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Abstract

Universal/variable life insurance combines the tax advantages of cash value life insurance with investment in money market, bond or equity funds. Despite expense loadings on universal/variable life policies, this tax treatment often generates a greater after tax return for these policies than similar alternative investment strategies. This paper provides a method for calculating relative after tax proceeds as a lump sum or periodic payments for universal/variable life and comparable alternative investment strategies. In general, universal/variable life insurance policies must be kept in force for at least seven years before providing a greater return than comparable investment strategies.

Introduction

Universal life insurance, introduced in 1979, and universal/variable (also known as flexible premium variable) life insurance, approved by the Securities and Exchange Commission in November, 1984, provide the tax sheltered treatment of investment earnings inherent in cash value life insurance policies with the insured retaining the investment risk. In both policies the investment medium is similar to that offered to non-insurance purchasers. In universal life policies, the cash value is invested in a floating rate fund similar to a money market fund; for universal/variable life insurance policies, the cash value can be invested in any of a variety of alternatives generally including stock market, long term bond and money market funds.

The typical universal life policy includes an expense loading, either flat rate or as a percentage of premiums, and an insurance charge based on the insured's mortality risk, with the remainder invested in a cash value account that earns a floating rate of interest. Some universal life policies include surrender changes, either in lieu of or in addition to, front end loads. The surrender changes reduce over time to encourage policy retention. Premiums for all universal life policies are not predetermined; within fairly wide limits the insured has flexibility in the amount of premiums paid. Since the insured retains the investment risk, changes in short term interest rates, in theory, directly affect the return on the policy's cash value. In practice, some universal life insurers invest the proceeds in longer term assets and credit the policy with the coupon rates of return achieved, rather than the total rate of return which

would include gains or losses on investments. This is an attractive competitive strategy while interest rates are falling, but would generate an uncompetitive, from the interest rate standpoint, product when interest rates rise. Death benefits on universal life policies generally equal the initial face value of the policy plus any cash value, although some policies provide only the initial face value as the death benefit. Policyholders can borrow funds from universal life insurance policies as from traditional cash value life insurance. The loans are not considered taxable income. However, interest paid on policy loans for universal life insurance is not an allowable tax deduction. Due to the indeterminate nature of universal life insurance premiums, the requirement that four of the first seven premiums be paid in full cannot be met [12].

In addition to transferring investment risk to policyholders, universal life insurance also requires the policyholder to assume the risk of shifts in mortality rates. The mortality charges are priced in a similar fashion to indeterminate premium annual renewable term insurance, with a current, nonguaranteed, rate structure subject to guaranteed maximums. If mortality improves, the mortality charges can be, but are not required to be, lowered. The current mortality charges can be raised if mortality experience worsens or for other reasons. For example, rather than lowering the highly visible interest rate on an universal life insurance policy, an insurer could raise the mortality charges, which are less noticeable and more difficult to compare.

A number of other differences exist on universal life insurance among companies. Some insurers credit the current interest rate on

the entire unborrowed cash value, whereas others pay that rate only on balances in excess of stipulated levels. The rate of return credited on policies is based on an external index for some insureres, based on portfolio performance for others and set by the Board of Directors in some companies. For some universal life insurance polices, the interest rate charged on loans is predetermined and cash value that is collateral for such loans earns a predetermined, but lower, rate. On other policies the loan rate fluctuates above, but in line with, the credited interest rate. All universal life insurance policies include guaranteed minimum interest rates that vary from 3 to 6 percent.

Universal/variable life insurance policies are similar in structure to universal life with a wider array of investment options and no minimum guaranteed rate of return. They differ from variable life policies considerably, notably in the discretionary premium levels, the distinct expense loadings, and the term insurance rate structure for the mortality risk. All investment choices, equity funds, bond funds, and specialized investment pools, are similar to investments generally available to the public outside of a life insurance policy, although competing investments do not have the same tax treatment. Unlike standard insurance accounting that uses amortized, rather than market, values and coupon, rather than total, rates of return, the performance of the investment funds associated with universal/variable life insurance is consistent with other investment funds. As universal/variable life insurance encompasses the basic features of universal life, with additional investment options, the term universal/variable will be used to apply to both policy types.

The tax advantage of life insurance policies becomes increasingly important the longer the policy is kept in force. Taxes on investment earnings are deferred until the cash value is withdrawn. If the policy is surrendered for the cash value, only the excess of cash value over all premiums paid is taxable; investment earnings that are offset by expense loadings and insurance costs are never taxed. If the cash value is paid as part of the death benefit, no income tax is payable on any investment earnings accrued prior to death. Since the tax advantage of life insurance policies increases with the holding period of the policy, there is often a specific holding period after which investment in the universal/ variable life insurance policy dominates an alternative unbundled investment strategy without the life insurance tax advantage. Policies held for shorter periods of time underperform alternative investments, primarily due to the expense loading inherent in the life insurance policies. In this paper universal/variable life insurance is compared with a number of alternative strategies. The alternative investment strategies involve purchasing term insurance and investing the difference in money market funds, bond funds, equity funds, deep discount bonds, deferred annuities, municipal bonds, or through an individual retirement account in a money market, bond or equity fund. The specific tax advantages of each investment option are explained and included in the analysis to determine the optimal investment strategy based on the values of the parameters and the holding period.

Literature Review

Prior to the development of life insurance policies that left the investment risk with the insured, analysis of life insurance purchase

decisions and competing investment alternatives (buy term and invest the difference) compared an interest rate guarantee against a hypothetical investment return [4, 8, 14, 15 pp. 135-45, 17, and 19]. Variations on investment rates of return affected one side of the equation only. More recently, Myers and Pritchett [18] examined the rate of return over 20 years on differential premiums between those paid on participating and nonparticipating policies for policies issued in 1959. The achieved rate of return depended heavily on the length of time the policy was kept in force. For policies kept in force for the full 20 year period, returns exceeded those available on competing investments.

Another study comparing investment options between a tax advantaged insurance product, in this case an annuity, and alternative investments was performed by Adelman and Dorfman [1]. Although this study ignored capital gains treatment of equity investment alternatives, the effect of different tax levels was measured. Again the holding period proved to be an important factor in evaluating the more advantageous investment.

Warshawsky analyzes the impact of the 1959 Life Insurance Company Income Tax Act on the after tax rate of return on investments for life insurers and finds that higher interest rates increased the differential between life insurance savings and alternative savings vehicles [26]. For the period 1977-1981, life insurance policies yielded a rate of return 2.0 percentage points below comparable long term bond investments. In 1982 the Tax Equity and Fiscal Responsibility Act temporarily revised the life insurance company taxation formula to reduce this differential. In 1984 the Tax Reform Act included a major

overhaul of the taxation of life insurers to return the tax calculation to a total income base, as opposed to separating underwriting and investment income [7].

This analysis of life insurance purchase decisions for universal/variable life includes the same rate of return forecast on both the life insurance policy and the competing investment alternative. As Belth [3] notes, rates of return on the savings component of universal life insurance differ depending on whether expense loadings are treated as a protection element or a savings element. If the expense loading is regarded as a savings element, the rate of return may be negative, whereas if the expense loading is allocated to the protection element of the policy, the rate of return could be quite high relative to alternative investments. The proper procedure in this calculation is to attribute a portion of the expense loading, in line with competitive values, to the protection element with the remainder allocated to the savings element.

Investment Value Determination

The after tax surrender value of an investment in a universal/variable life insurance policy that has a death benefit equal to the initial face value plus the cash value can be determined as follows:

$$
\text{(1)} \qquad UVL = \begin{cases} (1-S_n) \sum_{i=1}^{n} ((1-e_i)P_i - g \cdot F \cdot C_{x+i-1})(1+r+d)^{n-i+1} & \text{if } UVL \leq \sum_{i=1}^{n} P_i \\ (1-t_{x+n})\left[(1-S_n) \sum_{i=1}^{n} ((1-e_i)P_i - g \cdot F \cdot C_{x+i-1})\,(1+r+d)^{n-i+1} - \sum_{i=1}^{n} P_i\right] + \sum_{i=1}^{n} P_i & \text{otherwise} \end{cases}
$$

where P_i = premium paid in year i

n = number of years the policy is kept in force (holding period)

S_n = surrender charge at the end of the holding period

e_i = front end expense loading (as percentage of premium) in year i

g = index of competitiveness of term insurance through universal life policy

F = face value of the policy in thousands

C_x = cost of term insurance for policyholder age x per $1000 of coverage

r = annual net rate of return for comparable investment fund

d = differential between policy interest rate and comparable investment fund rate

t_x = marginal tax rate for policyholder at age x[1]

The amount invested in the cash value each year is the premium less an expense loading, and less the cost of insurance. The cash value earns a rate of return, r+d, that tracks below, at or above, comparable investment rates of return. This rate reflects the net rate of return credited on the cash value, which is not the same as the gross rate of return, ignoring expense loadings, cited by some insurers. The investment earnings are not taxed until the policy is surrendered. The investment value may be reduced by a surrender charge, which is a portion of the total cash value at surrender. If, at that time, the withdrawal value does not exceed the total premiums paid, no income tax liability exists. If the withdrawal value does exceed the premiums paid, the excess is taxed at the insured's current marginal tax rate.

One alternative investment strategy that is comparable to investing the cash value at money market fund rates, is a strategy of buying term

insurance and investing the remaining sum in a money market fund. The value of this investment would be:

$$(2) \qquad BTID_{MMF} = \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1})(1 + (1-t_{x+i-1})r)^{n-i+1}$$

The investment proceeds are taxed each year under this alternative, reducing the current yield. No expense loading is deducted from the amount to be invested as money market funds are no load funds. The cost of insurance is simply the lowest priced coverage available in a renewable term policy. Note that this can be higher than, equal to or lower than the rate charged in the universal life policy depending on whether, g, the index of competitiveness of the insurance costs through the universal life policy, is less than, equal to, or greater than one. The rate of return is simply the standard money market fund rate. This same calculation would apply if the alternative investment were in par value long term bonds under which all of the return is interest income. The rate of return, r, would likely be higher than for the short term rate, but the tax consequences would be the same.

Another alternative investment strategy would be to buy term insurance and invest the remaining sum in tax free municipal bonds either short or long term. The value of this investment would be:

$$(3) \qquad BTID_{MB} = \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1})(1+m \cdot r)^{n-i+1}$$

where m = ratio of municipal bond yields to taxable bond yields for similar maturities

No taxes are involved in this determination and no expense loadings if a no load fund is selected. However, municipal bonds

yield less than similar taxable investments in light of this tax advantage.

A third alternative investment strategy would be to invest the difference, after purchasing term insurance, in a deferred annuity. The value of this investment would be:

$$= B(1-SA_n) \sum_{i=1}^{n} (1-ea_i)(P_i - F \cdot C_{x+i-1})(1+r)^{n-i+1}$$

$$\text{if } BTID_{DA} < \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1})$$

(4) $$BTID_{DA}$$

$$= (1-t_{x+n})[B(1-SA_n) \sum_{i=1}^{n} (1-ea_i)(P_i - F \cdot C_{x+i-1})(1+r)^{n-i+1}$$

$$- \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1})] + \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1}) \quad \text{otherwise}$$

where B = .95 if $n < 5$ and $x+n < 60$
1.00 otherwise

SA_n = surrender charge at withdrawal on the deferred annuity

ea_i = front end expense loading at year i on the deferred annuity

The tax treatment of deferred annuities is somewhat similar to that of a universal/variable life insurance policy. If the withdrawal value does not exceed the total premiums paid, (total investment less term insurance costs), no income taxes are owed. Otherwise the excess is taxed at the policyholder's current tax rate. However, a penalty of 5 percent of the total amount withdrawn is applied unless the annuity has been in force for five years, the policyholder is 59 1/2 or older, disabled or deceased.

A fourth alternative would be to invest the remaining sum in deep discount bonds. These bonds pay a coupon rate below current interest rates for similar investments and therefore sell at a discount from

face value. The interest income is fully taxable, but the amortization of the discount is not taxed until the bond is sold or matures, at which time long term capital gains rates apply if the bond has been held for more than six months. The value of this investment would be:

$$(5) \qquad BTID_{DDB} = \sum_{i=1}^{n}(P_i - F \cdot C_{x+i-1})[(1+r_1(1-t_{x+i-1}) + r_2)^{n-i+1} - .4t_{x+n}$$
$$((1+r_1(1-t_{x+i-1}) + r_2)^{n-i+1} - (1 + r_1(1-t_{x+i-1}))^{n-i+1})]$$

where r_1 = current yield

r_2 = amortization of discount

The tax advantage of the capital gains treatment of the amortization of the discount has served to maintain the market value of low yield bonds such that $r_1 + r_2 < r$ for similar investments.

A final alternative investment strategy comparable to a fixed income investment allocation in a universal/variable life insurance policy is to invest the difference, after purchasing term insurance, in an Individual Retirement Account (IRA) or other similar salary reduction plan.[2] Investments made in such plans are deducted from gross income and investment income is tax deferred. When money is withdrawn from the IRA, it is taxed in its entirety at the individual's then current income tax rate. Withdrawals prior to age 59½ are also subject to a 10 percent tax penalty unless occurring as the result of the death or disability of the owner of the account. The maximum annual contribution to an IRA is the lesser of 100 percent of earned income or $2000. The after tax withdrawal value of an IRA is:

$$(6) \qquad BTID_{IRA} = (1-t_{x+n}-H) \sum_{i=1}^{n} Min[\frac{P_i - F \cdot C_{x+i-1}}{1-t_{x+i-1}}, 2000](1+r)^{n-i+1}$$

$$+ \sum_{i=1}^{n} Max[0,(\frac{P_i - F \cdot C_{x+i-1}}{1-t_{x+i-1}} - 2000)(1-t_{x+i-1})](1+(1-t_{x+i-1})r)^{n-i+1}$$

where $H = .1$ if $x+n < 60$
0 otherwise

The amount invested in the IRA is larger than simply the difference between what would have been invested in a universal/variable life insurance policy and the cost of term insurance as a result of the tax deductibility of IRA investments. Any amount invested in an IRA reduces taxes by t_{x+i-1} times the investment. This tax savings would then be available to increase the investment in the IRA. Thus, the amount $(P_i - F \cdot C_{x+i-1})$ is divided by $(1-t_{x+i-1})$ to determine the total amount available to invest in an IRA that would be equivalent to an investment of $(P_i - F \cdot C_{x+i-1})$ in a non deductible investment. However, the maximum allowable IRA investment is $2000, so additional amounts are not tax sheltered.

The same analysis can be performed assuming the policyholder elects investment in equity funds, which have different tax treatment from fixed income funds. In a stock market fund realized short term capital gains are taxed currently at ordinary income tax rates. Realized long term capital gains are taxed currently, but only 40 percent of the gain is taxable. Dividends are taxed currently at ordinary income tax rates with a $100 per taxpayer exclusion for dividends of domestic corporations. Unrealized gains are not taxed until shares of the fund are sold; any gains thus realized may be subject to long term capital

gains treatment depending on the holding period. For equity gains in a universal/variable life insurance policy or an IRA, no long term capital gains treatment applies; taxes are deferred, but taxable income is taxed at ordinary income rates regardless of the holding period.

The alternative stock fund investment strategy includes tax advantages not found in a money market fund or fixed income investment. The value of this alternative is:

$$(7) \qquad BTID_S = \sum_{i=1}^{n} (P_i - F \cdot C_{x+i-1})[(Q_1+Q_2)^{n-i+1} - .4t_{x+n}((Q_1+Q_2)^{n-i+1} - Q_1^{n-i+1})]$$

where $Q_1 = 1 + sr(1-t_{x+i-1}) + \ell r(1-.4t_{x+i-1})$

$Q_2 = (1-s-\ell)r$

s = proportion of r produced by realized short term capital gains and dividends

ℓ = proportion of r produced by realized long term capital gains

If the stock mutual fund did not generate any realized short or long term capital gains or dividends, no taxes would be payable until the shares were sold. If realized gains or dividends were generated, the investor has the option of reinvesting those amounts or receiving them in a cash distribution. Since the taxes owed would always be less than the cash distribution, the investor can pay the taxes out of the distribution and reinvest the remainder back in the stock fund. Thus, the basis in the fund would reduce only by any taxes paid and the investor would not retain any excess cash. Under this procedure, no shares would have to be sold to pay taxes. This situation is preferred

because any sale of shares would involve capital gains taxes on any unrealized (by the fund) gains, which would result in additional taxes payable.

Universal/variable life insurance contains an additional tax advantage not included in this holding period analysis. If the investor dies, all of the proceeds received as a death benefit, if paid to the beneficiary in a lump sum, are free from income taxation. Proceeds paid to a beneficiary from an IRA account are taxable income. The tax treatment of proceeds from a deep discount bond or stock fund are more complex. The beneficiary's basis for tax purposes is increased from the owner's basis to the market value at death. Thus, any unrealized appreciation of these funds prior to the death of the investor would not be taxed.

Life insurance comparisons are normally event specific. The situations compared in this research involve keeping a policy in force for a specified holding period and then withdrawing the proceeds either in a lump sum (prior to retirement) or as periodic payments (after retirement). Comparisons based on the policyholder's assumed demise at specific times would yield different results, although are more speculative than the holding period comparisons illustrated herein. Since the additional tax advantage based on the death of the policyholder is in favor of universal/variable life insurance, this analysis serves as a conservative comparison of the benefits of this investment strategy.

Categories of Investment Alternatives

Any comparison of projected investment results must limit the investment alternatives to those with similar risk characteristics. It would not be realistic to compare returns on an 8 percent short term government security with a projected 20 percent illiquid and speculative real estate investment. The higher return on the real estate investment results from greater risk, lower liquidity, and longer required holding period. In this study three types of investment alternatives are examined: short term money market accounts, intermediate to long term bonds and equity funds. Short term money market accounts generally maintain an average maturity of 40 to 90 days and provide a rate of return that fluctuates frequently in line with changes in short term interest rates. Although the principal is not guaranteed in many such accounts, the short maturities tend to minimize this risk. An individual can invest in short term money market accounts through many universal/variable life insurance policies, bank accounts, money market funds and short term municipal bond funds. These types of investments are generally considered to be the least risky investments and consequently provide the lowest rates of return.

Intermediate to long term bond funds invest in longer term fixed income investments and generally have an average maturity of five to fifteen years. Interest rates on these investments are usually higher than short term investments, although at times the yield curve is inverted so long term rates are lower than short term rates. One reason that long term rates are usually higher than short term rates is that if interest rates were to rise then the value of outstanding

bonds would fall, generating a loss of principal. The higher rate of return on longer term issues compensates the investor for assuming this additional risk. An individual can invest in longer term fixed income issues through some universal/variable life insurance policies, bank certificates of deposit, bond mutual funds, deferred annuities, deep discount bonds, and municipal bond funds. For the purposes of this research, it is assumed that no load deep discount bond funds exist; no load municipal bond funds and taxable bond funds do exist.

Investment in common stock is considered to be even riskier than long term bonds. Stock prices fluctuate constantly with no guaranteed rate of return over any particular holding period. Dividends, unlike interest payments, can be altered by the company's Board of Directors. Over long periods of time the average return produced by equity investments exceeds long term bond returns. However, over shorter periods stock averages, and even over longer periods individual stocks, have underperformed bond investments. Investors can participate in equity investments through universal/variable life insurance policies, purchasing individual common stocks or investing in stock mutual funds, many of which have no expense loads.

Parameter Values

The objective of this research project is to determine if universal/variable life insurance policies dominate similar investment strategies in money market, fixed income and equity funds outside of life insurance policies for the range of parameters available. The values of the parameters used to evaluate a universal/variable life insurance

policy vary significantly depending upon the potential policyholder and the specific policy. Standard values are determined that represent the typical universal/variable life insurance policy contract. These standard values are used to compare universal/variable life with other investment opportunities. However, many of these parameters change over time, across insurers or among policyholders. The rapidity and importance of such changes is noted by Heath and Wittemore [9]. The parameters can be varied through use of the personal computer program developed for this research. Determination of the standard values are discussed in this section.

The rate of return, r, used in this analysis is the money market or fixed income interest rate or the equity fund total rate of return. This value indicates the rate payable on a competing investment alternative; it could be considered either the average rate paid by money market, fixed income or equity funds, or the rate paid by a particular fund. The relevant rate of return is that experienced after the investment choice, universal/variable life or buy term, is made. Thus, it is a forecasted value, not a historical value, that indicates the preferred investment. As such, a range of values of r should be examined by a potential policyholder. Prior to the mid-1970s, interest rates were both lower and more stable than since that time [10]. Neither money market funds nor universal/variable life insurance would have been viable financial instruments for individual investors prior to the mid-1970s. The actual rates of return achieved on short term government bills, long term corporate bonds and equities from 1976 through 1985 are summarized in the Appendix. Based on these data, the standard rate of

return is 9 percent for money market investments, 11.5 percent for bond investments, and 14 percent for equity investments. However, money market fund returns and other interest rates have fallen in recent years. The current (June, 1986) average return on money market funds is 6.5 percent [20]. To illustrate the effect of low interest rates on universal/variable life insurance, a separate run of the money market investment selection using a 6.5 percent rate of return is also included.

The tax rate, t, is the individual's marginal tax rate each year under the buy term strategy or when the cash value is withdrawn under the life insurance strategies. The tax rate can vary during the pre-retirement period after which it is reduced to a constant level. The variety of potential patterns of changes in tax rates over time requires flexibility in setting the tax rate assumptions. In this analysis, the individual is initally in the 28 percent tax bracket, and climbs one tax bracket (married, filing jointly) each five years until reaching the 45 percent level at age 55. The tax rate is then held constant until retirement, after which it reduces to 33 percent. Any other pattern of tax rates could be input.

Expense loadings on universal/variable life insurance policies take a variety of forms, including a flat fee per policy, a charge based on the amount of coverage, a percentage of the investment, or a combination of these charges. In some cases expense loadings are constant over the life of the contract whereas other policies reduce expenses after the first year [25]. In this analysis for the front loaded policy the

expense loading, e_i, is determined as a percentage of annual investments [see Appendix]. For the standard value the initial expense rate is set at 15 percent with the renewal expense rate 7.5 percent.

Some universal/variable life insurance policies include surrender charges that reduce the policyholder's cash value if it is withdrawn prior to a stipulated holding period. Based on an analysis of information on 131 insurer's policies, 31 percent had no surrender charges, 3 percent had surrender charges for the first year only, 18 percent included charges for the first five years, 28 percent for the first ten years, 15 percent for fifteen years and 5 percent for twenty years [25]. The average surrender charges were 53.1 for the first year, 9.6 percent in the fifth year and 1.8 percent in the tenth year [see Appendix]. For the back loaded policy, the standard surrender value is a declining function of the holding period starting at 50.0 percent in year one and reducing by 10.0 percentage points per year until year 5, and then reducing by 1.6 percent per year. Thus, the surrender charge is 10.0 percent for the fifth year and 2.0 percent for the tenth year. No surrender charge applies after the tenth year.

The interest rate differential, d, indicates how the interest rate credited on the universal/variable life policy compares with rates of return available on comparable investments. Some universal life insurance policies have an interest rate that is tied to an external interest rate level, such as 90 day Treasury bills. Other insurers base the interest rate on how their own investment portfolio performs, providing either portfolio rates, new money rates, or investment year rates. A final group determine the interest rate based on a company

decision that is not tied directly to any performance results. Based on 126 universal life insurers for which the interest rate determination was disclosed, 12 percent relied on an external index, 79 percent used a company yield value, and 9 percent determined the rate independent of any performance guide [25]. For company decision cases the policyholder has no guarantee that the insurer will not alter past patterns of interest levels, but any change would affect all policyholders. For universal/variable life insurance policies the rate of return earned on cash values is not controllable by the insurer, but depends on short term, bond or equity investment performance. Administrative expenses, taxation of life insurers and investment policy may generate a differential between the return earned by the insurance fund and other public funds with similar risk characteristics. After these policies have established a track record, investment performance could be analyzed to project a differential value. Given the current lack of an investment record for universal/variable life insurance funds, expense loadings could be compared to project a difference. The differential is in percentage point terms and represents the difference between the universal/variable life rate of return and the comparable fund rate of return. The standard value for the differential is zero. At the end of 1984, universal life insurers were crediting an interest rate approximately 1.5 percentage points above short term interest rates [25], reflecting the lag effect in changing credited interest rates and a reluctance to lower this key value. Over any lenthy period, this differential should be zero or slightly negative.

Portfolio turnover also affects the relative attractiveness of investment in a universal/variable life insurance policy. Any gains realized by the investment fund in this policy are tax deferred until the policy is surrendered and then taxed at ordinary income rates to the extent cash value exceeds premiums paid. In the competing equity investment, short term capital gains are taxed currently at ordinary income tax rates, dividends are taxed currently at ordinary income tax rates and 40 percent of the long term capital gains are taxed currently at ordinary income tax rates. Stock funds have a wide range of portfolio turnover rates. A sample of funds examined indicated values of 20 percent to in excess of 200 percent. Higher turnover and dividend yield increases the current taxation on the competing investment strategy and improves the position of universal/variable life.

For this analysis, the standard rate of return on stock investments is 14 percent. The standard values used in this analysis are .50 for s, the proportion of r produced by realized short term capital gains and dividends, and .30 for ℓ, the proportion of r produced by realized long term capital gains. The remaining proportion of r is deferred until the mutual fund is sold.

The available capital per year, P, is the amount the policyholder wants to invest in either an insurance policy or the buy term and invest the difference strategy. One advantage of the new life insurance policies is the flexibility the policyholder has with regard to premium payments. Within fairly large limits the policyholder can select any investment level and alter the amount at will. Generally

the minimum allowed investment is the amount necessary to cover mortality costs, although some policies allow no payment if the cash value is large enough so that mortality costs can be paid by a reduction in cash value. The maximum contribution level is determined by the 1982 Tax Equity and Fiscal Responsibility Act that restricts the cash value to an age based percentage of the death benefit. For a policyholder age 40 or less, the death benefit must equal or exceed 140 percent of the cash value in a universal life policy; for insureds over 40, the percentage reduces by one percentage point each year until age 75. Insureds age 75 or over must have a death benefit at least 105 percent of the cash value [6]. For this analysis annual investment levels are assumed constant throughout the policy term. The standard premium level is $1000. In 1984, the average universal life insurance premium was $978 [13].

The face value of the life insurance policy, F, is the amount of coverage initially purchased. This analysis follows the standard practice of determining the death benefit by summing the policy face and the cash value. Thus, the mortality cost is based on a constant amount of coverage. The standard face value is $100,000. The average value for universal life policies in 1984 was $82,000 [13].

The initial age of the policyholder, x, is used to determine the mortality cost in the life policy and the cost of term insurance in the buy term strategy. Term insurance rates are calculated based on the average current rates quoted by the seven largest universal/variable life insurance writers [25], which equaled almost exactly the average

rate quoted by 62 insurers writing indeterminate premium annual renewable term insurance [11]. The standard value for the policyholder's initial age is 35.

The relative rate of return on tax free municipal bonds versus similar taxable issues varies over time and across maturities. From the end of 1985 through mid-1986, tax free money market funds were yielding on average 63 to 67 percent of taxable fund returns and long term municipals were yielding approximately 83 percent of comparable maturity industrial bonds [16, 20, 24]. Uncertainty over tax revision plans and the rapid drop in long term interest rates over this period, which tends to affect Federal issues first, then corporates, and finally municipal bonds due to relative trading frequency may have increased the recent ratio temporarily. The standard value of the relationship m used in this study is .65.

Each deep discount bond has its own maturity date, coupon and discount from face value. To the authors' knowledge, no mutual fund specializes in deep discount bond investments although no practical reason prevents this specialization. Without no load mutual funds providing this investment medium, an individual investor would have to make individual purchases of bonds incurring significant transaction costs. For the purposes of this study it is assumed that a no load fund investing in deep discount bonds exists. It is also assumed that the current yield rate, r_1, is one half the comparable investment rate of return, r, and appreciation, r_2, is 40 percent of r. The total return on the deep discount bond fund is less than comparable investments as a result of the favorable tax treatment accorded this medium.

The deferred annuity contains its own expense loading and surrender charge scale. Deferred annuities differ as widely as universal/variable life insurance policies in regard to interest rates, expense loadings and surrender charges. To simplify the comparison, typical values were selected for the deferred annuity option. The interest rate is the same as available on taxable bonds; the expense loading is 10 percent of all premiums; the surrender charge starts at 100 percent and declines linearly to zero after eleven years.

Prior to making the decision of whether to buy a universal/variable life insurance policy or to buy term insurance and invest the difference in a money market, bond or stock fund, the prospective policyholder would know the face value of the policy desired (F) and his or her age (x) and current tax rate (t). These values do not depend on the insurer or the policy. Also, for each life insurance policy considered, the individual can determine the expense loadings (e_i) and surrender charges (S_n), how the rates compare with basic term insurance rates (g), and any differential between similar investments and the interest rates credited for the policy (d). The decisionmaker must estimate future tax rates (t) and rates of return (r), the tax classification for earnings in comparable stock funds under the equity investment option (s and ℓ), the tax free municipal bond interest rate relativity (m), the deep discount bond rate factors (r_1 and r_2) and the expense components of any deferred annuities (SA_n and ea_i) and decide the amount to invest (P).

Comparison of Investment Results

Two universal/variable life insurance policies are compared with alternative investment choices. The first policy (UVLF) is a front loaded universal/variable life policy with no surrender charges. The second policy (UVLB) is a back loaded policy that has surrender charges but no premium loadings. These two policy types represent the extremes of expense loadings. Many insurers combine front loadings with surrender charges. Any combination of expense loadings can be input into the program, but these two examples were chosen to demonstrate the effect of different expense factors.

The after tax surrender values for holding periods of one to thirty years are shown. If the taxable income produced by surrendering a policy or terminating an investment is less than $25,000, the individual's current tax rate is applied in this comparison. However, large amounts of taxable income in one year could force a taxpayer into a higher tax bracket. The actual tax rate applied to a liquidation in this case would depend on the taxpayer's relative position within a tax bracket and the amount of taxable income generated by the liquidation. In this program, amounts of taxable income generated by terminating a policy or other investment in excess of $25,000 are taxed at a rate halfway between the current tax rate, t_{x+n} and the maximum tax bracket 50 percent (i.e., $\frac{t_{x+n} + .50}{2}$).

An alternative to a lump sum withdrawal from an insurance policy or other investment is the selection of periodic payments. A stream of payments often meets the financial needs of an older individual more

closely than one large payment. For IRAs and deferred annuities, the tax consequences of periodic payments are more favorable than lump sum payments as the income is taxed only when it is received. For holding periods of 30 years or longer, after tax periodic payments derived from the accumulated values of the individual investments are displayed. The terminal surrender value of the particular investment is taxed, if applicable, and then used to purchase an individual life annuity with no period certain.[3] The after tax portion of the annuity payments are displayed.

Annuties are taxed in such a way that the expected value of the return of the investor's basis is tax free with the remainder of the periodic payment taxed as ordinary income. The untaxed portion of each payment, termed the exclusion ratio, is determined by dividing the basis by the product of the annual payment times the insured's life expectancy based on Internal Revenue Service Mortality Tables. For IRAs the basis is zero, since all contributions represent untaxed income. The basis on the deferred annuity is the sum of the annual investments less the cost of life insurance each year. The basis for annuitized universal/variable life insurance policies, money market, bond, municipal bond, deep discount bond or stock investments is the after tax lump sum values, as these investments have to be terminated, and taxed, prior to purchasing an annuity.

Many universal life insurance policies provide policy loan provisions that can be used to avoid taxation on both the accumulated cash value and the periodic payments. The proceeds on a life insurance policy cannot be annuitized without tax consequences. However, the cash value could

be borrowed over the insured's expected lifetime wihtout being taxed. When the insured dies, the policy proceeds are tax free and the outstanding loan is deducted from the death benefits. In order to qualify for this favorable tax treatment, the insured must keep the policy in force and continue to pay (via deductions from the cash value) mortality charges. Policy loan provisions vary among insurers. To compare the financial consequences of the policy loan option, the results of borrowing the maximum annual amount based on one major writer's loan provisions such that the accumulated loan at interest does not exceed the cash value over the insured's life expectancy when the policy would otherwise have been terminated are displayed.

If the individual investor decides to invest in short term money market accounts, then the relevant investment alternatives are universal/variable life insurance or buying term insurance and investing the difference in a money market fund, short term municipal bond fund or through an IRA in a money market fund. The after tax surrender values for the various investment alternatives are displayed in Table 1 for the standard parameter values. The values listed in each row represent the amount that the individual would receive after taxes if the account were completely withdrawn within the first 30 years (by age 65) or annuitized thereafter. Each column represents an alternative investment strategy. Figure 1A illustrates lump sum surrender values from Table 1, and Figure 1B illustrates the periodic payment values.

Insert Table 1 here

For an individual who holds the investment for only one year, investing $1000 in a front loaded universal/variable life insurance policy at the beginning of the year returns $751 at the end of the year plus the value of the protection during the year. For a back loaded policy, the amount available to be withdrawn after one year is $457. For a holding period of only one year the optimal strategy is to buy term insurance and invest the difference in a money market fund, which would return $893, plus the value of the protection during the year. Buying term insurance and investing the difference in a municipal bond fund produces almost as high a terminal value. The penalty tax on premature IRA withdrawals significantly reduces the terminal value of this option, although it is still higher than the universal/variable life alternatives initially.

Buying term insurance and investing in a money market fund remains the optimal investment strategy for the first six years. For holding periods longer than six years, buying a back loaded universal/variable life insurance policy is the optimal investment strategy. After the tax penalty on premature withdrawals is removed, in year 25 for this example, the IRA alternative becomes the most attractive investment.

For years 30 through 35, the after tax values of annuitizing the investments into a life income, no refund, are displayed. For the universal/variable life insurance policies, the policy must be surrendered, which is a taxable event, and then the after tax proceeds used to purchase a life annuity. The money market fund, which has been taxed annually, and the municipal bond fund, can be annuitized without being subject to tax on withdrawal, although a portion of each annuity payment is taxable. The IRA can be annuitized without any tax on

the conversion, but the entire periodic payment received is taxable This tax advantage results in the largest stream of income being derived from the IRA alternative. Thus if these parameters represent the proper values, an individual should buy term insurance and invest the remainder in a money market fund if the desired holding period were six years or less, purchase a back loaded universal/variable life insurance policy if the holding period is seven through twenty-four years, or through an IRA in a money market fund if the holding period were 25 years or more.

However, if an individual is already putting the maximum allowable amounts into an IRA, or comparable tax sheltered investment such as 401-k or 403(b), then this investment option does not exist for additional investment dollars. In that case, the back loaded universal/variable life insurance policy is the optimal investment strategy for holding periods of seven years or more. The reasons the universal/variable life insurance policy produces a higher terminal value than the alternative investments are tax deferral on investment income and the tax free status of investment income equal to the mortality costs and expense loadings. The strategy of liquidating the cash value over the insured's life expectancy at the time the policy would have been terminated based on the loan provisions of one major insurer is shown for the two universal/variable life insurance policies.[4] For the illustrated values the loan option does not provide as high an income stream as terminating the policies and purchasing annuities except for holding periods of 34 or 35 years under the

back loaded universal/variable life policy. However, even this strategy does not dominate the IRA alternative.

Although short term interest rates have averaged about 9 percent over the last decade, by mid-1986 they had fallen to approximately 6.5 percent. To illustrate the effect of lower interest rates on the investment alternatives, the program was rerun using all of the same parameter values except lowering the interest rate to 6.5 percent. The results of this run are listed in Table 2 and displayed on Figures 2A and 2B. The relationships among the investment alternatives remain similar with the money market fund representing the optimal investment for the first six years, then the back loaded universal/variable life insurance policy until year 29, after which the IRA investment dominates. The only difference involves the policy loan options. The lower accumulated values that resulted from the reduced interest rate prevent the loan options from producing a higher income stream than terminating the policies and purchasing annuities since the mortality costs represent a larger proportion of the accumulated investment.

Insert Table 2 here

If the individual investor is willing to accept the risk of investing in longer term bonds, additional investment alternatives exist and a higher rate of return is likely. The investment alternatives include a front loaded or back loaded universal/variable life insurance policy with the cash value invested in bonds or buying term insurance and investing the difference in a bond fund, deep discount bonds, a deferred annuity, long term municipal bonds, or through an IRA in a

bond fund. The after tax surrender values for the various investment alternatives are listed in Table 3 and displayed in Figures 3A and 3B for the standard parameter values, including a rate of return of 11.5 percent.

Insert Table 3 here

For a holding period of six years or less, the optimal investment is to buy term insurance and invest the difference in a bond fund. For holding periods of seven to nineteen years, buying a back loaded universal/variable life insurance policy would be optimal. For holding periods of 20 years or longer, buying term insurance and investing the difference in a bond fund through an IRA would be best. If the IRA alternative is not available, then the back loaded universal/variable life insurance policy is the optimal choice for holding periods of six to thirty years. However, if the investment is maintained for 30 years or more and then annuitized, the deferred annuity option is optimal because this investment can be annuitized without subjecting the accumulated value to taxation. The periodic payments of the annuity are taxed, and the exclusion ratio (proportion of the annuity that is tax free) is determined based on the initial investment, ignoring accrued interest, but the after tax periodic payments exceed those received by annuitizing the backloaded universal/variable life insurance policy. The loan option under the universal/variable life policy would produce the highest periodic payment, though, since none of the loan proceeds are taxed.

For the investor who is willing to accept the risks associated with investment in the stock market, four comparable investments exist: back and front loaded universal/variable life insurance policies with the cash value invested in equities, buying term insurance and investing the difference in a stock mutual fund or buying term insurance and investing the difference through an IRA in a stock mutual fund. The expected value of returns from equity investments are higher than bond investments, although greater variation occurs. For this example, stock returns are projected to be 14 percent annually. The terminal investment values of these alternatives are listed in Table 4 and displayed on Figures 4A and 4B.

Insert Table 4 here

Long term capital gain treatment for equities applies only to direct investments in common stock. Equity investments through an IRA or universal/variable life insurance policy are not eligible for capital gains treatment regardless of the holding period. The optimal investment for holding periods of ten years or less is to buy term insurance and invest the difference in an equity mutual fund, except that for a nine year holding period the IRA alternative is optimal. This exception occurs because of the changing tax brackets (33 percent in year nine but 38 percent in year ten) and the fact that IRA withdrawals do not receive captial gains treatment. For holding periods of eleven to fifteen years, investing in a back loaded universal/variable life insurance policy would be optimal. For holding periods of 16 through 30 years, buying term insurance and

investing the difference in an equity fund through an IRA would be optimal. If the terminal values are annuitized after holding periods of 30 years or longer, the IRA alternative produces the highest after tax income. If the IRA option is not available, the policy loan option on the back loaded universal/variable life insurance policy produces the highest income stream.

Universal life insurance policies have been written only since 1979; universal/variable life insurance policies have been offered only since 1984. Thus, the industry has not compiled accurate retention rates for these policies. The likelihood of retaining a policy for seven years or more simply cannot be calculated based on experience. The policyholder has to make a judgement about his or her likely holding period. However, lapse rates for all existing life insurance policies indicate that in 1984, 23 percent of policies in force for less than two years lapsed and 10 percent of policies in force for two years or more lapsed [2]. Based on these data, most policyholders do not view life insurance as a long term investment. However, this study demonstrates that unless the policies are kept in force for at least seven years, alternative investment strategies would be preferable. If a policy is to be kept in force this long, then back loaded policies will tend to dominate front loaded policies as the surrender charges are usually either minimal or entirely eliminated after seven to ten years. However, if the policy had to be surrendered in the early years, then the investment value of the back loaded policy would be below the front loaded policy.

Description of Computer Program

The program used to derive the examples included in this paper is written in BASIC and runs on IBM PCs and compatible computers.[5] The program can be used to calculate the optimal investment selection for the specific parameters for a particular investor, rate of return forecast or specific universal/ variable life insurance policy. The results indicate the lump sum withdrawal values at each holding period from one year to retirement and after tax periodic payments resulting from annuitizing or borrowing the withdrawal values after retirement.

The program includes values for typical term insurance rates from age 20 through 99 based on current indeterminate rate term policies for the largest writers of this coverage. The restrictions on cash value accumulations and death benefits for universal/variable life insurance policies as codified in the 1982 Tax Equity and Fiscal Responsibility Tax Act are included in the program. If the universal/ variable life insurance premiums are not sufficient to cover the policy expenses and mortality costs, the cash value is reduced to cover the deficit. For the alternative investments, if the annual investment is not sufficient to pay for the term insurance, the accumulated investment value is used to offset the difference.

In running the program, the investor is first asked for the desired investment medium, money market instruments, bonds, or equities. This choice determines the comparable alternatives to a universal/ variable life insurance policy. The program then requests the necessary parameters for the universal/variable life insurance policy and the alternative investments. The results are both displayed on the screen and input to a file for later analysis.

Conclusions

Universal/variable life insurance policies allow an investor to participate in the returns of a selected investment medium through a life insurance policy. Tax advantages inherent in life insurance create the situation that purchase of these policies, despite paying expense loadings or surrender charges above those in comparable investments, is the preferred choice, once the maximum amounts have been invested in an IRA or similar tax sheltered investment, if the policy is held long enough. The necessary holding period depends on a number of values, some known to the policyholder, age, cost of insurance, tax rate, and expense loading, and some unknown, rate of return to be earned through the insurance policy and the alternative investment and the tax status of stock investment earnings. This analysis provides both a method for determining the preferred investment and illustrates the necessary holding period for the universal/variable life policy to dominate under a selection of parameter values. For typical values, the universal/ variable life insurance policy dominates the alternative non IRA investment strategy in seven to eleven years. A policyholder can estimate the likelihood of keeping the policy in force for the necessary holding period and decide which investment is preferable.

References

[1] Adelman, Saul W., and Dorfman, Mark S., "A Comparison of TDA and Non-TDA Investment Returns," The Journal of Risk and Insurance, Vol. 49, No. 1 (March, 1982), pp. 73-90.

[2] American Council of Life Insurance, Life Insurance Fact Book, Update, 1985, (American Council on Life Insurance: Washington, 1985), p. 24.

[3] Belth, Joseph M., "A Note on Disclosure of Realized Rate of Return for Retirement Accumulations, Savings Accounts, and the Savings Component of Universal Life Insurance Policies," The Journal of Risk and Insurance, Vol. 49, No. 4 (December, 1982), pp. 613-17.

[4] Belth, Joseph M., "The Rate of Return on the Savings Element in Cash-Value Life Insurance," The Journal of Risk and Insurance, Vol. 35, No. 4 (December, 1968), pp. 569-81.

[5] Best, A. M. Company, Best's Flitcraft Compend (Oldwich, NJ: A.M. Best Company, 1986), pp. 644-46.

[6] Chalke, Shane, "Walking a Tightrope on UL Taxation," Best's Review Life and Health Edition, Vol. 84, No. 5 (September, 1983), pp. 36-40, 120-122.

[7] Explanation of Tax Reform Act of 1984 (Chicago, IL: Commerce Clearing House, 1984), Chapter 9.

[8] Ferrari, Robert J., "Investment Life Insurance Versus Term Insurance and Separate Investment: A Determination of Expected Return Equivalents," The Journal of Risk and Insurance, Vol. 35, No. 2 (June, 1968), pp. 181-98.

[9] Heath, Roger and Wittemore, David G. "Comparing Universal Life Policies," Emphasis (November, 1985), pp. 1-3.

[10] Ibbotson, Roger G. and Sinquefield, Rex A., Stocks, Bonds, Bills, and Inflation: The Past (1926-76) and the Future (1977-2000) (Charlottesville, Va: The Financial Analysts Research Foundation, 1977).

[11] "Indeterminate-Premium Annual Renewable Term Policy Comparison," Best's Review Life and Health Edition (September, 1985), pp. 84-85.

[12] Internal Revenue Code, Section 264.

[13] "Life Sales Showed 21% Increase, Says LIMRA," The National Underwriter Property-Casualty Insurance Edition, Vol. 89, No. 11 (March 15, 1985), p. 32.

[14] Linton, M. Albert, "Life Insurance as an Investment," Life and Health Insurance Handbook, ed. Davis W. Gregg (Second Edition; Homewood, IL: Richard D. Irwin, 1964), pp. 238-45.

[15] Mehr, Robert I. and Gustavson, Sandra G., Life Insurance Theory and Practice (Plano, Texas: Business Publications, Inc., 1984).

[16] "Money Market Mutual Funds," Wall Street Journal (November 18, 1985).

[17] Murray, Michael L., "Analyzing the Investment Value of Cash Value Life Insurance," The Journal of Risk and Insurance, Vol. 43, No. 1 (March, 1976), pp. 121-28.

[18] Myers, Phyllis S. and Pritchett, S. Travis, "Rates of Return on Differential Premiums for Selected Participating Life Insurance Contracts," The Journal of Risk and Insurance, Vol. 50, No. 4 (December, 1983), pp. 569-86.

[19] Schwarzschild, Stuart, "Rates of Return on the Investment Differentials between Life Insurance Policies," The Journal of Risk and Insurance, Vol. 35, No. 4 (December, 1968), pp. 583-95.

[20] Sebastian, Pamela, "Tax-Free Money Fund Yields Stay Sweet," Wall Street Journal (July 7, 1986), p. 21.

[21] Standard & Poor's Statistical Service, Basic Statistics (New York: Standard & Poor's, 1985).

[22] Standard & Poor's Statistical Service, Current Statistics (New York: Standard & Poor's, 1986).

[23] Standard & Poor's Statistical Service, Security Price Index Record (New York: Standard & Poor's, 1984).

[24] Stein, Roe & Farnham, Tax Exempt Bond Fund Third Quarter Report (September 30, 1985), p. 3.

[25] "Universal Life Interest Sensitive Whole Life Policy Comparison," Best's Review Life and Health Edition (May, 1985), pp. 156-77.

[26] Warshawsky, Mark, "Life Insurance Savings and The After-Tax Life Insurance Rate of Return," The Journal of Risk and Insurance, Vol. 52, No. 4 (December, 1985), pp. 585-606.

Appendix

Rates of Return on Investment Alternatives[6] 1976-1985

Investment Medium	Arithmetic Mean	Geometric Mean	Minimum	Maximum	Standard Value
Six-month Treasury Bills	9.1	9.1	5.3	13.8	9.0
Long-term Corporate Bonds	11.5	11.4	8.5	14.6	11.5
Equities	14.7	14.0	-7.2	31.5	14.0

Universal/Variable Life Expense Loadings and Surrender Charges[7]

Type of Expense	Mean	Minimum*	Maximum	Standard Value
Initial Expense Loading	15.0	3.0	61.6	15.0
Renewal Expense Loading	7.7	2.5	20.0	7.5
Surrender Change:				
Year 1	53.1	1.7	100.0	50.0
Year 5	9.6	0.2	44.1	10.0
Year 10	1.8	0.1	10.9	2.0

*zero values excluded

Footnotes

[1]Some of the investment alternatives generate taxable income continuously whereas others create taxable income only on withdrawal of funds. Investment in money market, bond (par value or deep discount) or stock funds generate taxable income throughout the year. Thus, the appropriate tax rate is t_{x+i-1} for each year's determination. For example, in the first year the money market fund produces interest that is taxable at the investor's initial ($t_{x+1-1} = t_x$) tax rate. Other investment alternatives, such as the universal/variable life insurance policy, an IRA investment or a deferred annuity would generate taxable income only when capital is withdrawn, at which time the tax rate would be t_{x+i}. For an IRA surrendered at the end of the first year, the appropriate tax rate is the investor's tax rate a year after the initial year, or t_{x+1}. Thus, different subscripts to the tax rate apply depending upon whether the investment income is taxed currently or only on withdrawal.

[2]Plans that function similarly to an IRA include 403(b) plans for employees of tax-exempt or educational organizations and 401-k plans for employees of private firms that offer this benefit. Each of these tax sheltered plans have special rules defining the maximum allowable contribution in terms of salary with an absolute upper limit. The example developed in the paper is based on the IRA rules for maximum contribution since more individuals are eligible for an IRA and the contribution limit is, for almost all employees, the same. If an individual is also eligible to contribute to one of the other tax

sheltered plans, the aggregate maximum may be increased. The taxation of lump sum withdrawals from the plans differ, also, with the entire proceeds from an IRA or 403(b) plan subject to taxation but ten year forward averaging applicable to 401-k distributions. The IRA withdrawal rules are used in this program.

[3]The annuity rates were derived from resentative current male rates, as listed in Best's Flitcraft [5].

[4]The loan provisions allow the policyholder to borrow at an interest rate of 5.5 percent. The unborrowed cash value continues to earn market interest rates but the borrowed portion earns at a guaranteed 4.0 percent rate. The policyholder stops paying additional premiums and mortality costs are deducted from the cash value. The loan amount is the maximum amount that can be withdrawn annually that allows the policy to remain in force, by the cash value exceeding the accumulated loan value, for the life expectancy of the insured.

[5]The authors would be pleased to provide a disk copy of the program to anyone who forwards a floppy disk.

[6]The source for the rates of return was Standard & Poor's Statistical Service. Six-month treasury bill rates were in [21, p. 16] and [22 (May), p. 4]. The long-term coporate bond rates were the annual average yield to maturity for composite bonds rated A [23, p. 270] and [22 (January), p. 28]. The equity return is the total return, dividends plus change in price, of the S & P 500 [23, p. 125-126] and [22 (May), p. 30].

[7]The expense loadings and surrender charges were calculated from the data provided in Best's Review [25] for 131 universal life insurance policies.

Table 1: Comparison of Money Market Investment Alternatives

Starting age:	35
Retirement age:	65
Amount of capital/yr ($):	1000
Face value of policy ($):	100000

Marginal tax rate at different age (%)

Age	Tax Rate
35-39	28
40-44	33
45-49	38
50-54	42
55-64	45
Over 65	33

Rate of return (%):	9
Interest differential on UVLF & UVLB (%)	0
Index of competitiveness on UVLF & UVLB	1
Initial expense loading on UVLF (%)	15
Renewal expense loading on UVLF (%)	7.5
Duration of surrender charge on UVLB (yr)	10
Surrender charge at year 1 (%)	50
Surrender charge at year 5 (%)	10
Annual decrement after year 5 (%)	1.6
Index of return on municipal bond:	.65

After Tax Lump Sum Withdrawal Amount

Year	UVLFmmf	UVLBmmf	BTIDmmf	IRAmmf	BTIDmb
1	751	457	893	823	888
2	1,640	1,140	1,834	1,710	1,818
3	2,599	2,075	2,825	2,668	2,791
4	3,632	3,289	3,868	3,701	3,809
5	4,747	4,816	4,969	4,482	4,877
6	5,951	6,087	6,104	5,658	5,996
7	7,163	7,388	7,287	6,922	7,161
8	8,423	8,790	8,522	8,281	8,374
9	9,753	10,302	9,812	9,744	9,638
10	11,073	11,790	11,160	10,476	10,957
11	12,526	13,536	12,515	12,099	12,333
12	14,056	15,208	13,916	13,842	13,759
13	15,671	16,977	15,366	15,692	15,238
14	17,377	18,852	16,866	17,509	16,774
15	18,914	20,465	18,419	18,322	18,369
16	20,771	22,508	19,262	20,385	20,028
17	22,730	24,672	21,540	22,595	21,740
18	24,802	26,965	23,157	24,966	23,507
19	26,996	29,402	24,815	27,513	25,334
20	28,841	31,373	26,516	29,063	27,224
21	31,238	34,042	28,188	31,944	29,179
22	33,764	36,815	29,865	35,014	31,170
23	36,433	39,717	31,546	38,290	33,198
24	39,188	42,796	33,232	41,791	35,266
25	42,090	46,065	34,923	50,527	37,376
26	45,168	49,543	36,619	54,986	39,529
27	48,408	53,220	38,268	59,716	41,677
28	51,825	57,113	39,867	64,741	43,816
29	55,435	61,242	41,413	70,088	45,949
30	64,027	71,128	42,903	85,875	48,072

After Tax Annuity Withdrawal Amount

Year	UVLFmmf	UVLBmmf	BTIDmmf	IRAmmf	BTIDmb
30	7,004	7,781	4,693	12,511	5,259
31	7,667	8,540	5,019	13,814	5,624
32	8,392	9,372	5,351	15,237	5,998
33	9,193	10,297	5,695	16,815	6,389
34	10,066	11,306	6,041	18,526	6,785
35	11,006	12,400	6,382	20,404	7,178

Loan Amount on UVLF & UVLB

30	5,865	7,108
31	6,768	8,187
32	7,833	9,461
33	8,376	10,160
34	9,725	11,781
35	10,376	12,626

Table 2: Comparison of Money Market Investment Alternatives

All parameter values are the same as Table 1 except the rate of return = 6.5%

After Tax Lump Sum Withdrawal Amount

Year	UVLFmmf	UVLBmmf	BTIDmmf	IRAmmf	BTIDmb
1	734	447	878	804	874
2	1,584	1,101	1,787	1,651	1,775
3	2,480	1,978	2,728	2,543	2,704
4	3,422	3,096	3,702	3,483	3,660
5	4,414	4,474	4,710	4,164	4,647
6	5,460	5,619	5,738	5,190	5,664
7	6,554	6,852	6,790	6,264	6,705
8	7,699	8,120	7,868	7,390	7,770
9	8,899	9,409	8,975	8,572	8,861
10	10,098	10,712	10,110	9,080	9,979
11	11,296	12,150	11,239	10,336	11,124
12	12,528	13,488	12,385	11,646	12,288
13	13,797	14,869	13,547	13,014	13,471
14	15,106	16,296	14,726	14,443	14,675
15	16,361	17,594	15,923	14,881	15,899
16	17,730	19,089	17,096	16,276	17,147
17	19,134	20,628	18,270	17,724	18,403
18	20,577	22,213	19,444	19,229	19,668
19	22,060	23,850	20,621	20,795	20,944
20	23,401	25,252	21,797	21,455	22,230
21	24,945	26,960	22,932	23,123	23,527
22	26,515	28,705	24,029	24,831	24,800
23	28,114	30,490	25,088	26,580	26,049
24	29,744	32,319	26,109	28,376	27,274
25	31,407	34,319	27,087	33,509	28,472
26	33,106	36,117	28,024	35,615	29,642
27	34,812	38,063	28,864	37,731	30,732
28	36,526	40,032	29,604	39,856	31,737
29	38,248	42,026	30,241	41,992	32,653
30	42,158	47,067	30,770	50,612	33,477

After Tax Annunity Withdrawal Amount

Year	UVLFmmf	UVLBmmf	BTIDmmf	IRAmmf	BTIDmb
30	4,612	5,149	3,366	7,243	3,662
31	4,937	5,511	3,521	7,775	3,833
32	5,275	5,891	3,664	8,326	3,993
33	5,633	6,296	3,797	8,906	4,144
34	6,000	6,718	3,912	9,499	4,278
35	6,372	7,149	4,002	10,114	4,388

Loan Amount on UVLF & UVLB

30	1,405	2,062
31	1,664	2,408
32	1,969	2,813
33	1,873	2,780
34	2,222	3,255
35	2,075	3,184

Table 3: Comparison of Bond Investment Alternatives

All parameter values are the same as Table 1 except as follows:

Rate of return (%)	11.5
Rate of return on DDB (%)	
Interest	5.75
Appreciation	4.6
Expense loading on Deferred Annuity (%)	10
First year surrender charge on DA (%)	100
Number of years	10
Surrender charge on DA (%)	0 - 100

After Tax Lump Sum Withdrawal Amount

Year	UVLFbond	UVLBbond	BTIDbond	IRAbond	BTIDddb	BTIDda	BTIDmb
1	768	468	908	842	908	0	902
2	1,697	1,180	1,881	1,771	1,880	168	1,860
3	2,722	2,175	2,924	2,796	2,922	531	2,879
4	3,852	3,492	4,041	3,929	4,037	1,120	3,963
5	5,068	5,121	5,240	4,821	5,222	2,072	5,117
6	6,324	6,459	6,492	6,167	6,485	3,284	6,346
7	7,672	7,926	7,820	7,647	7,828	4,857	7,647
8	9,123	9,541	9,231	9,279	9,258	6,698	9,025
9	10,689	11,321	10,730	11,081	10,783	8,591	10,486
10	12,205	13,043	12,325	12,096	12,351	10,621	12,036
11	13,980	15,176	13,947	14,183	14,037	13,141	13,682
12	15,895	17,281	15,655	16,387	15,822	14,947	15,420
13	17,967	19,564	17,454	18,677	17,715	16,902	17,258
14	20,215	22,047	19,351	21,204	19,725	19,026	19,202
15	22,163	24,122	21,352	22,692	21,735	20,673	21,261
16	24,716	26,949	23,365	25,703	23,933	23,071	23,443
17	27,486	30,025	25,467	29,020	26,253	25,676	25,744
18	30,500	33,319	27,665	32,679	28,703	28,413	28,171
19	33,766	36,800	29,966	36,721	31,295	31,329	30,736
20	36,352	39,685	32,376	39,698	33,846	33,581	33,447
21	40,000	43,760	34,788	44,520	36,670	36,984	36,316
22	43,969	48,205	37,273	49,824	39,624	40,684	39,319
23	48,295	53,063	39,836	55,667	42,720	44,721	42,465
24	53,022	58,382	42,482	62,111	45,955	49,137	45,767
25	58,193	64,213	45,216	76,846	49,338	53,979	49,236
26	63,861	70,617	48,043	85,578	52,895	59,298	52,883
27	70,053	77,630	50,916	95,182	56,589	65,098	56,668
28	76,053	85,320	53,836	105,756	60,429	71,441	60,601
29	84,255	93,768	56,809	117,413	64,428	78,395	64,694
30	100,968	112,836	59,385	146,593	70,400	95,822	68,957

After Tax Annuity Withdrawal Amount

Year	UVLFbond	UVLBbond	BTIDbond	IRAbond	BTIDddb	BTIDda	BTIDmb
30	11,045	12,343	6,545	21,582	7,701	13,480	7,543
31	12,420	13,908	7,142	24,446	8,444	15,222	8,225
32	13,976	15,682	7,780	27,683	9,249	17,185	8,956
33	15,755	17,715	8,471	31,383	10,133	19,422	9,751
34	17,764	20,014	9,206	35,539	11,087	21,928	10,600
35	20,018	22,597	9,980	40,254	12,108	24,762	11,495

Loan Amount on UVLF and UVLB

30	14,476	16,836
31	16,815	19,546
32	19,602	22,775
33	21,751	25,299
34	25,454	29,596
35	28,220	32,848

Table 4: Comparison of Equity Investment Alternatives

All parameter values are the same as Table 1 except as follows:

Rate of return (%)	14
Short term taxable portion on BTIDstock (%)	50
Long term taxable portion on BTIDstock (%)	30

After Tax Lump Sum Withdrawal Amount

Year	UVLFstock	UVLBstock	BTIDstock	IRAstock
1	785	478	933	861
2	1,755	1,221	1,961	1,832
3	2,849	2,278	3,093	2,929
4	4,060	3,705	4,341	4,168
5	5,321	5,382	5,709	5,183
6	6,710	6,861	7,198	6,717
7	8,232	8,519	8,826	8,447
8	9,906	10,383	10,610	10,399
9	11,756	12,485	12,568	12,605
10	13,519	14,498	14,671	13,975
11	15,697	17,115	16,952	16,533
12	18,107	19,777	19,439	19,254
13	20,781	22,738	22,152	22,330
14	23,756	26,040	25,116	25,811
15	26,295	28,780	28,250	28,243
16	29,830	32,560	31,674	32,584
17	33,616	36,722	35,397	37,493
18	37,790	41,376	39,447	43,049
19	42,458	46,592	43,860	49,344
20	46,573	51,200	48,482	54,564
21	52,311	57,631	53,572	62,451
22	58,741	64,850	59,079	71,370
23	65,960	72,970	65,043	81,463
24	74,079	82,114	71,481	92,897
25	83,223	92,428	78,461	117,550
26	93,535	104,075	86,046	133,886
27	105,151	117,210	94,239	152,373
28	118,250	132,043	103,100	173,311
29	133,042	148,811	112,697	197,044
30	164,879	184,960	125,202	250,987

After Tax Annuity Withdrawal Amount

Year	UVLFstock	UVLBstock	BTIDstock	IRAstock
30	18,036	20,233	13,696	37,177
31	20,825	23,395	15,462	43,127
32	24,071	27,081	17,454	50,034
33	27,884	31,414	19,725	58,126
34	32,317	36,454	22,281	67,471
35	37,441	42,286	25,140	78,349

Loan Amount on UVLF & UVLB

30	30,948	35,433
31	36,402	41,669
32	42,971	49,179
33	48,934	56,023
34	58,001	66,393
35	66,017	75,596

A Comparison of Universal/Variable Life Insurance with Similar Unbundled Investment Strategies

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University of Illinois

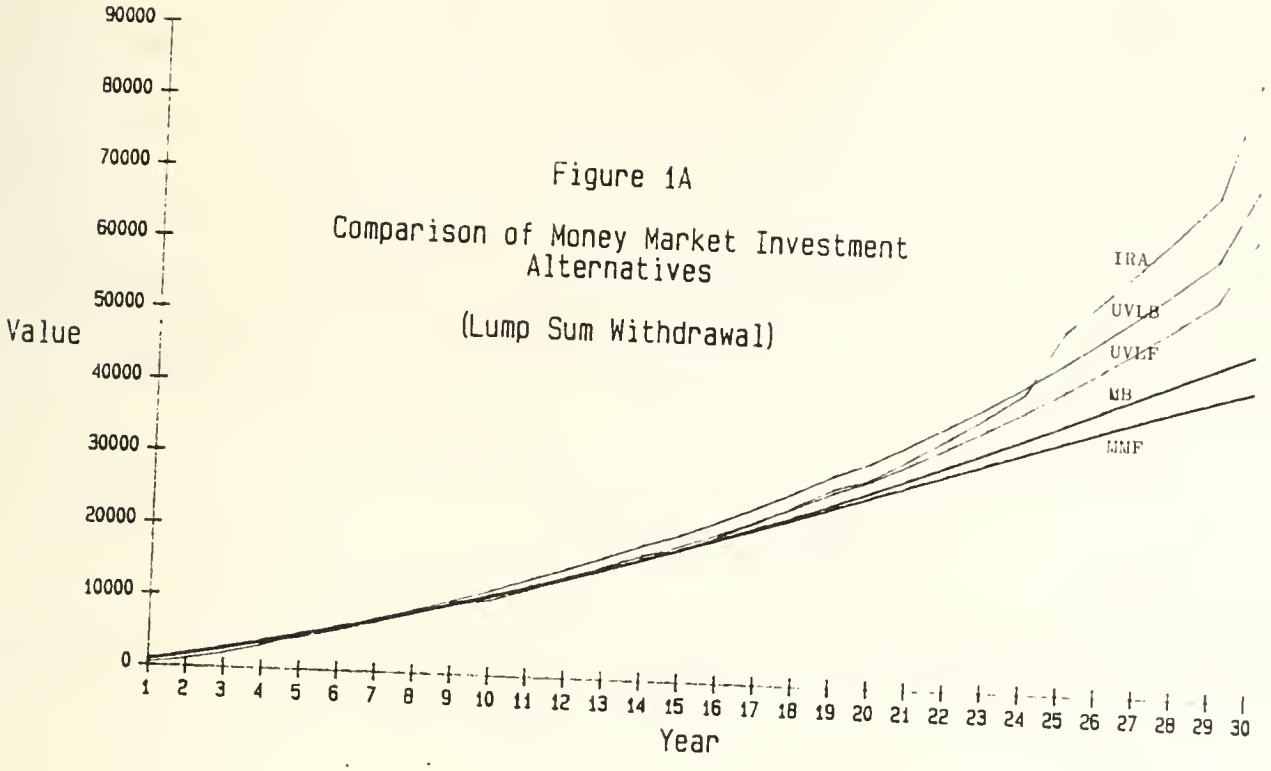
Figure 1A
Comparison of Money Market Investment Alternatives
(Lump Sum Withdrawal)
Value
Year
IRA
UVLB
UVLF
MB
MMF
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

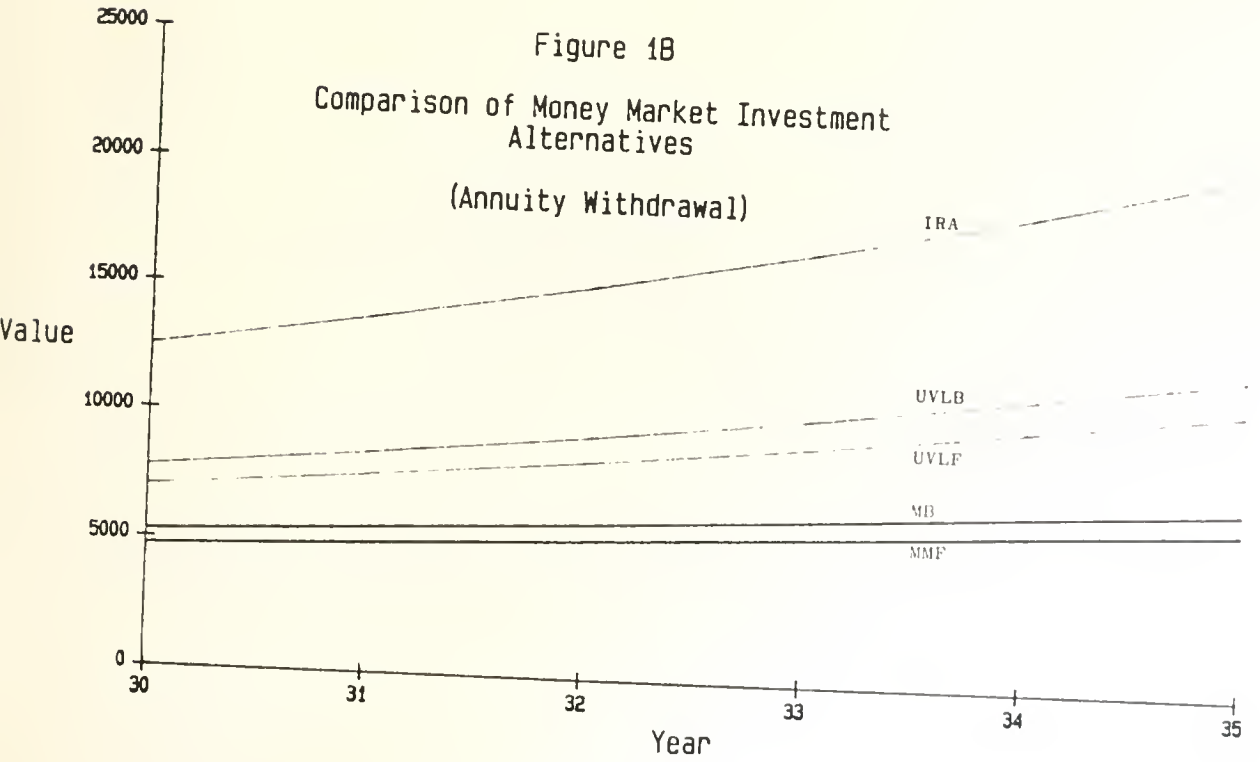
Figure 1B
Comparison of Money Market Investment Alternatives
(Annuity Withdrawal)
Value
Year
IRA
UVLB
UVLF
MB
MMF
25000
20000
15000
10000
5000
0
30
31
32
33
34
35

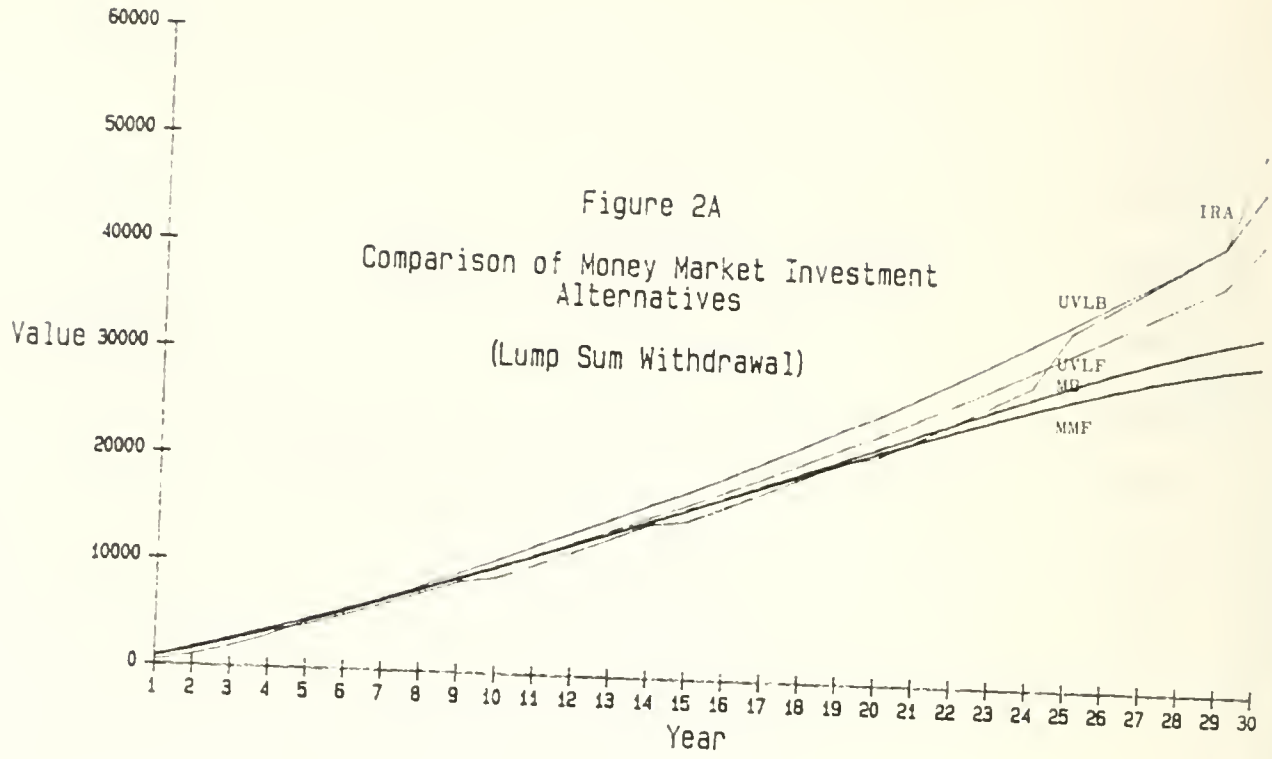

Figure 2A

Comparison of Money Market Investment Alternatives

(Lump Sum Withdrawal)

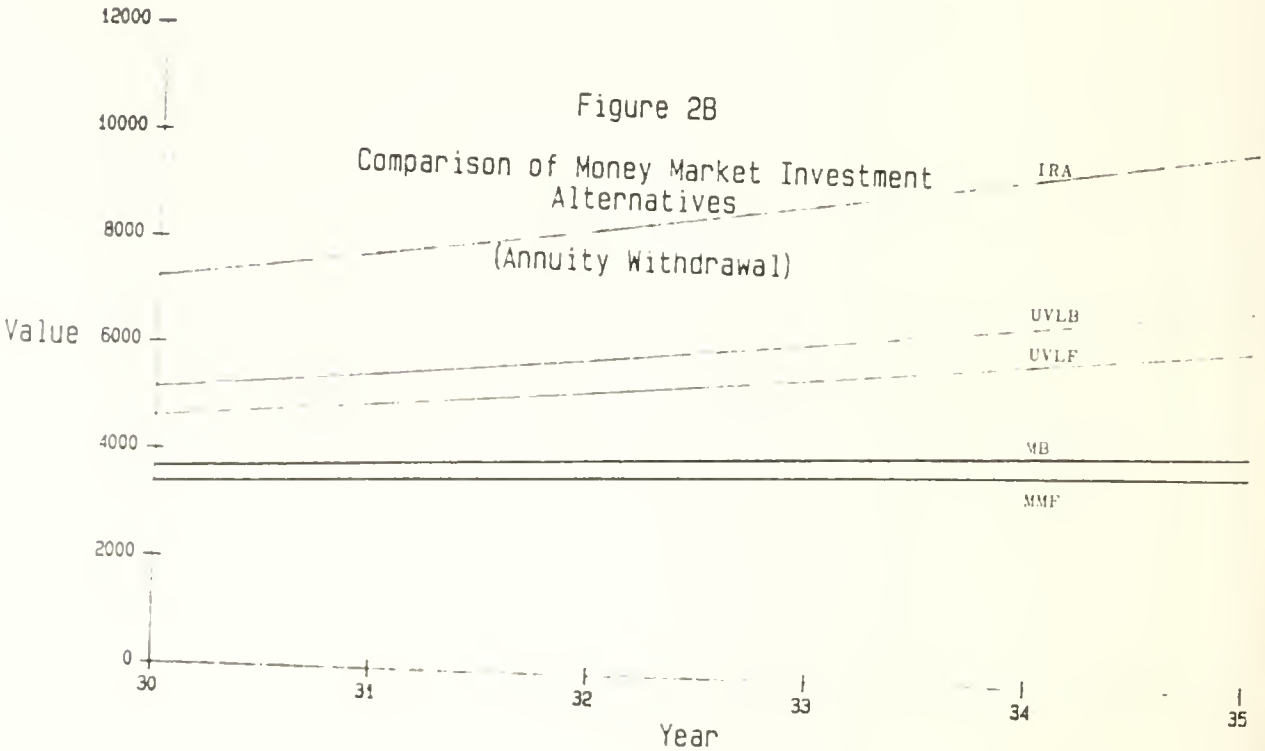

Figure 2B

Comparison of Money Market Investment Alternatives

(Annuity Withdrawal)

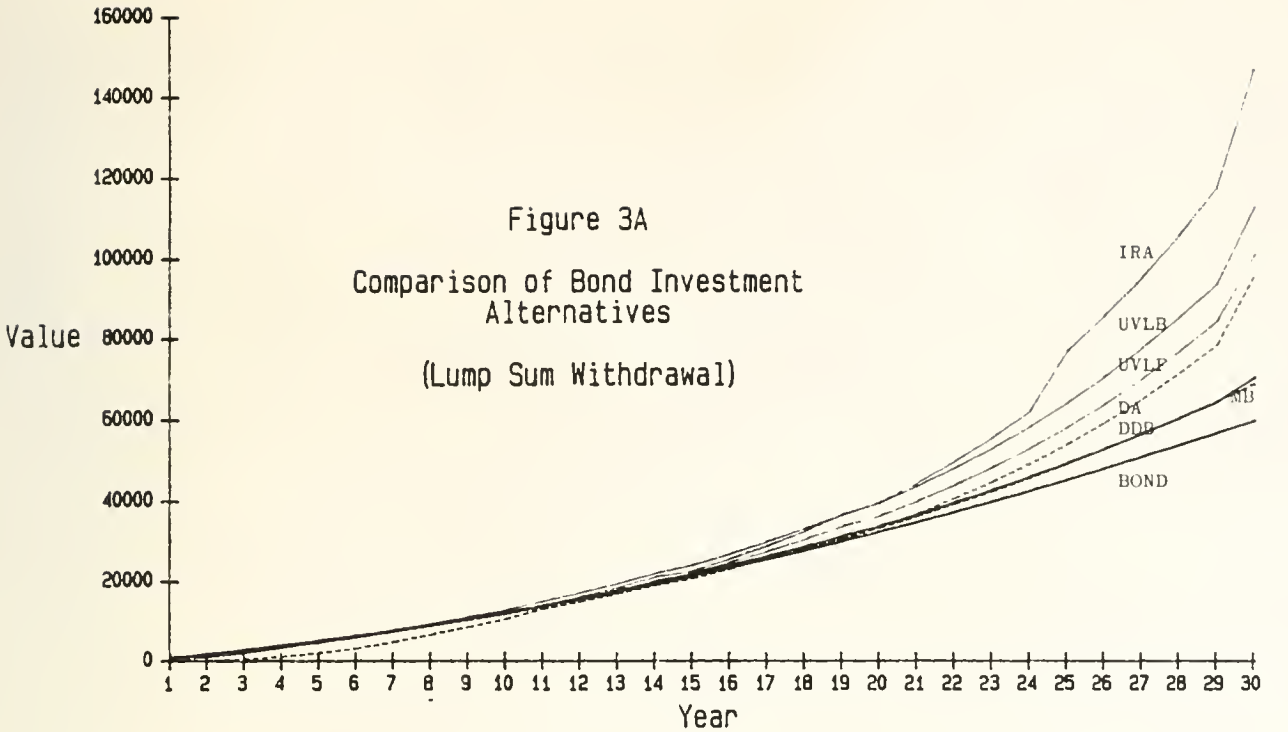
Figure 3A
Comparison of Bond Investment Alternatives
(Lump Sum Withdrawal)
Value
Year
IRA
UVLB
UVLP
DA
DDB
MB
BOND
160000
140000
120000
100000
80000
60000
40000
20000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

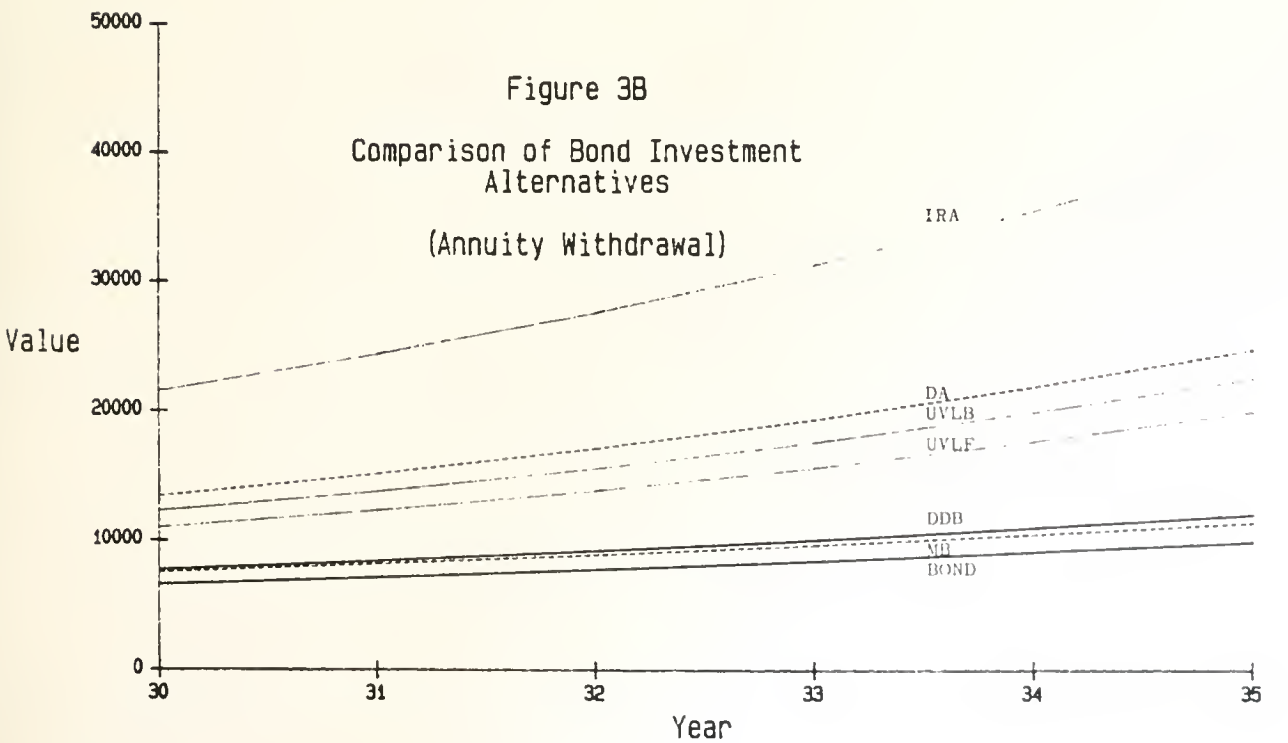
Figure 3B
Comparison of Bond Investment Alternatives
(Annuity Withdrawal)
Value
Year
IRA
DA
UVLB
UVLF
DDB
MB
BOND
50000
40000
30000
20000
10000
0
30
31
32
33
34
35

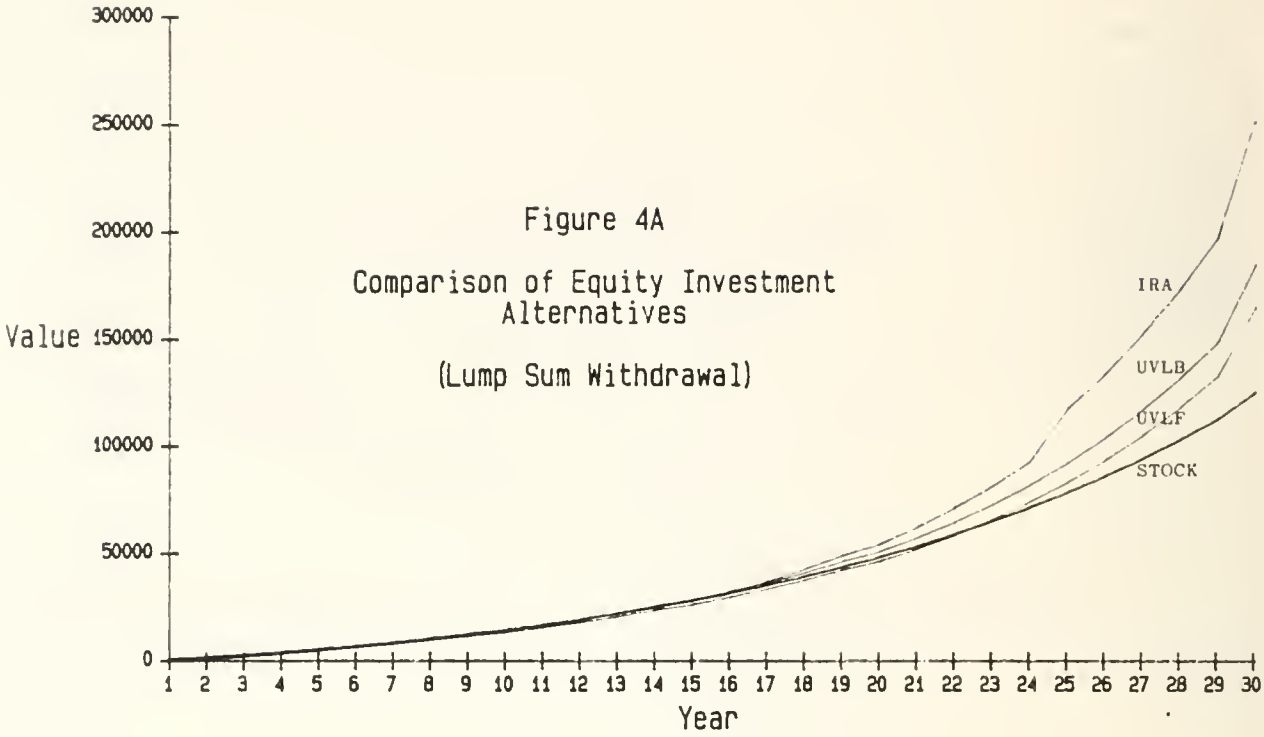
Figure 4A
Comparison of Equity Investment Alternatives
(Lump Sum Withdrawal)
Value
Year
IRA
UVLB
UVLF
STOCK
300000
250000
200000
150000
100000
50000
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

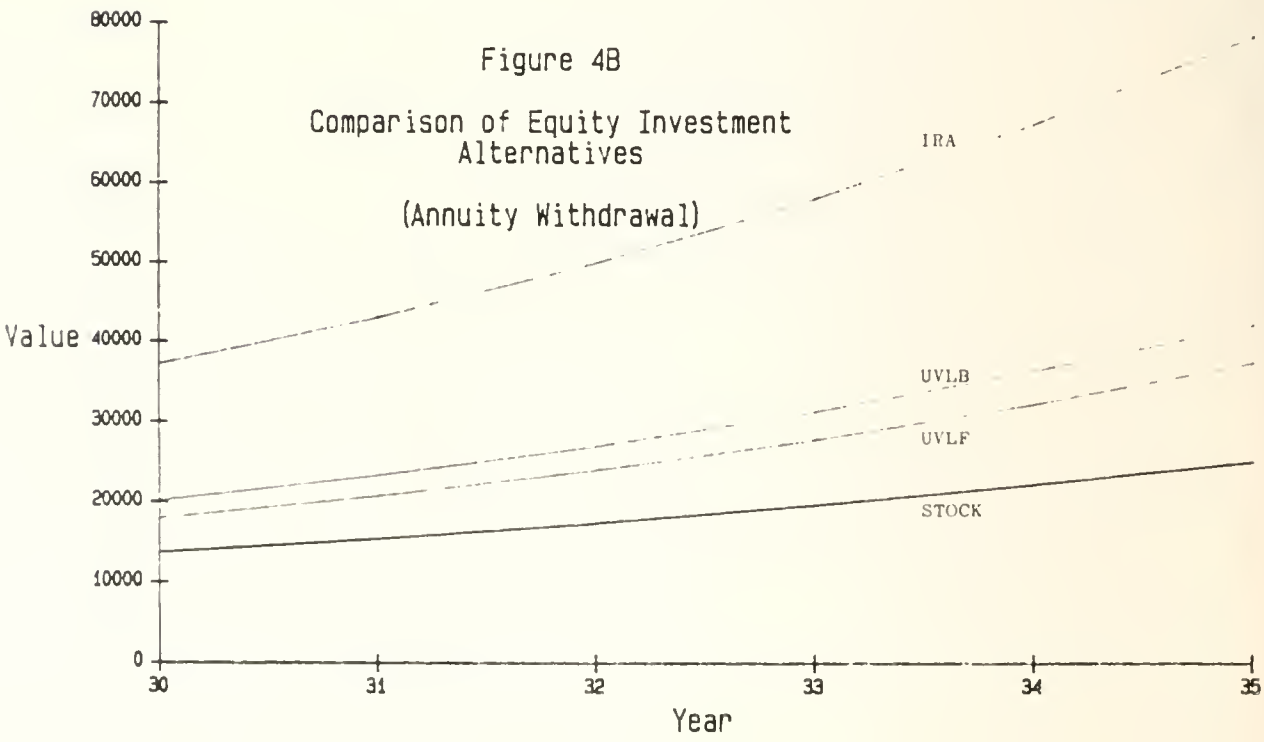
Figure 4B
Comparison of Equity Investment Alternatives
(Annuity Withdrawal)
Value
Year
IRA
UVLB
UVLF
STOCK
80000
70000
60000
50000
40000
30000
20000
10000
0
30 31 32 33 34 35