurance

Term insurance provides coverage only for a limited term. That period can be for a single commercial airplane flight (flight insurance), a single year, or a period of years, such as 5 years, 10 years, 20 years, or term-to-age-65. In fact, in recent years several companies have offered term coverage up to 85 years of age, and there were even a couple of companies that offered it, with limitations, to age 95 or 99.[3]

Some term insurance is available with a renewal option. For instance, annual renewable term has been popular in the past. Another policy design exists whereby at the end of a multiyear period (e.g., 5

or 10 years), the policyowner may renew the policy for another multiyear period of equal length. If the policy provisions allow it, the policy can be renewed without providing new evidence of insurability. Such renewal options typically expire after a stipulated maximum number of renewals, or until reaching some prespecified age. The insurance premium per $1,000 of coverage is typically constant throughout each term, but at the beginning of each renewal period, jumps to a higher level. The jump in premiums at the onset of each renewal period is often so high that policyowners lapse their policies.[4]

People often think that term insurance is the least expensive way to purchase coverage, but this is not necessarily true. The misunderstanding can be analogized to purchasing apples at a market. One vendor may offer to sell a dozen apples for $6. Another vendor nearby may offer to sell apples for only $4. But if paying the lower price delivers only a half dozen apples, the price per apple is actually higher. In the first case, the price is 50¢ per apple, but in the second, it is 67¢ per apple. Alternatively, the second vendor may offer a dozen apples for only $4, but they may differ in quality from those offered by the first vendor. Accordingly, when considering cost, one must also consider the benefit received. Financial economists call this the cost-benefit ratio, and measure the numerator and denominator of this ratio in expected present values. A cost-benefit ratio in excess of 1.0 means that there is a markup or profit margin, which is common—indeed, necessary—in viable commerce. This concept will be revisited shortly.

McGill points out that term insurance has a long history of being controversial. He noted as early as 1967 that "there are certain insurance 'consultants' who, when they find permanent plans in an insurance program, will advise their surrender for cash and replacement with term insurance." Its appeal, at least in earlier years, was the lower premium outlay associated with a given amount of coverage, but this does not necessarily translate into a lower cost. Indeed, McGill has stated:

> The premium for term insurance is initially relatively low [when compared to the premium for a whole life policy with an equivalent amount of insurance in force], despite the fact that it contains a relatively high expense loading and an allowance for adverse selection… . Whether the policy is on the yearly renewable term plan or a longer-term basis, there is likely to be strong selection against the company at time of renewal, and this adverse selection will become greater as the age of the insured—and hence, the renewal premium—increases. Resistance to increasing premiums will cause many of those who remain in good health to fail to renew each time a premium increase takes effect, while those in poor health will tend to take advantage of the right of renewal. As time goes on, the mortality experience among the surviving policyowners will become increasingly unfavorable… . As a result, each dollar of protection on the term basis tends to cost middle-aged or older policyowners more than under any other type of contract.[5]

Of course, insurers are very aware of this adverse selection and set their schedule of term insurance rates anticipating the effects of age-related increases in mortality as well as likely adverse selection. Certainly adverse selection would be expected on insurance issued with little or no underwriting, which is more commonly ignored with smaller policies. Also, an insurer may periodically offer reduced rates to persons who are willing to provide new evidence of insurability.

McGill discusses circumstances under which the choice of a term policy may be the best option. These include situations where "the need for protection is purely temporary, or the need for protection is permanent, but the insured temporarily cannot afford the premiums for permanent insurance." In the former case, the term policy ideally should be renewable in the event that the need for protection extends somewhat beyond the period originally expected, and McGill provides several examples where the needs are

clearly temporary. In the latter case, the term insurance purchased ideally should be both renewable and convertible. For example, term insurance may be particularly important to young people who are making substantial investments in education and training that are likely to translate into an improved financial situation over time, and to growing families. In both cases, having sufficient protection over the early years is crucial.[6] Given the relatively higher premiums, it can be much more difficult to purchase the appropriate/correct amount of life insurance coverage when using cash value policies.

McGill continues with a discussion of what he terms "fallacious arguments in favor of term insurance," including often-repeated claims that level premium insurance overcharges the policyowner, that the accumulation and protection elements should be separated, and that whole life policies are illiquid.[7] While we do not rehearse each of those arguments here, they are worth considering.

Whole Life Insurance

The insurance contract known as whole life differs in several respects from term life. In its classic textbook form, whole life has level premiums that are paid throughout life and a death benefit paid regardless of the age of the insured at death—hence the name "whole life." Unlike term insurance, the whole life contract never expires, so it never has to be renewed nor be converted. The insured maintains protection against the financial consequences of death as long as he or she lives, and regardless of changes in health.

Level premium whole life has an investment element that accumulates over time and goes to offset the higher costs of life insurance as the insured ages. This investment element provides a number of options to the insured that enhance the policy's flexibility. These are discussed in depth in numerous textbooks and will not be repeated here.

Economic Modeling Efforts

Beginning with the financial revolution of the 1960s and continuing well into the 1990s, it became fashionable to break down investments into their component parts. For example, for investors in a portfolio of mortgages, it became possible to purchase a share of mortgage payment proceeds, such as the "interest only" portion, "principal only" portion, or various tranches like the payments due between years two and five. Similarly, with government bonds, the stripping of coupons became popular and investors could purchase rights to the particular coupon or coupons that suited their desires, such as the coupon interest payment due in 25 years and 6 months.

In the spirit of that time, and to gain the advantages of mathematical tractability when modeling whole life insurance without the "clutter" of contractual details, economists abstracted from many of its elements and began to posit the whole life policy as a series of single-period or instantaneous term contracts, renewable throughout life without providing new medical evidence of insurability.[8] Notwithstanding the fact that such contracts did not exist at the time (nor even to this day), this modeling simplification provided some valuable economic insights into the investment and savings strategies facing consumers with uncertain lifetimes. Some early studies considered whole life insurance to be "a linear combination of one period (year) term life insurance and **a savings plan of some sort.** (emphasis added)"[9] The last part of this statement is emphasized for a good reason. The "sort" of savings plan assumed was not and even today is not available to consumers apart from what is embedded in a whole life policy, as will be discussed later.

Enter Buy Term and Invest the Difference

Given this backdrop of the financial revolution, it was inevitable that some insurance marketers would eventually devise a plan to "unbundle" (as they assumed) whole life insurance into its components, term life and an investment program. As would be expected, the marketers of such a program, termed Buy Term and Invest the Difference (BTID), just

conveniently happened to offer not only term insurance but an assortment of mutual funds and other investments that could be purchased together with the term life. The idea behind separating the elements of death protection from investments was appealing to a large number of people, and one such program, initiated in 1977 by a former high school football coach named A. L. Williams, grew at an extraordinary pace. While the program undoubtedly was helpful to some people, it was not a panacea for all. Some insurers were undoubtedly resentful because their existing policies were surrendered and monies diverted to the companies Williams favored, including his own. But other insurers were worried that the idea of separating the whole life insurance package into its (supposed) separate elements may leave a lot of people worse off. They felt that caution should precede the decision to surrender an existing whole life policy and replace it with term and a separate investment program.

Behavioral Limitations to the Buy Term and Invest the Difference Model

While the BTID concept certainly fits with the revolution in finance that was going on at that time, as a solution for funding retirement, it has behavioral and financial limitations. An overview of the concept's behavioral limitations will be given before describing the financial limitations it poses when compared with whole life insurance. In considering behavioral limitations, the ways in which people tend to behave differently than assumed in the BTID alternative are described. In particular, the behavioral limitations to this alternative come in two forms: (a) adverse selection of customers and (b) mental accounting in budgeting.

Customer Selection

It is important to note that the additional freedom of not being forced to save assumes that people will be willing and able to save on their own. Note that the marketing plan and appeal of this product are primarily targeted to those in middle- and lower-income brackets. This means that the very people who have limited capacity to save and limited access to investment instruments are expected to save on their own. This shortcoming is at least partly offset by the idea of decreasing responsibility, or that over time heads of families will have fewer financial obligations as dependents move out of the house and become financially independent.

Thus, people might not be able to save today what they will be able to save in later periods because of financial obligations related to dependents, from large sums related to education to smaller day-to-day costs like food and clothing. Term life insurance allows individuals to put off saving until they can more easily afford it later in life. Note that planning to defer savings in this way eliminates the largest chunk of interest they would otherwise accrue, meaning later investments must be larger to make up for the difference. However, the BTID alternative assumes that people will change their behavior in ways that they never have previously by deferring consumption until later in life—easier said than done.

Mental Accounting and Behavioral Concerns

The second component of behavioral limitations is taken from work by behavioral economists and highlights that the assumed model of behavior in the BTID alternative contradicts some very important and innate tendencies for almost all people, regardless of economic class. In prefacing this issue, it is important to remember that the assumed behavior in BTID is that people will be able to save the additional amount that otherwise would have been allotted to a whole life premium and invest it on their own. Studies in behavioral economics on people's tendency to budget have found that people are limited in their ability to perform such for two interrelated reasons.

The first reason is what these researchers call mental accounting. Research has found that people tend to place money in "buckets" in their heads and are often unwilling to shift these amounts.[10] The following stylized example illustrates how this affects

people's ability to save. If someone has allotted a certain sum of money for lunch in the week, but on Monday sees that lunch will be cheaper during the week, instead of saving the difference between what was budgeted and what will be spent, because that person has mentally allotted the whole amount in the lunch or food bucket, he or she tends to either buy more lunch or splurge on a more expensive dinner later in the week.

People's tendency to consume what could be saved is further enhanced by a second related issue known as hyperbolic discounting. Hyperbolic discounting is the tendency for people to discount by large amounts the utility of something that could be purchased later, thus making almost any purchase today seem more valuable than putting it off for later and saving for tomorrow.[11] This means that even if people can overcome the mental accounting constraint to savings, when they evaluate what they could purchase later from savings, they will be more likely to overstate their utility for purchasing something now. In everyday terms, these two concepts combined are a formal way of noting that people tend towards impatience.

When people buy term life insurance, they often frame the difference between the premiums for term life insurance and the whole life insurance alternative as money gained by the transaction. For the two reasons cited above, it would take an extraordinary amount of discipline to allot money toward savings when that money is framed as gained. If left to their own devices, individuals choosing term life insurance are less likely to invest the whole difference as is assumed under the BTID alternative. However, it is true some companies sell products that combat this by providing investment vehicle options to the insured, but in doing so they reduce the "freedom" associated with this option.

Voting with Their Feet…or Their Wallets

There is good evidence that consumers do not persist with their term insurance policies as much as they do with whole life policies. A recent study (2012) cosponsored by the Society of Actuaries and LIMRA, entitled "U.S. Individual Life Insurance Persistency," presents an extensive survey of lapse rates over the 15-year period extending from 1994 through 2009. The data show that over the first 5 years of whole life and term policies, roughly equal percentages of policies "lapse." (These early lapses will include consumers who experience buyer's remorse and others whose economic situations have made it difficult for them to continue making premium payments.) Yet, that study also notes that over the same period, the average annual lapse rate of about 3 percent on traditional whole life policies is less than half that of term life (6.9 percent) over the policies' durations.[12]

Because of the manner in which lapse was defined in their study,[13] a further adjustment is necessary when comparing lapse rates across policy types. When term life is "surrendered" or lapsed, the policyowner receives nothing in return. Yet, when a whole life policy is surrendered after the first year or two, it will return a cash surrender value or the policyowner can exercise a number of other policy options.[14] Thus, in comparing lapse rates, in the relatively few cases where a whole life policy is lapsed and returns nothing, similar to what is returned for all term policy lapses, it should be noted that such lapses are a small fraction of term insurance lapses. Moreover, many whole life policies are from the outset purchased with the primary intent to build up substantial tax-deferred cash values for later surrender and deployment in retirement or living bequests, while providing protection for premature death. While the survey data tally these surrenders as lapses, they are quite different from term insurance lapses. Furthermore, the reported rates of term insurance lapses do not include the voluminous lapses that occur on policy renewal dates, in which about half of remaining policies are discontinued, as discussed earlier.[15] While there are other factors that contribute to these large disparities in lapse rates across products, and some term policy lapses are undertaken by healthy people

when other lower-priced carriers are located for similar products, the fact that consumer lapses of term policies are so much more frequent should give pause to those advocating a strategy that depends on term life being held as long as protection is needed.[16]

Though these behavioral issues are persistent and imply serious limitations in the assumed model behind term life insurance savings plans, they can be overcome by those with both extraordinary amounts of financial discipline and higher levels of resources and access to investment opportunities. Along with these behavioral constraints, there are also financial limitations to these products, as will be described in the remainder of this article.

What Is Learned from Financial Analysis

Creating and manipulating policy illustrations became all the rage when the personal computer attained popularity beginning in the early 1980s. The exploding availability of software programs such as VisiCalc, Lotus 1-2-3, and Excel made a sport of amateur sleuthing by aspiring accounting, actuarial, and financial types who seemed undaunted by their shallow understanding of the insurance products they were modeling. Then entered the financial economists. While their initial understanding of insurance products was only rudimentary and their early efforts were no better, it didn't take long before they recognized that they were using the wrong tools, wrong models, and were capturing only those aspects of the insurance policies that were easiest to model, while ignoring others that added significant value. Furthermore, the analyses were typically based on policy illustrations, not actual, expected, or realized cash flows.

A breakthrough seminal paper by Michael Smith, a professor of insurance and finance at Ohio State University, framed the discussion at a deeper level.[17] While others had noticed that many elements of whole life insurance were difficult to model in a simple spreadsheet program, Smith clearly demonstrated that the whole life insurance contract "is a package of options that is not precisely duplicated by any other combination of commonly available financial contracts." He argued that "[whole] life insurance enjoys a unique position in the field of investments and should be judged in this light."[18] He concluded that "no single contract is ideally suited to all situations; the perceived value of an options package will depend on circumstances faced by the owner of the contract, the beneficiary, and the insured... ."[19] Viewing a product as an options package offers insight into the needs it serves and the circumstances leading a policyholder to increase his or her perception of its value" and that "cost disclosure methods based on the savings-and-term-insurance view ignore important options provided by a life insurance contract… . [A]n insurance shopper who relies solely on cost comparisons developed under this simplified view may be misled."[20]

Smith discusses in some depth seven of these options, including:

1. A renewal guarantee;
2. Guaranteed renewal premiums;
3. An option to surrender the policy for its cash value;
4. An option to surrender the policy for paid-up insurance, extended term insurance, or in some cases, an annuity, with rates guaranteed at the time the original contract is issued;
5. An option to borrow nearly all of the cash surrender value at a rate of interest that is subject to a contractual maximum;
6. Optional modes of receiving payment of a death claim (e.g., lifetime income); and
7. For a participating policy only, optional methods by which dividends can be received, with guarantees built into the options.

There are several other options in a whole life policy that Smith did not discuss, and one of the most valuable, from a policyholder's/investor's perspective, is comparable in some ways to a Guaranteed Investment Contract (GIC).[21] In the case of a participating whole life policy, it is even better—a combination of a GIC for the minimum cash value growth guaran-

tees and something akin to a stable value investment fund for the policy dividends. This option will be discussed later.

Option pricing was in its infancy in those days and none of the available spreadsheet programs had incorporated its insights in the analysis of the whole life contract. Moreover, because the policy was not a tradable security, but rather a contract with policyholder options whose values would "depend upon circumstances faced by the policyowner or beneficiary,"[22] it would be misleading to suppose that a unique value could be stipulated. Furthermore, some of the options within a whole life contract are so long-lived that there simply is no credible model today, even three decades later, that is capable of valuing them accurately in an option pricing context.

Econometric research was conducted shortly after the appearance of Smith's study to ascertain whether consumers acted in a way consistent with the value proposition of options within a contract. The earliest study was by Waldon[23] and found support for the options package view of whole life insurance. It was followed by refined studies that were more supportive.

Increasingly powerful economic models were then developed to examine certain aspects of term insurance and whole life. One such study proved that whole life is not a "linear combination of one (year) term life and a savings plan of some sort," which should have put to rest the notion that a simplistic BTID analysis could prove adequate and that BTID's purported dominance over whole life could be established.[24] Apparently, some BTID marketers didn't get the memo.

The aforementioned study was the first to demonstrate using a rigorous economic model that "rational, well-informed consumers may well choose to hold both term and whole life policies [simultaneously]." These results held true whether insurance pricing was done at actuarially fair values (no loads) or at typical loads to cover expenses and commissions, and provide for a return on capital.[25] Importantly, the BTID alternative was always an option the representative consumer could have chosen, yet it was never selected by the rational, well-informed consumer except in the most extreme scenarios modeled. The study added to the analysis the policy loan option and the guaranteed renewability option within the context of a multiperiod consumption-investment framework. It examined level premium cash value life insurance with surrender cash values, stochastic renewability, stochastic interest rates, state-dependent utility for consumption and bequest, lengthy earnings periods, a long retirement period, allowance for savings, borrowing either as a policy loan or a regular loan, stochastic mortality, good health, bad health, death, reduced wages in poor health, different mortality tables evolving depending on health states, inflation, real growth rates in income, tax rates, and a subsistence income threshold. While not comprehensive, it included more factors than any previously published model. The model design also accommodated varying degrees of risk tolerance, consumers with and without bequest motives, and incorporated 30 different "states of nature" over four time periods of 15 years each in a state-preference framework.

Figure 1 and Figure 2 illustrate the results of that study. Figure 1 shows the impact of increasing whole life rates on the demand for both term life insurance and whole life insurance. Note in both graphs the wide range of whole life rates for which there is coexisting demand for both kinds of insurance. The graph on the left of each figure reveals how sharply the demand for whole life declines as its price rises (from left to right) above actuarially fair levels, while term's price is held constant at the actuarially fair rate. Demand patterns shown are characteristic of goods that have at least some degree of substitutability. Total insurance in force (the sum of whole life and term) declines modestly as whole life prices are increased. The graph on the right, which shows demand under loaded premiums (with term premiums held constant at their typical load at that time), exhibits a similar pattern to the fair prices case, except with lower total insurance in force at each price interval.

Figure 2 depicts the analogous case for changing term premiums, with whole life premiums held constant at either their fair value or their typical markup at that time. Note again how in both graphs there is a wide range of term rates for which there is concurrent demand for both kinds of insurance. These graphs reconfirm that the consumer will treat whole life and term as complements, and also as substitutes, at least to a limited degree. Of particular note is that when whole life is offered at its actuarially fair price, the demand for term insurance evaporates quickly when small loadings are added to term prices. However, when both kinds of insurance have typical premium loadings, the demand for term does not fall off so quickly as term prices are raised. Total insurance in force goes from around $30,000 to $20,000 when premiums go from fair to loaded. (These dollar figures are scalable to the wealth and income of an insurance consumer, so what is important here is the relative magnitudes. Multiplying by 15 will give more practical ranges for 15-year periods.)

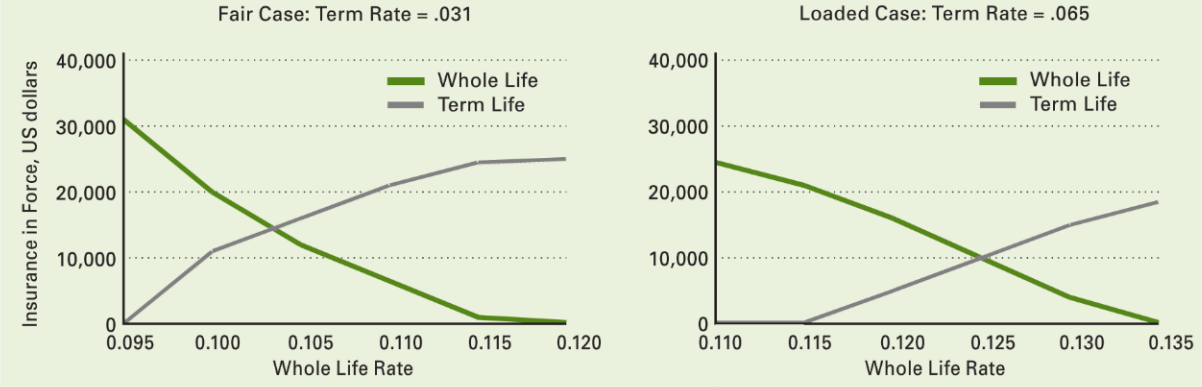
At typical price loadings shown on the right hand sides of both figures, an optimal combination of insurance for a 35-year-old representative consumer is to have roughly equal amounts of whole life and term insurance in force. (This is shown just before the point where the term and whole life insurance lines intersect.) Of course, these amounts would diverge depending on variations in other assumptions, such as risk tolerance, bequest motive, initial wealth, pension level, wages, disability income amounts, and other items, which are shown in the aforementioned study but not reproduced here. In fact, in most scenarios studied during the first 15-year period (from age 35 to 50), the optimal combination of insurance involved both term and whole life. However, there was no theoretical demand evident for term insurance beyond age 50; only at younger ages did term insurance enter into the optimal mix of consumption-investing, and even then only in combination with whole life insurance.

Subsequent Developments

While subsequent transformations in the design of term and whole life contracts would render some of the aforementioned findings dated, the principles endure.

Many insurers, having been burned by their generous policy loan provisions during the inflationary period of the late 1970s and early 1980s, now link policy loan rates to market rates, thereby reducing the policyholder's ability to gain from arbitrage. Fur-

FIGURE 1
Changing Whole Life Premiums with Fair and Loaded Term



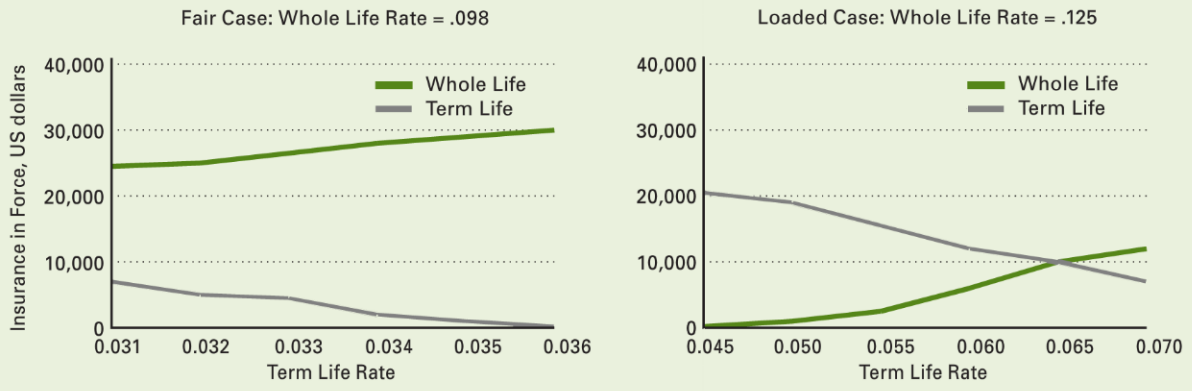
thermore, tax changes have eliminated the deductibility of policy loan interest costs on many policies.[26] These changes virtually eliminated the financial value of the policy loan privilege, except in cases where outside credit is not available, or available only at higher-than-market rates. However, other valuable options remain in life insurance policies.

At about the same time that these studies were published, insurance companies developed an array of other products that serve as more direct alternatives to the BTID approach. They include universal life and variable universal life policies. The flexibility involved in these policies tends to allow a policyowner to mimic the BTID approach, should he or she desire to do so, yet these forms of insurance maintain certain advantages relative to BTID. They allow more flexibility in premium amounts and timing, preserve insurability at all ages, permit switching from one fund to another at low or no cost, and may be amenable to increasing insurance coverage within certain limits. On the other hand, they tend to transfer more risk to the consumer than whole life policies when it comes to crediting rates and cost of insurance, while also diminishing the value of some other valuable options embedded in whole life.

There have been several additional insightful studies where inroads have been made in the comparison of whole life and term products,[27] but none yet allows for direct comparison of all elements and options.[28] Fechtel[29] lamented that using an inadequate model for assessing the value of a life insurance policy is "as flawed as trying to completely describe a rectangle with a single measurement…and therefore not helpful in the financial world… ." His approach is to reverse-engineer the illustrated policy values by stripping policy illustrations of their embedded assumptions and isolating the underlying cost elements to ascertain their competitiveness. Its virtue is also its vice. Rather than produce a metric of quality that is easily comparable between policies, it produces a plethora of numbers that makes it difficult for all but a professional to assess. In its defense, comparing a multifaceted product with another one is difficult to do adequately with a single number.

One element of whole life policies that has not been sufficiently appreciated in the BTID exercises is the highly valuable schedule of crediting rates applied in whole life policies. Unlike the rates of return on the "invest the difference" portfolios, which can be sharply negative in some cases, whether invested in government bonds, corporate bonds, or stocks, the cash values in whole life always grow by positive amounts

FIGURE 2
Changing Term Premiums with Fair and Loaded Whole Life



and in relatively stable ways. Indeed, they manifest stability in growth patterns that exceeds that available in the ever-popular stable value funds which are offered in 401(k) and other retirement savings plans. Research has shown that when these types of funds compete with other available funds, such as small stocks, large stocks, long-term government bonds, long-term corporates, intermediate government/credit notes, and money market funds, the optimization algorithms almost universally load up in stable value funds, sometimes accompanied by small stocks, across a wide range of consumer risk tolerance levels.[30]

These results are corroborated by actual data, where stable value funds tend to be the first or second most sought choice in retirement savings plans that offer them. Thus, to use some sort of comparative algorithm in a BTID analysis that does not properly take into account consumer risk tolerance and preferences for such returns will certainly undervalue whole life contracts relative to the BTID alternative. Using the earlier analogy, it is akin to saying the price of apples is cheaper from the second vendor than from the first without counting the number nor considering the quality of apples offered by each vendor at a given price, while ascribing zero value to whatever other groceries might be included in the first vendor's basket along with the apples.

Returning to the subject at hand, if a consumer places little or no value on the options and features of a whole life policy, and has only temporary insurance needs, and has the self-control to execute the BTID strategy assiduously, then buying term and investing the difference may be the best choice. Of course, it still leaves open the question of where the best place is to invest the difference. There are many important studies, however, that suggest investors perform far worse, on average, than the returns on market indices to which they aspire and which are used in enticing them to try the BTID strategy.[31]

Professor Robert C. Merton, in an insightful article written as the financial revolution's penchant to decompose all investments and offer the pieces separately to investors began to wane, observed that it was time for financial engineers to package financial instruments into forms that were more consumer-friendly products.[32] He elaborated further on this call to action in his Nobel Laureate address 4 years later.[33] Whether or not the whole life product meets this objective will depend on the consumer and the evolution of alternative products. ■

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David F. Babbel, PhD, is Professor at The Wharton School of the University of Pennsylvania, having previously served as a finance professor at UC Berkeley. He also is Director of Insurance Economics at Charles River Associates. His scholarly articles and books have won awards from finance, insurance, and actuarial associations. Prof. Babbel can be reached at Babbel@Wharton.UPenn.edu.

Oliver D. Hahl, PhD, is Assistant Professor, Tepper School of Business, Carnegie Mellon University. He received a PhD from the Sloan School of Management, MIT, an MBA from the Yale School of Management, and a BS from The Wharton School of the University of Pennsylvania. His research focuses on business strategy and behavioral economics. Prof. Hahl can be reached at OHahl@Andrew.CMU.edu.

(1) More recently, other forms of permanent life insurance have been developed, including variable life, endowment life, universal life, variable universal life, and others. Similarly, term life has evolved to include renewable term, term-to-65, convertible term, and so forth. The focus in this review will be on the traditional whole life and term insurance products, although others will be remarked on briefly.
(2) Dan M. McGill, *Life Insurance,* Richard D. Irwin, Inc., Revised Edition, 1967. Updated treatments of his analysis are available in *McGill's Life Insurance,* Edward E. Graves, Editor, The American College, Bryn Mawr, PA, 1994 and up through the 9th edition, 2013.

(3) New coverage at an advanced age, if available at all, is prohibitively expensive to obtain or comes with delays in the availability of full coverage and very limited coverage levels.
(4) These lapses are referred to by the industry as "shock lapses" and often induce over 50 percent of remaining policyowners to abandon their policies at that point, according to a recent and extensive study jointly sponsored by LIMRA and the Society of Actuaries, "U.S. Life Insurance Persistency," (2012).
(5) McGill 1967, endnote 2, pp. 33-34. This observation regarding the high cost of term life insurance was confirmed by David F. Babbel and Kim B. Staking, "A Capital Budgeting Analysis of Life Insurance in the United States: 1950-1979." *Journal of Finance* 38:1 (1983): 149-170. Over the 30-year period examined, and assuming 15-year holding periods, individual renewable 5-year term life had average net cost-benefit ratios, or markups per dollar of insurance coverage provided, as measured in expected present value terms, much larger than whole life contracts—on the order of three to four times higher. Of course, net cost-benefit ratios are only a partial measure of how much higher the term insurance protection cost was, because the additional values derived from many elements and options associated with the whole life policies were ignored in that study. Since the time of that study, however, individual term insurance has become much more competitively priced and the authors expect that the cost advantage that whole life has vs. term over periods of 20 years or longer has diminished a lot. (Interestingly, and as a side note, over that same time period the study also found that the true cost of participating whole life over 20-year periods was only about half as much as its nonparticipating counterpart, owing to the dividends of the former.)
(6) McGill 1967, endnote 2, pp. 39-40.
(7) McGill 1967, endnote 2, pp. 54-57.
(8) Menahem E. Yaari, "Uncertain Lifetime, Life Insurance, and the Theory of the Consumer," *Review of Economic Studies* 32, No. 2 (1965): 137-150; Nils H. Hakansson, "Optimal Investment and Consumption Strategies under Risk, an Uncertain Lifetime, and Insurance," *International Economic Review* 10, No. 3 (1969): 443-466.
(9) Scott F. Richard, "Optimal Consumption, Portfolio and Life Insurance Rules for an Uncertain Lived Individual in a Continuous Time Model." *Journal of Financial Economics* 2, No. 2 (1975): p. 188.
(10) Richard H. Thaler, "Mental Accounting Matters," *Journal of Behavioral Decision Making* 12, No. 3 (1999): 183–206.
(11) David I. Laibson, *Hyperbolic Discount Functions, Undersaving, and Savings Policy,* Working Paper (National Bureau of Economic Research, June 1996); accessed at: http://www.nber.org/papers/w5635.
(12) "U.S. Individual Life Insurance Persistency, A Joint Study Sponsored by the Society of Actuaries and LIMRA," Windsor, CT: 2012.
(13) For purposes of their report, "lapse" did not include terminated policies occasioned by death of the insured, but included termination for nonpayment of premium, insufficient cash value or full surrender of a policy, transfer to reduced paid-up or extended term status, and terminations for unknown reason. This was consistent with the definition of lapse applied to other LIMRA and the Society of Actuaries experience studies.
(14) In stating this, the authors do not intend to minimize the well-known problem associated with the widespread replacement of cash value policies and the significant loss of principal due to surrender charges that can remain substantial for many years, far beyond the one or 2 years typically required before whole life policies begin to build cash values.
(15) See endnote 4.
(16) Ironically, these lapses in term insurance occur most frequently just before the actuarial margins included in the term product pricing actually turn negative, which should make persistency more attractive to the policyowner. See Daniel Gottlieb and Kent Smetters, "Lapse-Based Insurance," Working paper, The Wharton School, University of Pennsylvania, 2013.
(17) Michael L. Smith, "The Life Insurance Policy as an Options Package," *Journal of Risk and Insurance* 49, No. 4 (1982): 583-601. This was not some obscure study; it has been cited by 63 other subsequent studies. It received two of the highest awards from the academic insurance profession: *The Journal of Risk and Insurance* Award for the best feature article appearing in 1982, and the 1992 Alpha Kappa Psi Foundation Spangler Award for the study that was judged to have the most enduring value over the previous 10-year period.
(18) *Ibid,* 583-584.
(19) An example of a whole life policy attribute that clearly will be evaluated differently by different consumers is the value of tax deferral. This value will be dependent upon the tax profile of the consumer. Another attribute of the term vs. whole life policies that will have differing importance to consumers is their terms of insurability/renewal. The value of this feature will depend upon health, life expectancy, inheritable physical capital, dependents, taxes, and needs at older ages.
(20) Smith (1982), endnote 17; p. 595, p. 597.
(21) Fechtel notes that "Cash value life insurance policies enable and/or require policyholders to pay premiums (deposit funds) annually for many years and have these ever increasing funds earn a guaranteed rate. While a cash value policy is often described as the bundling of a savings vehicle and a term insurance policy, a whole life or universal life policy is not just any savings vehicle, it is actually a guaranteed interest rate contract (GIC)." This observation seems to have escaped most previous researchers. See R. Brian Fechtel, "Bringing Real Clarity of Cash Value Life Insurance to the Marketplace," *Journal of Financial Planning* 25, No. 5 (September 2012): 50; and "The Importance of Understanding the Financial Strength and Operations of a Life Insurer: And The Many Impli-

cations Such Provides About Cash Value Life Insurance." Working Paper (November 2013).
(22) Smith (1982), endnote 17; p. 585.
(23) Michael L. Walden, "The Life Insurance Policy as an Options Package: An Empirical Investigation," *Journal of Risk and Insurance* 52, No. 1 (1985), 44-58.
(24) David F. Babbel and Eisaku Ohtsuka, "Aspects of Optimal Multiperiod Life Insurance." *Journal of Risk and Insurance* 56, No. 3 (1989), 460-481. Neither was this an obscure study, as it was voted Best Feature Article Award of 1989 by the academic American Risk and Insurance Association, has been noted in widely used sources such as *The Insurance Handbook,* and cited by other studies that extended and refined its models and methodologies. Two Nobel Laureates provided valuable assistance to the authors, one of whom (John Harsani) helped develop the models used in the analysis. Seven of the brightest luminaries in finance at that time made many helpful suggestions that were incorporated into the final model. Note that because whole life insurance cannot be replicated by a linear combination of term life and a saving plan, dominance cannot be demonstrated by allocating wealth in constant (static) proportions to term life and a savings program. Moreover, one cannot replicate the whole life contract even with a nonlinear combination of term life and a savings plan, meaning that dynamic trading cannot replicate the whole life contract either. These issues are subtle and technical, but are discussed widely in option pricing models. The upshot is that because the whole life contract cannot be replicated through static or dynamic trading replication attempts, the dominance of BTID cannot be established unless the ranges of outcomes for whole life and a combination of term life with saving are nonintersecting.
(25) The typical loadings were derived from 30 years of historical data, as given by Babbel and Staking (endnote 5) and later tested successfully in David F. Babbel, "The Price Elasticity of Demand for Life Insurance," *Journal of Finance* 40, No. 1 (March 1985): 225-239.
(26) Personal life insurance policy loan interest expenses are not deductible. Similarly, businesses cannot deduct interest on a debt incurred with respect to any life insurance, annuity, or endowment contract that covers any individual unless that individual is a key person. If the policy or contract covers a key person, it can deduct the interest on up to $50,000 of debt for that person.
(27) See, for example, R. Brian Fechtel, "New Perspectives on Age-Old Controversies about Buying Whole Life or Term and Investing the Difference," *Journal of Insurance Regulation* (Winter 2002); and Fechtel 2012, endnote 21. He pointed out some of the severe flaws in the typical BTID analyses that are conducted. For example, he noted that the comparisons are often done based on future values which "are based on the assumption of a homogeneous investment environment, that is, one where investment returns are a constant rate across all years and all products." He also noted that the BTID alternative typically grows without taking into account investment-related expenses, that it is assumed to grow tax deferred, and that a single tax rate is used. There is a plethora of other simplifying assumptions incorporated in the typical BTID analysis, including the absence of option valuation and the framing of the comparison in such a way that the considerable values produced by the whole life policy as time extends beyond the short periods of analysis are ignored.
(28) A monograph commissioned by the Society of Actuaries describes a framework wherein certain of these options can be valued, but we have yet to see it applied in any published BTID analyses. See David F. Babbel and Craig Merrill, *Valuation of Interest-Sensitive Financial Instruments,* Wiley Publishers, revised ed., 2000.
(29) R. Brian Fechtel 2012, endnote 21.
(30) David F. Babbel and Miguel Herce, "Stable Value Funds: Performance to Date." Wharton Financial Institutions Center Working Paper, January 2011 and *Retirement Income Journal* (March 2013).
(31) The number of such studies is legion. The annual Dalbar *Quantitative Analysis of Investor Behavior* surveys have shown for many years that in practice, investors typically earn little more than half of what the reference indices return. See also John C. Bogle, "The Relentless Rules of Humble Arithmetic." *Financial Analysts Journal* 61, No. 6 (November/December 2005): 22-35, which provides an even more pessimistic assessment; and Ilia D. Dichev, "What Are Stock Investors' Actual Historical Returns? Evidence from Dollar-Weighted Returns." *American Economic Review* 97, No. 1 (March 2007): 386-401.
(32) Robert C. Merton, "Thoughts on the Future: Theory and Practice in Investment Management." *Financial Analysts Journal* 59, No. 1 (January/February 2003): 17-23.
(33) Robert C. Merton, "Applications of Option-Pricing Theory: Twenty-Five Years Later." Nobel Lecture, December 9, 1997.