Appendix 1: The Math of Retirement Management

What is provided here are all the formulas that I use in the analysis of retirement income. This is how I came up with my "Retirement Management Idea" (see *Retirement Management Idea*).

Everything can be done on a Fixed, Total (or, if you want), Flexible basis. If it is not stated, well, we'll let you imply it. I also put both the "Percentage" and "Amount" here. I designed the formulas to be mathematically equivalent, but having both percentage rate and amounts provides different information.

Further, for "today" everything can be done with pencil and paper, except perhaps your budget. That said, a spreadsheet is useful if you are interested in projecting out the future.

Things you will need:

Its time go to get our assumptions in order:

- You'll need to have your budget worked out (that's the hard part – you probably had to work your assumptions off).
- You'll need your various account balances.
- You need to have a "Target" investment rate. (TargetRate)
- You need to know your Tax Rate on Income (FITRate)

Taxes are complicated, to say the least. I would suggest you take your total taxes owed and divide it by your AGI from your 1040 form. I would not try to adjust for capital gains, large write-offs, and all the other tax tricks in the book. Just get close enough.

Group 1: Income Ratio Calculations

Fixed Income Ratio = Fixed Expenses / Fixed Income
Total Income Ratio = Total Expenses / Total Income

Fixed Income Needed = Fixed Expenses – Fixed Income
Total Income Needed = Total Income – Total Expenses

Next is the part where IRA Pays His Taxes

Withdrawal

- From non-qualified funds (savings, after tax brokerage funds, Roth IRA, etc.)
- From qualified funds (IRA's, 401(k), 457, etc.) – your friendly neighborhood IRA

For nonqualified funds, the Withdrawal (WD) = Income Needed

For qualified funds, you need to add taxes to those withdrawals:

$$WD = \frac{WD}{1 - FITRate}$$

Comment: It is possible to allocate your income needed against both qual and non-qual accounts. The formulas below assume that you're drawing from only one type of fund.

Group 2: Earnings from Invested Assets

I'll give you two formulas here. They are equivalent, but how you use them is a bit different. You can use these on a Fixed Income or Total Income Basis – just swap in the Fixed or Total Income Needed.

$$Minimum\ Invested\ Assets = \frac{WD}{TargetRate\ x\ (1 - FITRate)}$$

Note that the Minimum Earning Rate is calculated using Invested Assets (since these generate income and I assume that your basic savings does not).

$$Minimum\ Earning\ Rate\ = \frac{WD}{InvAssets\ x\ (1 - FITRate)}$$

Where:

Income Needed = Either the Fixed or Total Income Needed.
InvAssets = The Invested Assets that you've saved.
TargetRate = An inputted earning rate, typically the "target investment rate".
FITRate = *Combined approximate State/Federal tax on income.*

A few comments:

- I solved for these formulas assuming that you take your withdrawals at the end of the year, not the beginning. I do have the formulas the other way around, but they're more complicated and I wanted simple.
- *That said, having withdrawals at the End of Year means that you are consistently overstating your earnings on invested assets during the year.* I did this for simplicity; with volatility in your spending, the stock market and the volatile nature of various ostriches, the difference from this is really not an issue.
- The formulas for Earnings Rates and Invested Assets are equivalent to one another, but one is a rate and the other is an amount. Both are useful to give you context.

How do we use these?

Solving for the Minimum Savings Needed

We can define one more thing:

> *Nest Egg* = Total Savings you have less Minimum Assets Needed.
>
> *Risk Tolerance* = *Target Investment Rate – Minimum Investment Rate*

These can be viewed as risk measures how much can I vary from my target and be ok. But a more complete perspective is:

- If the amounts are positive: These tell you how much you can afford to lose before your basic earnings are paying for expenses in that year.
- If the amounts are negative: A better perspective is to help plan savings – either through increased investment earnings (and risks that go with it), or putting more money into savings, or by cutting expenses.

The Nest Egg as I define it is really just an update from what your parents would have thought. They looked at it as "above my pension". Now it has to pull double-duty and BE your pension. The key is that any additional earnings on your Nest Egg can help offset future costs which are only going to increase over time. Ultimately, this becomes your kid's inheritance (assuming you like them; you can leave it to the cat if you'd prefer, or to us at LarryLand).