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Investment Newsletter – September 2018

Normally in the September newsletter we update the performance for the Long Term Income strategy. We'll defer this analysis to the December newsletter due to the length of our main topic here. This newsletter will expand on the June and September 2017 newsletters' analysis of the connection between savings and your retirement spending plan. We incorporate the lessons of part 1 and 2 in the series and expand the analysis to include social security, and the financial risks from variations in asset returns and cost inflation.

Linking Savings to Retirement Spending – Part 3

To review our motivation for this series of analyses, the link between savings and retirement spending provides answers to two key 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?

In this, part 3 of the series, we'll focus on how financial risk impacts the probability of achieving your goals and how you can mitigate risks via key retirement decisions. Cumulatively, this series of newsletters focuses on the following variables which tend to be the most important for our clients in determining whether they outlive their money:

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.

In Part 1 (June 2017), we analyzed liquid asset portfolio allocation choices and the interaction of market risk and spending budgets. This analysis showed that choosing a higher risk portfolio yielded very little extra spending power relative to the downside risks as compared to a more moderate portfolio. In Part 2 of the series (September 2017), we analyzed owning a home versus renting and found that this would increase the amount available to spend on other things in retirement. This finding applies based on current market conditions (which could change) and it assumes we would have rented an identical house if we did not own it. We also quantified the impact of downsizing to a less expensive home when we need to sell to use home equity to fund our remaining retirement. Given a moderate spending budget, downsizing extended the time our money would last by about 2 years.

This time we will build on the lessons of Part 1 and 2. We will include the impact of social security income while exploring the real world risks of running out of money because of cost inflation and asset return variability.

First I'll provide details on the social security option. Next, I'll review and update the components of our retirement financing model and we'll cover key assumptions. After presenting results, I'll offer my analysis and conclusions.

Social Security Income

Social security was designed as a safety net to make sure workers would have income to survive in retirement. It does not come close to replacing income for high earners in high cost states like California. At full retirement age, as of 2018, the social security monthly benefit formula replaces 90% of the first $895 of monthly income, 32% of the next $4,502, and 15% above that up to the limit on earnings subject to social security tax. As an example, for someone who had average inflation adjusted earnings over the last 35 years of $100,00 per year ($8,333 per month), full retirement age monthly social security would be $32,238 per year (2,686.50 per month). Clearly for those of us living in California, it will cover a small fraction of the cost of living.

Your actual benefit depends on your average inflation adjusted taxable earnings over your highest 35 years, the year you were born and the age at which you start taking social security. For purposes of illustration later in the newsletter we will assume social security of $30,089 annually per person and this income automatically rises with inflation. This corresponds to the social security example shown above, reduced to 93.3% of full retirement amount for retiring at 65 for someone with a full retirement age of 66. For this hypothetical person, delaying the start of social security income to age 70 would increase the starting amount to 132% of full retirement amount - to $42,554 per year in 2018.

Modeling Assets, Spending, and Social Security with Taxation

We are updating an excel spreadsheet which projects future investment balances, investment income, taxes, and spending for 35 years, starting on your 65th birthday. We will assume a particular set of starting circumstances. Previously we analyzed the choice of risk for the allocation of investment balances. Here we assume that we apply that learning and avoid the riskiest allocation. When there is a significant chance of low equity returns at the start of retirement, the previous analysis shows that the riskier allocation leads to running out of money much earlier if the poor returns scenario materializes. Using realistic return sequences, as we will do in the current analysis, confirms this finding.

For purposes of this newsletter, we will ignore the possibility of downsizing the personal residence while noting that this remains an important safety valve for responding to unfavorable cost or investment results. Elimination of this possibility and the portfolio risk choices results in two choices under our control for this analysis. As before, the main choice variable is the initial level of spending as a percentage of the starting assets. We compare 5 possible choices: 4%, 4.5%, 5%, 5.5% and 6%. Now that our analysis will incorporate social security, we can also choose whether to start taking it at age 65 or delay it to age 70.

The output we use to judge the outcome of our choices is the resulting time series of investment balances and the age at which assets go to 0.

Our starting point is the same as in part 2 where we own a house that would rent for $60,000 and we have net worth of $3,000,000. See **Exhibit A** for further details on these initial conditions. As before we want to separate the spending budget decision from the housing investment decision and also keep it separate from the social security timing decision. Thus we will specify an initial spending budget as a percent of net worth and we will stipulate that 2% of net worth (the rental value of the house) is devoted to housing costs regardless of actual cash outlays and forgone investment returns on home equity. In addition to the budget we set as a percentage of net worth we will add the after-tax amount of social security that we could receive if we start it at age 65 regardless of whether we start it or delay it. This after-tax amount is calculated as $52,325 for a couple at age 65 (and born before 1955).

The non-housing budget then grows with inflation as does the cost of renting (in the event that we need to sell the house and rent so as to use the equity for other spending). Rents and home prices increase over time in line with inflation as per the analysis in the part 2 newsletter. Although we've used $60,000 as housing costs in year one to translate housing consumption into a percentage of initial net worth, the model uses actual cash costs (net of tax savings) each year while the house is owned. At a point when the house must be sold to fund spending, the housing component of the spending budget reverts to rental costs. See **Exhibit A** for details of housing costs.

Time Varying Inflation and Returns

In part 1of this series we did a very simple analysis of risk using different assumptions about equity returns over the first 10 years. In part 2 we used static returns in order to focus on the housing choice aspect of retirement. In this newsletter we will begin by looking at results using the constant inflation and returns from part 2 so as to link the two sets of analyses; then we will use a more realistic scenario where inflation and asset returns can vary each year. Because we want to ensure all these variables are internally consistent, I've chosen to use an actual series from history[1] – with a slight adjustment to take into account the current valuations in the stock market as compared to the historical starting point.

In particular I've chosen to use the inflation, interest rates, and equity market returns starting in 1965 and stepping forward year by year for 35 years to the end of 1999. In doing this I made several estimations and adjustments so that the data could plausibly relate to the near future in 2018. Since no data is available for high yield bond spreads prior 12/31/1996, I assumed that the high yield spread at the start of 1965 was equal to today's spread. From 1965 to 1996 I estimated spread movements using a model that relates movements to equity market returns. Second, because the equity market valuation per future dollar of

[1] Economic and capital market variables are related in complex ways and although I'd prefer a full go-forward simulation to choosing a particular historical path, such an exercise would be the equivalent of a Ph.D. thesis and thus beyond the time I have for this humble newsletter.

cash flow is higher than in 1965, I assumed that this valuation difference was amortized against returns during the first five years so that using the historical returns would be realistic when starting from today's stock prices. I choose this particular starting point (1965) in order to minimize the necessary adjustments.

Here is a comparison of 1965 variables to recent history:

Time	Inflation	10 year Treasury Yield	12 month Equity Return	CAPE (a)	High Yield Bond Rate (b)	1 month T-Bill Yield (c)
1965 start	1.92%	4.19%	14.16%	26.65	7.44%	3.92%
Current	2.70%	3.06%	15.66%	36.15	6.31%	2.11%

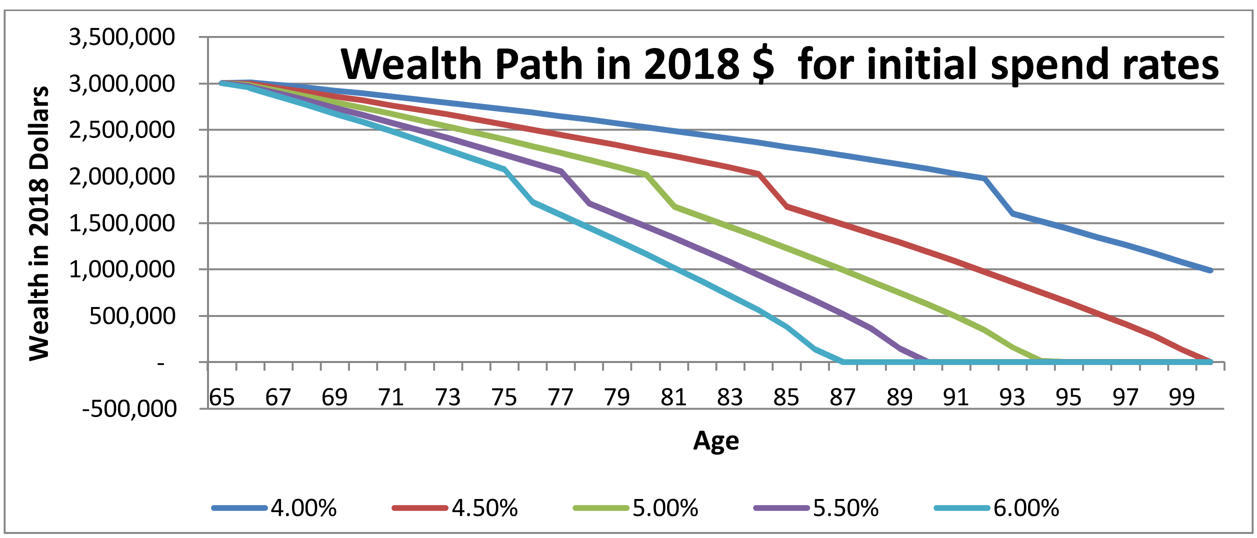
(a) Cyclically Adjusted Price to Earnings Ratio (adjusted for stock buybacks)
(b) The 1965 starting high yield bond spread is not available - so set equal to current
(c) We are assuming money market balances earn the 1 month T-Bill rate

See **Exhibit B** for details of the time series of inflation and returns used in the analysis.

Constant Returns Base Case Taking Social Security at 65

In part 2 we assumed constant returns and inflation over 35 years as follows:
Inflation, housing appreciation, and T-Bill rate = 2.5%
High yield bond annual return = 5.25%
Stocks annual return = 6.5%
In part 2 where we used the old tax rates and didn't take into account social security we calculated that we would have money left over when choosing the 4% or 4.5% initial spending levels. Each higher spending level above 4.5% would have lowered the age of running out of money – to 95, 91, and 88 respectively.

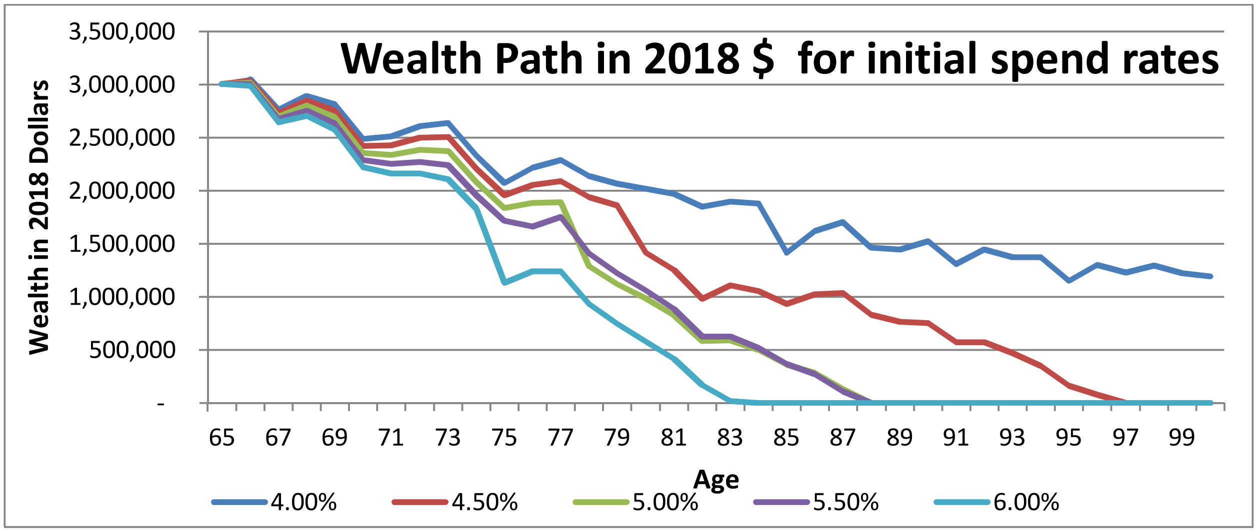
Now, incorporating the new tax law and taking social security at age 65 here is the graph of asset balances (measured in current dollars) for each of the 5 initial spending rates:



Here again the money lasts for the 4% and 4.5% spending level. Each higher spending level above 4.5% lowers the age at which money runs out – to 95, 90, and 87. This is almost exactly the same (though we are actually modeling higher spending thanks to social security).

Realistic Returns and Taking Social Security at 65

Now we're ready to see how the variations across time in real inflation and asset returns impact how long our money will last in retirement. We already know from the part 1 newsletter that non-constant returns lead to faster depletion of assets even if the overall average returns are higher. Here's the graph:



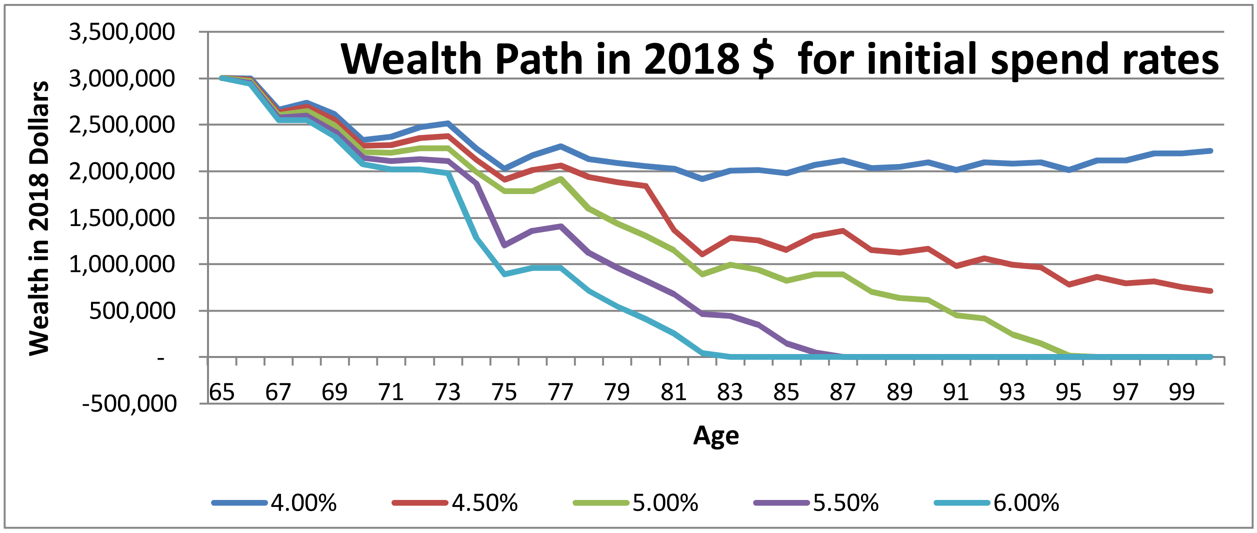
Only the 4% initial budget leaves money remaining at age 100 here. Above this level of spending the ages of running out of money move lower for each higher budget as follows: 97, 88, 88, and 84. In this case the 5% and 5.5% spending choices yield the same result. This seems to be related to this particular path of returns where there are very high returns at age 86 and 87 and then terrible returns at age 88. The 5.5% spending level does require that the home be sold 2 years earlier than if the budget were 5%.

These are much worse results than the case of constant inflation and returns. A much higher inflation average is one culprit here. Over these 35 years the compounded rate of inflation is 4.9% and it is 5.2% over the first 10 years. Because of the interaction of inflation with the taxes on investment income, this drives up the portion of income used to pay taxes and thus the rate of spending.

The other big factor is relatively poor equity returns right at the beginning of retirement. Although the compounded annual equity return adjusted for inflation over the full 35 years is higher than the constant returns case (6% compared to 3.9%), it is -7.1% compounded over the first 10 years after adjustment for inflation. Thus a riskier asset allocation would make things significantly worse for this sequence of returns even though the long run returns are good.

Realistic Returns and Delaying Social Security to 70

Finally, we take a look at delaying taking social security from age 65 to age 70. We expect that this will reduce our risks of running out of money in high inflation environments because our returns to this strategy rise with inflation whereas after-tax asset returns are typically hurt by inflation. Spending in this scenario is the same as the other scenarios; it is only our method of funding the spending that is changing. Here is the graph:



We see here that delaying social security causes us to not run out of money for spending at the 4% and 4.5% levels. At progressively higher levels of spending above 4.5% we run out of money at ages 96, 87, and 84. Things look particularly good for the 4% level because in this scenario there is no need to sell the house and thus the tax hit on the house sale (which shows as a kink down in the other paths) never happens.

Analysis of the Social Security Delay Decision

The table below summarizes the results across the three scenarios we've analyzed.

Scenario Description	Initial Spending Rate as % of assets: 4.0%	4.5%	5.0%	5.5%	6.0%	Present Value of all tax as % of all income at the 4.5% spend rate
	Age when run out of funds by withdrawal rate:					
Constant Returns/S.S. at 65			95	90	87	13.8%
Realistic Returns/S.S. at 65		97	88	88	84	19.9%
Realistic Returns/S.S. at 70			96	87	84	21.3%

Looking at the results for the realistic series of inflation and returns, delaying social security leads to our money lasting longer when the starting spending budget is 5% or less of initial wealth. At an initial budget of 5.5% or 6% delaying social security will deplete savings balances a bit faster than taking social security at age 65. This is because the benefits of delaying social security take many years to make up for the forgone early income. If you are rapidly spending all your savings, you will run out of assets before you can recoup the forgone income. You would still benefit from delaying social security by having higher income later in life, but it would not prevent you from depleting your savings. For example, at age 88 your social security income would be 41% higher if you started drawing it at 70 compared to starting at age 65. So even if you ran out of savings, you would still be able to pay living expenses at some lower standard of living. Unless your health is such that you're unlikely to live to 85, it is safer financially to delay taking social security.

Summary and Conclusions

In this third installment of our series exploring the linkage between savings and the capacity for retirement spending, we looked at how higher inflation and unfavorable sequences of real returns could decrease how long our savings will last in retirement. We then showed that delaying social security to age 70 could mitigate some of this risk – at least for spending levels below 5.5% of initial wealth.

The results show that by delaying social security to decrease the sensitivity of future results to inflation, we can safely increase our initial spending budget to 4.5% of assets – meaning our non-housing budget can rise from 2% of assets to 2.5% of assets. Even a budget of 5% of initial assets might work out if we are willing to downsize when our residence is eventually sold.

These results are very much dependent on this particular set of historic inflation and market returns as well as the current tax laws. Also, so far we have not attempted to incorporate our potential responses to changing conditions. For example, in real life you could revisit spending level decisions throughout retirement in order to adjust to more or less favorable conditions. In addition we could respond to changes in market conditions to adjust allocations so as to improve our returns compared to the fixed allocations modeled so far. These potential enhancements to the analysis can be tackled in a later analysis. By focusing our analysis on just a few issues at a time we are building up an in-depth understanding of the various pieces that come into play in planning for funding our retirement spending.

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Exhibit A

Initial Conditions Assumptions

The starting situation at age 65 is $3,000,000 in net worth, with 89% in a combination of home equity and taxable accounts, 10% in a tax deferred account (an IRA) and 1% in a tax free Roth account. Whether owned or rented, the residence is a home worth $1,450,000 (which was roughly the median value in San Francisco in 2017). Based on an analysis of the relationship between house prices and rents, the rent for the house would be $5,000 per month. Note that the annual rent of $60,000 equals 2% of initial net worth so that we are fixing the housing portion of the budget at that level for purposes of this analysis. (Higher spending levels are assumed to go towards non-housing items).

In the situation where the home is owned, we need to assume some history of the home and its financing in order to properly account for costs and taxes going forward. The year purchased determines the income tax basis, the property tax basis, and the maximum mortgage amount for which interest is deductable from taxable income. We assume the house was purchased 25 years ago. Using data from an index of housing prices we calculate that the implied purchase price was $424,000. This is also the income tax basis. Property tax assessed value increases by 2% annually so that the current assessed value would be $695,617. Using this we can calculate property tax and how it increases through time. We assume that insurance repairs and maintenance increase according to general inflation.

For the history of the mortgage, we assume that the owner tries to maintain the mortgage balance at the highest level where interest is fully deductible but refinances the mortgage (at least twice) to take advantage of significant declines in mortgage rates. The net result is a mortgage of $320,000 at 4% with amortization over the 25 years remaining. Thus the current home equity of the owner would be $1,130,000 (1,450,000 – 320,000) and the monthly payment would be $1,762.

These starting assumptions are important for determining the taxes that will become due over the forecast period. Lower starting assets, a more recent home purchase, or a higher percentage in the Roth could significantly reduce tax rates applied to investment income.

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. For taxable liquid assets we assume 2% is held in a money market account as reserves, 78% is in high yield bonds, and 20% is in equity.

Exhibit B

	Annualized Compounded Averages			
		1 month	High Yield	
		T-Bill	Bond	Equity
	Inflation	return	Return	Returns
Constant Assumption	2.50%	2.50%	5.25%	6.50%
First 10 Years	5.22%	5.42%	6.13%	-2.22%
Full 35 Years	4.93%	6.51%	10.88%	11.22%
	Year by Year outcomes			
1965	1.92%	3.92%	8.02%	7.41%
1966	3.46%	4.75%	-4.57%	-14.29%
1967	3.04%	4.20%	16.69%	19.82%
1968	4.72%	5.22%	4.21%	6.22%
1969	6.20%	6.57%	-7.47%	-15.66%
1970	5.57%	6.52%	22.58%	0.52%
1971	3.27%	4.39%	19.76%	16.25%
1972	3.41%	3.84%	9.31%	17.75%
1973	8.71%	6.93%	-5.72%	-18.29%
1974	12.34%	8.01%	3.28%	-28.07%
1975	6.94%	5.80%	37.73%	37.85%
1976	4.86%	5.08%	21.81%	26.61%
1977	6.70%	5.13%	-2.43%	-3.45%
1978	9.02%	7.20%	10.02%	8.49%
1979	13.29%	10.38%	12.58%	24.54%
1980	12.52%	11.26%	5.31%	33.40%
1981	8.92%	14.73%	1.49%	-4.51%
1982	3.83%	11.23%	42.67%	20.49%
1983	3.79%	8.90%	10.71%	22.82%
1984	3.95%	10.00%	10.61%	2.14%
1985	3.80%	7.78%	32.78%	30.80%
1986	1.10%	6.21%	18.66%	15.55%
1987	4.43%	5.88%	-1.96%	1.85%
1988	4.42%	6.72%	13.63%	17.48%
1989	4.65%	8.49%	20.13%	28.35%
1990	6.11%	7.79%	5.40%	-6.24%
1991	3.06%	5.65%	24.00%	34.21%
1992	2.90%	3.55%	9.54%	9.22%
1993	2.75%	3.04%	15.88%	11.45%
1994	2.67%	4.17%	-4.91%	-0.41%
1995	2.54%	5.66%	28.30%	36.12%
1996	3.32%	5.13%	3.70%	21.41%
1997	1.70%	5.18%	15.31%	30.72%
1998	1.61%	4.93%	0.26%	22.74%
1999	2.68%	4.73%	5.95%	25.63%