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Investment Newsletter – June 2017

Our topic this quarter is the connection between savings and your retirement spending plan. This is inspired by real world situations of clients who need to understand what they can realistically spend without running out of money during retirement. This topic is like an onion: it has many layers to peel away. We cannot cover everything in a single newsletter so we will tackle this topic piece by piece over a series of newsletters with each adding another layer of analysis built upon those that came before.

Linking Savings to Retirement Spending

We can think of the link between savings and retirement spending as the answers to two related questions:

A. How much savings do I need to fund my desired retirement spending budget?

B. How much can I afford to spend in retirement given my accumulated savings?

Realistic answers to these questions are essential to making informed choices about life's most important trade-offs and taking actions early to achieve your goals. To find the answers, we must analyze a complex set of factors that influence how savings are managed to maximize spending over an extended retirement period.

There are many variables which ultimately determine whether you will outlive your money or not but we'll focus on those which tend to be the most important for clients of Berkeley Investment Advisors. Specifically, over the course of this series of articles, we want to consider the following:

1. Spending in retirement - measured as a percentage of assets.
2. Asset allocation impact on risks and inflation adjusted returns on assets.
3. The taxation applicable to returns and retirement account withdrawals.
4. How long you will live.
5. Amount of social security, pensions, or other income unrelated to assets.
6. How much cushion you want to avoid running out of money – your risk tolerance.

This is a lot of ground to cover, so in this first piece we'll limit our analysis primarily to the choice of your spending rate and we'll combine that with a limited look at dialing up investment risk in pursuit of more spending. We will take into account tax effects, but the analysis will be simplified considerably by ignoring social security and other non-investment income, as well as the impact of assets allocated to a personal residence. In this basic model of retirement, you can think of one part of your spending budget as being spent on housing via rent or via the reduction in investment income that would result from devoting some portion of assets to home equity rather than securities. We postpone further analysis of the housing choice to a later newsletter. We also defer a more thorough exploration of the real world risks of running out of money because of cost inflation and asset return variability.

First I'll outline the building blocks of our retirement financing model and then we'll discuss key assumptions. After presenting results, I'll offer my analysis and conclusions.

Building a Model of Assets and Spending with Taxation

Our objective for this newsletter is to use an excel spreadsheet to project future investment balances, investment income, taxes, and spending for 35 years, starting on your 65th birthday (we're assuming you don't plan to live past 100). We will assume a particular set of starting circumstances. For this analysis there are two choices under our control. The main choice variable is the initial level of spending as a percentage of the starting assets. Once we choose this first year level of spending, it is assumed to rise with the inflation rate every year thereafter. The secondary choice variable is whether our asset allocation is moderate risk or high risk (aggressive).

The output we use to judge the outcome of our choices is the resulting time series of investment balances. More specifically we are interested in the age at which assets go to 0. In real life, every person's situation is different; the possible permutations are countless. In this model I've narrowed things down to a very specific starting position so we can focus on just these two choice variables and their impact on the age at which we run out of money (in the model).

The starting situation at age 65 is $3,000,000 in investable assets, with 89% in taxable accounts, 10% in a tax deferred account (an IRA) and 1% in a tax free Roth account. These starting assumptions are important for determining the taxes that will become due over the forecast period. Lower starting assets or a higher percentage in the Roth could significantly reduce tax rates applied to investment income.

We will specify a limited set of potential assets to represent the risk and return spectrum. There is no real estate in this model. It includes just four asset classes:

- Money market – cash reserves
- Long term California tax exempt bonds
- High yield corporate bonds
- Equities

We reduce asset allocation choices by assuming all money in the Roth account is allocated to high yield bonds, all money in the IRA is allocated to equities, and 2% of taxable assets are held in a money market account as reserves. We have two choices for how to allocate the other 98% of the taxable assets:

1. **Moderate Risk** is 30% tax exempt bonds, 48% high yield bonds, 20% equity.
2. **High Risk** is 38% tax exempt bonds, 10% high yield bonds, 50% equity.

See exhibit A for a summary of allocations along with return assumptions.

As a measure of risk, I assign a maximum likely drawdown percentage to each asset class based on the historical behavior of such investments in periods of extreme re-pricing. I assume no loss for money market funds, 25% maximum market value losses for both classes of bonds, and a 50% maximum drawdown for equities. Such conditions should be expected to occur in the course of normal market cycles. The length between cycles varies but has averaged 56 months. The average up phase is 39 months and the average down phase is 17 months. The current up cycle, at 86 months is the 2nd longest ever! Given the nature of these market cycles we will hit multiple down markets over 35 years. These draw down estimates are not the worst possible case but rather a very likely occurrence across many cycles. Assuming maximum draw downs are perfectly correlated across asset classes, the maximum draw down for the moderate risk portfolio would be 31.5%, whereas the high risk portfolio's draw down is calculated at 38.2%. These are not meant to be precise measures of actual draw down risk but rather are intended to give you a rough idea of the relative risk of the two allocations. We will save a more thorough risk analysis for a later article.

Tax Efficiency

When setting allocations within the taxable portion of assets we want to allocate money to tax exempt bonds only to the extent that the return is relatively close to the after-tax returns from high yield bonds. Given the returns assumed in this model, these two asset classes generate approximately the same returns when the marginal tax rate is 33%. Therefore allocations were chosen with a goal of generating enough taxable income to hit this tax bracket before allocating to the tax exempt portfolio. Likewise we want to limit the allocation to taxable income generating investments to avoid being pushed into a tax bracket higher than 33%. This dynamic is also taken into account in the model when deciding which accounts to draw from first to fund spending in excess of income. As assets decline and taxable income drops, we draw on the tax exempt portfolio first because this produces less spendable income than high yield bonds once we drop into lower tax brackets.

Estimating Future Returns of the Asset Classes

Determining the appropriate long term returns of various assets over the length of your retirement is where things get complex. An entire newsletter could be devoted to this topic by itself, but for now I'll just provide some forecasts and relatively short justifications. We will build our forecast based on both historical norms and current market conditions starting with the least risky assets and then adding on risk premiums as we move up to riskier assets.

First we will assume over the long run, short term money market securities such as Treasury Bills will pay returns equal to the inflation rate. From 1926 to 2012 inflation averaged roughly 3.2% but we'll use 2.5% as our forecast going forward because of the bias towards deflation that currently exists in the world economic order.

For longer term California tax exempt bonds we directly observe current yields to maturity. Although we do not know what the reinvestment rates in the future will be, a reasonable forecast is that over time they will yield 3.5% returns – about 1% higher than inflation. To get a forecast for long run returns for high yield bonds, we add the average spread over treasury yields since 1996 (about 5.75%)

to get a forecast for yields on high yield bonds before factoring in credit losses. We then assume defaults reduce the yield spread by about 3% so that net long term returns to high yield bonds are forecast to be 5.25% (= 2.5%+5.75% - 3%)

Equity returns vary greatly over time; long run returns greatly dependent on valuation levels at initial buy in. Although returns over the next 10 years are likely to be very low as valuations move back to historical norms, subsequent returns would then revert to a higher long run premiums to risk free bonds. We'll assume an average risk premium of roughly 4% overall for the forecast period. Thus we'll use a long term equity return of 6.5% (= 2.5% long term money market yield + 4% risk premium). By way of comparison, the compounded return for the S&P 500 stock index from 1928 to 2016 was about 9.5%. We are using a lower number because we are starting from very high equity valuations here. The compounded annual return from a similarly high valuation level in 1999 to the end of 2016 was just 4.5%. This was just 2.5% per year above inflation. Although a stock market return of 6.5% is achievable over the 30+ year horizon that we are analyzing, there is a high likelihood that this could be realized via 0% returns for the first 10 years and then more "normal" returns in the back half of the forecast.

Two Possible Paths for Equity Returns to Proxy for Risks

As mentioned above, we are currently in the second longest up market in history (2nd to the run from 1987 to 2000). Stock prices relative to long term earnings power are very high and, by some measures, higher than the 2000 bubble. Research into valuation statistics that are 90% correlated[1] with long run (10-12 years) returns indicate the market is more than 140% above historical norms. This doesn't mean a crash is coming tomorrow or even this year necessarily, but unless valuations in 10 years are at similar highs, returns over this time frame will likely be lower than historical average returns. To take this situation into account and bring at least some element of risk into the analysis we will look at the case where equity returns turn out to be a constant 0% over the first 10 years and thereafter jump to 9.5% for the next 25 years. Overall this provides a compounded annual return over the full 35 years of 6.7% which is a bit higher than our base case of constant 6.5% return per year for equities. But as we'll see, the path of returns makes a significant difference.

Analyzing Four Cases

As discussed above we are interested in results for two possible allocations under two possible sets of future returns. Therefore our analysis will look at four cases: each possible combination of asset allocation and equity returns. For each of these cases – combining different allocation choices and return outcomes, we use the model to forecast asset balances to see when we would run out of money depending on the rate of initial spending that we choose. A typical rule of thumb for the sustainable initial withdrawal rate is 4%. We use this as our lowest possible initial spending rate and look at additional .5% increments – up to a maximum of 6%. Note that these percentages determine the actual cash spending budget; taxes are an additional cost that also reduces account balances. So in that way our 4% is a bit higher than the rule of thumb 4% which refers to withdrawal rate.

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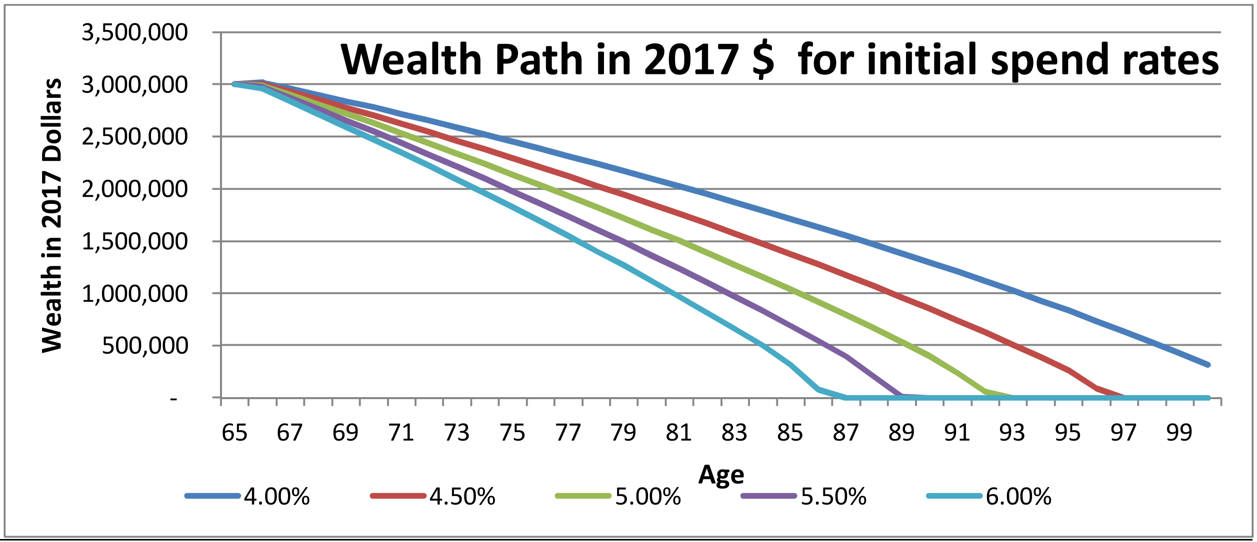
[1] This means that the valuation measure explains 90% of the variation in returns at this time horizon. In other words these measures are highly predictive of outcomes over the long term.

Our first case, which we call Constant Base Case, is the Moderate Risk allocation combined with constant returns across the full 35 years. Here is a graph of asset balances (measured in current dollars) for each of the 5 initial spending rates:

Constant Base Case

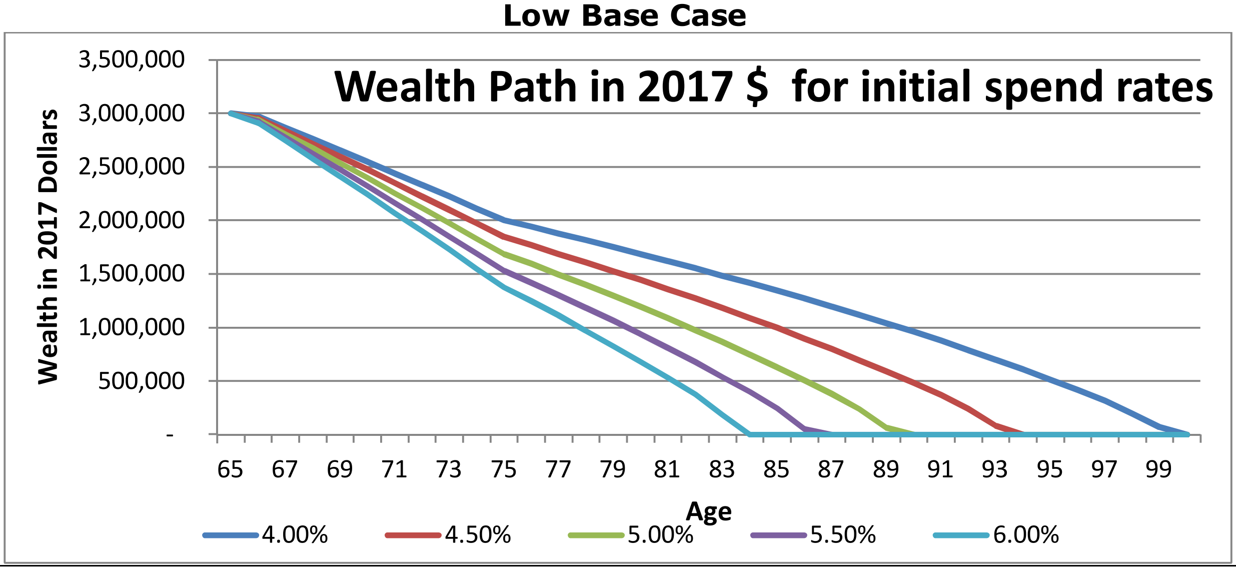


For the 4% initial spending rate, there is money left over at age 100 (enough to make it to age 102). Each higher spending level above 4% lowers the age at which money runs out - to 97, 93, 90, and 87.

For a couple at age 65, there is an 18% chance that at least one of them lives to age 95. Even in this world of constant returns, an initial spending rate above 4.5% brings substantial risk of running out of money before you die.

Next is the Low Base Case combining a Moderate Risk allocation with low (meaning 0) equity returns for the first 10 years. This differs from Constant Base Case only in the sequence of equity returns; over the full 35 years, equity returns are actually slightly higher than in the constant returns case. Here is the graph:

Low Base Case

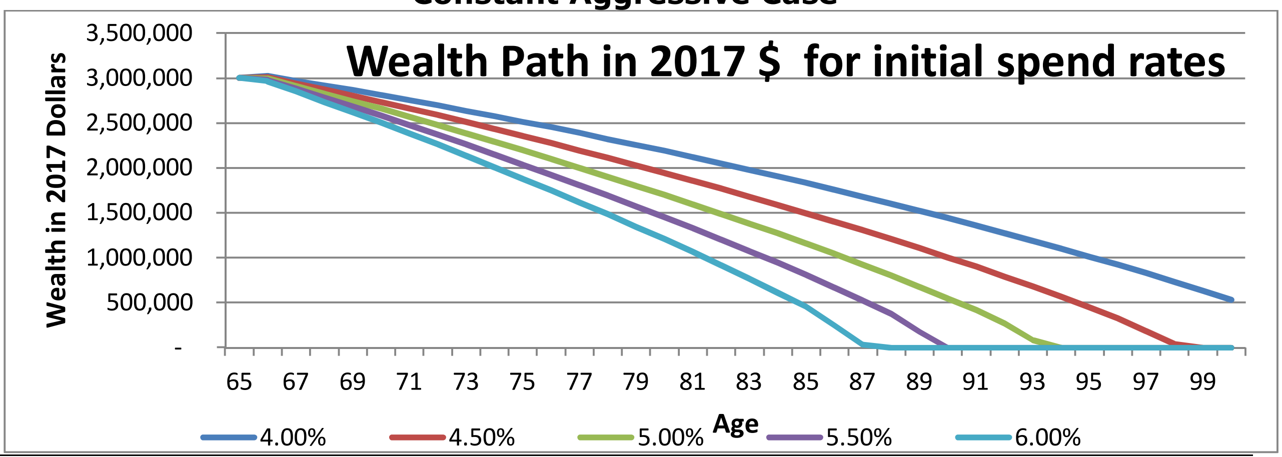


In this case money runs out at age 100 even at 4% initial spending rate. As we move to each higher spending rate, money runs out at ages 94, 90, 87, and 84.

Comparing these two cases we see that poor early returns in equities causes assets to be depleted up to 3 years earlier than expected, even with only a moderate allocation and low initial spending rate. For faster spending rates the difference is not as great because all assets are gone quickly and compounding effects are therefore lessened.

Our third case, which I'll call Constant Aggressive Case, combines the High Risk asset allocation with constant equity returns for the full forecast period. In this case we generate higher returns than the other cases. Also this case results in a significantly lower overall tax rate because of the allocation away from high yield bonds to tax exempt bonds. Here is the graph:

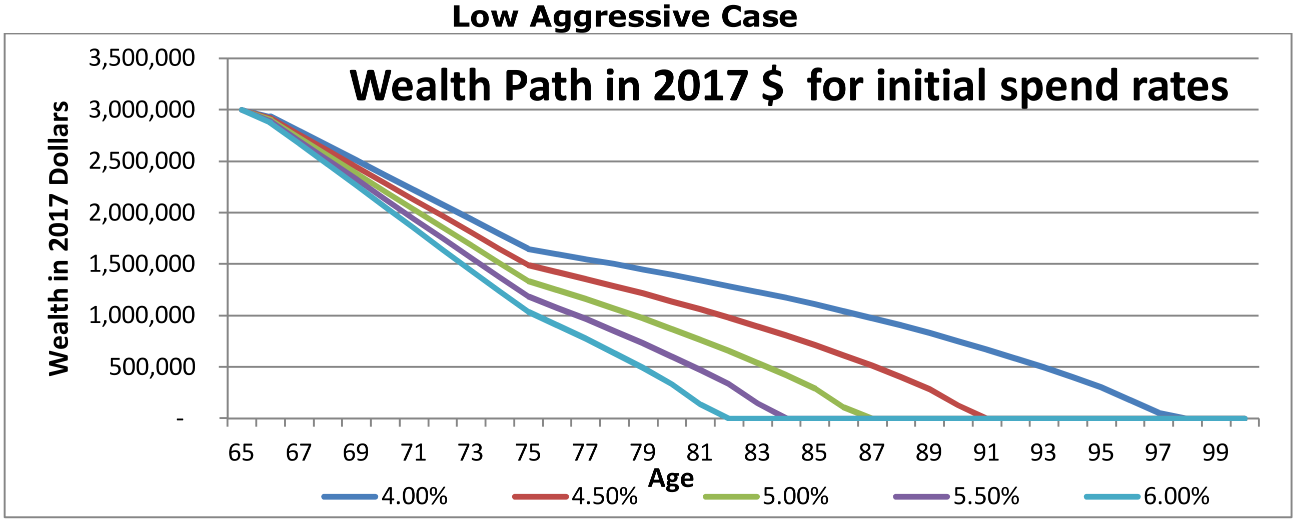
Constant Aggressive Case



Although money still runs out before 100 for the higher initial spending rates, the more aggressive allocation does make it last slightly longer. Ages of running out for the spending rates above 4% are 99, 94, 90, and 88.

Our final case, called Low Aggressive Case examines what happens when the High Risk allocation is chosen but equity returns start out low for 10 years before rising to more normal levels thereafter. Here is the graph:

Low Aggressive Case



Here we see a very big negative impact from betting on an aggressive allocation and starting with poor equity returns at the beginning of retirement. Even with an initial spending budget of 4% you run out of money at age 98. For the higher initial spending rates the ages at which money runs out are 91, 87, 84, and 82.

This case results in the highest overall tax rate because the uneven run of equity returns causes tax inefficiency. We end up with too much in tax exempt bonds in the low equity return years and not enough in the high equity return years. In the real world decision making would be more dynamic and could alleviate this issue to some degree. Even so, this would not be a pleasant scenario.

Comparing the Impact of Spending Choices for the Different Cases

We have the following cases to analyze:

Scenario Name	Risk of Allocation	Potential for Drawdown	Equity Returns Path
Constant Base Case	Moderate	31.5%	Constant Medium
Low Base Case	Moderate	31.5%	Low then Normal
Constant Aggressive Case	Aggressive	38.2%	Constant Medium
Low Aggressive Case	Aggressive	38.2%	Low then Normal

The table below summarizes for each case the year that money runs out for each of the choices of initial spending rate and provides a summary of tax rates:

	Initial Spending Rate as % of assets:					PV of all tax as
	4.00%	4.50%	5.00%	5.50%	6.00%	% of all Income
Scenario Name	Age when run out of funds by withdrawal rate:					at 4% spend rate
Constant Base Case	103	97	93	90	87	11.0%
Low Base Case	100	94	90	87	84	10.9%
Constant Aggressive Case	105	99	94	90	88	10.2%
Low Aggressive Case	98	91	87	84	82	11.7%

If we look across the row of results for each case we see that each incremental increase in the spending rate above 4% cuts a significant number of years off the period over which savings will last; going from a 4% spending rate to 4.5% cuts off 5 to 7 years. Going from 4.5% to 5% cuts a further 4 to 5 years. Above a 5% spending rate, you face a significant possibility of outliving your money even if you choose and aggressive allocation and you achieve good returns.

By comparing Constant Base Case against Constant Aggressive case we can isolate the potential upside of choosing the higher risk allocation. We see that the magnitude of the potential gain is 2 years if our spending rate is 4.5% or 1 year at a 5% spending rate. Above these spending rates we are likely to outlive our money and being aggressive doesn't change things much.

Likewise, by comparing Low Base Case against Low Aggressive Case we can isolate the downside risk of choosing the higher risk allocation. At the key 4.5% and 5% spending rate choices, being Aggressive and getting low early returns in equity, reduces how long your money lasts by 3 years compared to Base Case moderate risk allocation.

It's also worth noting that this model incorporates somewhat efficient tax strategies so that overall taxes are not too large a factor over the course of retirement spending. Taxes do end up being higher in lower return environments because we don't efficiently use the lower tax brackets and because we can end up paying much higher tax rates when we are forced to fund spending with extra withdrawals from a tax deferred account (meaning above the required minimum).

Summary and Conclusions

As a first step in exploring the linkage between savings and the capacity for retirement spending, we looked at the results for a retiree with $3 million saved in a typical mixture of taxable and retirement accounts. Based on the current market environment we chose two stylized sets of long term returns. The first had constant returns for 35 years. The second set of returns differed in that equity returns were zero for 10 year and then jumped to the long run average (9.5%) and stayed constant the next 25 years. These simplifications allow us to focus on two key choice variables – initial spending budget as a percent of assets and the risk level of our portfolio allocation. Using returns and asset allocation choice combinations as scenarios we could then calculate how long assets would last, depending on the rate of spending.

The results show that we should set our initial spending budget at 4% of assets if we want minimal risk of running out of money in retirement. Pushing up investment risk does not increase returns enough to compensate for a higher spending rate – and if stocks revert to normal valuations the aggressive stance leads to a faster depletion of assets.

Given the current low return environment most retirees with normal health should choose a spending rate no higher than 4.5% of assets (4% if you want even lower risk of running out of money).

There is hope, however, for safely raising spending budgets in the future. In simplifying the analysis here, we eliminated a good deal of real world dynamics. In particular the currently depressed level of returns available in financial markets could revert to more normal levels in a few years. As long as we have not locked in the current low long term returns, we will be free to adjust allocations along the way and take advantage of the better returns. Based on the effective tax rates calculated above, we can expect to spend about 88% of additional long run returns that we may obtain through dynamic portfolio allocations. In future newsletter we will explore the dynamic relationships between changing market conditions, asset allocations, spending levels, and the risk of outliving your assets.

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Exhibit A

Constant Base Case

Asset Class:	% of total	Total $ by Asset Class	dollars allocated by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Allocation % by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Forecast returns: years 1-10	> 10 years
Money market - reserves	2%	53,400	53,400	-	-	2%			2.50%	2.50%
CA Tax Exempt Bonds	27%	801,000	801,000	-	-	30%			3.50%	3.50%
High Yield Bonds	44%	1,311,600	1,281,600	-	30,000	48%		100%	5.25%	5.25%
Equities	28%	834,000	534,000	300,000	-	20%	100%		6.50%	6.50%
Total or weighted averge		3,000,000	2,670,000	300,000	30,000	100%	100%	100%	5.08%	5.08%

Low Base Case

Asset Class:	% of total	Total $ by Asset Class	dollars allocated by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Allocation % by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Forecast returns: years 1-10	> 10 years
Money market - reserves	2%	53,400	53,400	-	-	2%			2.50%	2.50%
CA Tax Exempt Bonds	27%	801,000	801,000	-	-	30%			3.50%	3.50%
High Yield Bonds	44%	1,311,600	1,281,600	-	30,000	48%		100%	5.25%	5.25%
Equities	28%	834,000	534,000	300,000	-	20%	100%		0.00%	9.50%
Total or weighted averge		3,000,000	2,670,000	300,000	30,000	100%	100%	100%	3.27%	5.92%

Constant Aggressive Case

Asset Class:	% of total	Total $ by Asset Class	dollars allocated by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Allocation % by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Forecast returns: years 1-10	> 10 years
Money market - reserves	2%	53,400	53,400	-	-	2%			2.50%	2.50%
CA Tax Exempt Bonds	34%	1,014,600	1,014,600	-	-	38%			3.50%	3.50%
High Yield Bonds	10%	297,000	267,000	-	30,000	10%		100%	5.25%	5.25%
Equities	55%	1,635,000	1,335,000	300,000	-	50%	100%		6.50%	6.50%
Total or weighted averge		3,000,000	2,670,000	300,000	30,000	100%	100%	100%	5.29%	5.29%

Low Aggressive Case

Asset Class:	% of total	Total $ by Asset Class	dollars allocated by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Allocation % by Tax Status: Taxable accounts	Tax Derred accounts	Tax Free Accounts	Forecast returns: years 1-10	> 10 years
Money market - reserves	2%	53,400	53,400	-	-	2%			2.50%	2.50%
CA Tax Exempt Bonds	34%	1,014,600	1,014,600	-	-	38%			3.50%	3.50%
High Yield Bonds	10%	297,000	267,000	-	30,000	10%		100%	5.25%	5.25%
Equities	55%	1,635,000	1,335,000	300,000	-	50%	100%		0.00%	9.50%
Total or weighted averge		3,000,000	2,670,000	300,000	30,000	100%	100%	100%	1.75%	6.93%