Retirement Tool Class

Objectives

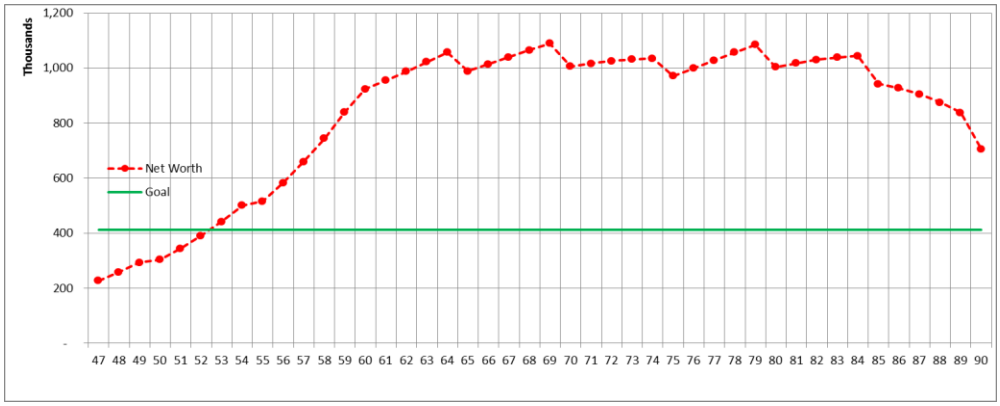
1. Use the tool to estimate and manipulate your **retirement funds at retirement age**.
2. Use the tool to estimate and manipulate the **minimum amount needed** in a retirement fund to retire and maintain your standard of living as long as you live.
3. Use the tool to estimate and manipulate your remaining **funds at death**.

What you need to know

Key Dates and Durations and Estimates				
User Defined	Year (yyyy)	#1		Year born
Calculated	Age (nn)	#2	0	Current age
User Defined	Dollars	#3		Current retirement fund value
User Defined	Dollars	#4		Current annual salary/expenses
Estimate	Rate	#5		Inflation rate
User Defined	Years (nn)	#6		Economic downturn freqency
User Defined	Rate	#7		Economic downturn rate
Pre-retirement planning				
User Defined	Age (nn)	#8		Retire age
Calculated	Year (yyyy)	#9	0	Retire year
Calculated	Age (nn)	#10	0	Years to retire
User Defined	Rate	#11		Annual wage growth until retirement
User Defined	Dollars	#12		Monthly investments until retirement
Estimate	Rate	#13		Inv. growth rate before retirement
Calculated	Dollars	#14	$0	Annual salary @ retirement
Calculated	Dollars	#15	$0	Annual expenses inflated to retirement
What's needed vs. what you have				
Calculated	Dollars	#16	$0	Net worth needed retire and keep principle
Calculated	Dollars	#17	$0	Net worth @ retirement
Estimate	Rate	#18		Inv. growth rate after retirement
Post-Retirement				
User Defined	Age (nn)	#19		Death age
Calculated	Age (nn)	#20	0	Years after retirement
User Defined	Dollars	#21		Annual pension received
User Defined	Rate	#22		Pension growth rate (COLA)
User Defined	Dollars	#23		Annual social security payment received
User Defined	Age (nn)	#24		Age starting social security
User Defined	Rate	#25		Social security growth rate (COLA)
User Defined	Dollars	#26		Post retirement annual income
User Defined	Years (nn)	#27		Years working after retirement
Calculated	Dollars	#28	$0	Net worth @ death

This class has five parts: (1) Objectives, (2) What you need to know, (3) Guided Practice, (4) Independent Practice, and (5) Challenge. The Objectives tell you what you will be able to do as a result of this class. "What you need to know" explains the information you need to understand as you complete the tasks outlined in Guided Practice. The Guided Practice walks you through the fundamental steps needed to accomplish a task. Key to your learning is reading and thinking about the question you are addressing in each step of the Guided Practice. Independent Practice is just like the Guided Practice but without the step-by-step instructions needed to complete the task needed to answer the question posed. However, should you find you need some help, look to the Guided Practice for a similar task. The Challenge if optional and asks you to complete tasks that have not been taught as part of this lesson but are closely related. This section is aimed at those individuals how probably already know how to complete the objectives but may not have attempted some the more Challenging related features included here.

The purpose of this spreadsheet is to estimate how much you need in your retirement fund to retire at a desired age. Once retired, or if already retired, this sheet helps you estimate what investment return you need to continue funding your retirement.



Visually, you want boxes #17 and #28 to be green. Net worth @ retirement (#17) is green if its value is greater or equal to Net worth need to retire (#16). Net worth @ death (#28) is green if it has a positive value. Both boxes green may be ideal but there are many successful scenarios not requiring both green.

On the chart, you want the Net Worth line above the green Goal line to begin your retirement. You may want your net worth to be above zero at your estimated death if you want to leave your heirs any legacy.

How it works

Here's what the sheet looks like. You need to update the information in the yellow cells with your information to get started. All other entries are calculations or text.

This sheet is designed to estimate (1) how much you are likely to have based on your current investment profile (#17); (2) how much you need to retire (#16); and (3) what your net worth is expected at death (#28).

How much will you have? We start with your financial profile and estimate how much you're likely to have at retirement age. For any future value projection there are four key variables: present value (#3), rate of growth (#11), years to grow (#10), and investment payments (#12). We calculate this on the Details sheet, year by year, and then lookup the results for *Net worth @ retirement (#17)*. This allows us to chart the year-by-year changes on the Chart sheet (red line).

How much will you need? Knowing how much you're likely to have, the question is, how much do you need? Your need is based primarily on your *Current annual salary/expenses (#4)*. This spreadsheet assumes you spend 100% of your wages every year. To determine how much you need at retirement we inflate your current wage until retirement (#14). Conventional wisdom suggests you can live forever on you retirement if you never withdraw more than 4% of your retirement fund for living expenses. Assuming you have a million dollars this guidance suggests you can live forever on that amount if your expenses don't exceed $1 million x 4% = $40,000. We reverse that math and determine how much we need by dividing the amount we need (inflated expenses) (#15) by the *Investment rate growth rate after retirement (#18). Net worth needed to retire* (#16) shows the resulsts.

We highlight *Net worth @ retirement (#17)* green if it exceeds *Net worth needed (#16);* otherwise it's highlighted red when it falls short.

How much left at death? Your *net worth at death* (#28) is ultimately determined by how quickly spend vs. how quickly you replenish & grow your investments. Spending rate is determined by inflation (#5) of your original *Current annual salary/expense (#4)*. Three options are built-in to slow spending by supplementing post-retirement income with (1) a pension (#22); (2) Social Security (#23); and (3) working (#26) for a wage during retirement.

Pension (#22) and Social Security (#25) allow for a COLA rate. A job during retirement is assumed to have a limited number of years (#27) with no expected growth in revenue.

Guided Practice

1. Bob was born in 1965 and plans to retire at age 65. He has $200,00 in his retirement account and is all planning to make 10% annually on his investments. How much will he have when he retires?
   a. Enter the following in the tool:
      i. Born in 1965, (#1)
      ii. Current retirement fund value = $200,000, (#3)
      iii. Retirement Age = 65 (#8)
      iv. Investment growth rate = 10% (#13)
   b. The answer is found in #17 - *Net worth @ retirement*
      i. Answer: $1,223,182 or about $1.2 million.
2. Bob wants to know if his $1.2 million will be enough to sustain his annual income/expenses of $60,000 annually at 3% inflation. Bob is planning to lower his investment risk/growth to 8% after retirement.
   a. Enter the following in the tool:
      i. $60,000 in Current Salary/Expenses (#4)
      ii. 3% inflation (#5)
      iii. 8% growth rate after retirement (#18)
   b. The answer is found in by comparing the amount Bob will have, #17, with the amount he will need, #16.
      i. The answer is no, since we expect he will need $2.1 million but only has $1.2 million.
3. Bob is told his salary is likely to increase by 5% annually and that he should routinely invest about 10% of his gross into his retirement fund. If Bob deposits $6,000 annually, $500/month, will that boost his funds to achieve his goal of $2.1 million.
   a. Enter the following into the tool:
      i. Annual wage growth = 5% (#11)
      ii. Monthly investment = $500 (#12)
   b. The answer is same still no, Bob will increase his fund to $1.6 million but that still doesn't achieve his goal of $2.1 million.
4. Bob has been advised that once he is retired, given his extra time and interest in investing he can reasonably expect to improve his return after retirement to 10-12%.
   a. Enter the following into the tool:
      i. Change the Investment growth rate (#18) to 10%
   b. The answer is yes, with the increase growth rate post-retirement we see our minimum needed reduced to $1.5 million, just under our projected balance.
5. After this recent recession, Bob is concerned about the impact of recessionary markets. He's asked if we can include a 5% recessionary drop every 5 years.
   a. Enter the following into the tool:
      i. Economic downturn frequency = 5 (#6)
      ii. Economic downturn rate = 5% (#7)
   b. Bob was right to be concerned. The fund amount has dropped below the $1.5 million (#17) goal to $1.4 million (#16).
6. Bob is so close to his goal he is curious to know how much he would have as a legacy with the current profile if he were to die at age 90?
   a. Enter the following into the tool:
      i. Death age = 90 (#19)
   b. Bob will have *Net worth @ death* (#28) of $469,920.

7. Bob remembers he will be getting a pension upon retirement of about $40,000 annually, adjusted with a COLA of about 1.5%. How does that affect the results?
    a. Enter the following in the tool:
        i. *Annual pension received* (#21)= $40,000
        ii. *Pension growth rate (COLA)* (#22) = 1.5%
    b. The pension reduced the goal needed to $900K (#16) with the increase revenue during retirement increasing the potential legacy to $4.6 million (#28).
8. Bob confesses he plans to work for a friend for about 5 years after retiring. He expects to earn about $10,000 each year. What impact will this have?
    a. Enter the following into the tool:
        i. Post retirement annual income = $10,000
        ii. Years working after retirement = 5
    b. The additional $50,000 post retirement only impacts net worth @ death (#28) increasing is slightly to $4.9 million from $4.6 million.
9. Finally, Bob mentions he plans to collect about $30,000 annually for Social Security with an annual 1.5% COLA adjustment at age 70.
    a. Enter the following into the tool:
        i. *Annual social security payment* (#23) = $30,000
        ii. Age starting social security (#24) = 70
        iii. Social security COLA (#25) = 1.5%
    b. The result is nice.
        i. As a post retirement revenue stream the main impact is on the legacy increasing it to $6.8 million (#28) from $6.4 million.
        ii. The goal for retirement has also been impacted since this can be a planned revenue. The goal has changed to $500K (#16) from $900K.

Independent Practice

1. Frank, born in 1955, has $750,000 in his retirement fund and would like to retire at age 65. He makes/spends about $100K annually, expects that amount unchanged, and is expecting inflation to continue to be a bit lower, 2.5% annually. His portfolio is well managed and well positioned for economic downturns, so believes he will maintain a 7% growth both pre and post retirement. Frank will receive a pension of $50,000 annually with a 1% COLA. Frank would like his last check to bounce. How long can frank fund his retirement before he dies with no legacy?

   Answer: Yes, Frank can retire at age 65 and fund his retirement with his current investment profile through age 97.

Key Dates and Durations and Estimates				
User Defined	Year (yyyy)	#1	1955	Year born
Calculated	Age (nn)	#2	57	Current age
User Defined	Dollars	#3	$750,000	Current retirement fund value
User Defined	Dollars	#4	$100,000	Current annual salary/expenses
Estimate	Rate	#5	2.50%	Inflation rate
User Defined	Years (nn)	#6		Economic downturn freqency
User Defined	Rate	#7		Economic downturn rate
Pre-retirement planning				
User Defined	Age (nn)	#8	65	Retire age
Calculated	Year (yyyy)	#9	2020	Retire year
Calculated	Age (nn)	#10	9	Years to retire
User Defined	Rate	#11	0.00%	Annual wage growth until retirement
User Defined	Dollars	#12	$0	Monthly investments until retirement
Estimate	Rate	#13	7.00%	Inv. growth rate before retirement
Calculated	Dollars	#14	$100,000	Annual salary @ retirement
Calculated	Dollars	#15	$124,886	Annual expenses inflated to retirement
What's needed vs. what you have				
Calculated	Dollars	#16	$1,664,140	Net worth needed retire and keep principle
Calculated	Dollars	#17	$1,428,844	Net worth @ retirement
Estimate	Rate	#18	7.00%	Inv. growth rate after retirement
Post-Retirement				
User Defined	Age (nn)	#19	97	Death age
Calculated	Age (nn)	#20	32	Years after retirement
User Defined	Dollars	#21	$50,000	Annual pension received
User Defined	Rate	#22	1.00%	Pension growth rate (COLA)
User Defined	Dollars	#23		Annual social security payment received
User Defined	Age (nn)	#24		Age starting social security
User Defined	Rate	#25		Social security growth rate (COLA)
User Defined	Dollars	#26		Post retirement annual income
User Defined	Years (nn)	#27		Years working after retirement
Calculated	Dollars	#28	$108,014	Net worth @ death

2. Sam, born in 1945, is retired. He has $800,000 in his portfolio and a solid return of 12% He is vulnerable to 5-year, 5% recessionary markets. His expenses are approximately $80,000 annually and expects 3% inflation. He expects to collect $30,000 annually for social security at age 70 with a 1.5% COLA.
   a. Will Sam be able to retire and maintain his lifestyle?
   b. What will Sam's legacy be at age 100?

Answer: Yes, Sam can retire with his current profile. His legacy at 100 is estimated to be

Key Dates and Durations and Estimates				
User Defined	Year (yyyy)	#1	1945	Year born
Calculated	Age (nn)	#2	67	Current age
User Defined	Dollars	#3	$800,000	Current retirement fund value
User Defined	Dollars	#4	$80,000	Current annual salary/expenses
Estimate	Rate	#5	3.00%	Inflation rate
User Defined	Years (nn)	#6	5	Economic downturn freqency
User Defined	Rate	#7	5.00%	Economic downturn rate
Pre-retirement planning				
User Defined	Age (nn)	#8	65	Retire age
Calculated	Year (yyyy)	#9	2010	Retire year
Calculated	Age (nn)	#10	-1	Years to retire
User Defined	Rate	#11	0.00%	Annual wage growth until retirement
User Defined	Dollars	#12	$0	Monthly investments until retirement
Estimate	Rate	#13		Inv. growth rate before retirement
Calculated	Dollars	#14	$80,000	Annual salary @ retirement
Calculated	Dollars	#15	$77,670	Annual expenses inflated to retirement
What's needed vs. what you have				
Calculated	Dollars	#16	$529,666	Net worth needed retire and keep principle
Calculated	Dollars	#17	$800,000	Net worth @ retirement
Estimate	Rate	#18	12.00%	Inv. growth rate after retirement
Post-Retirement				
User Defined	Age (nn)	#19	100	Death age
Calculated	Age (nn)	#20	35	Years after retirement
User Defined	Dollars	#21		Annual pension received
User Defined	Rate	#22		Pension growth rate (COLA)
User Defined	Dollars	#23	$30,000	Annual social security payment received
User Defined	Age (nn)	#24	70	Age starting social security
User Defined	Rate	#25	1.50%	Social security growth rate (COLA)
User Defined	Dollars	#26		Post retirement annual income
User Defined	Years (nn)	#27		Years working after retirement
Calculated	Dollars	#28	$2,528,611	Net worth @ death

Challenge

1. Try doing a sensitivity analysis to determine which variables have the most impact of the results. The most common variables to test would include time, rate, and principal, payment.

   Setup a retirement profile and record/print the results. Next change one variable, for example increase the growth rate by 1% or increase the time by 1 year and again record the results. Do this for each of your selected variables making your changes reasonable for the profile. Use this table to help record the results. (available in spreadsheet on "Challenge" tab.)

	Original	Change 1	Change 2	Change 3	Change 4	Change 5
Age #1						
% diff		0.0%				
Age #19						
% diff			0.0%			
Rate #3						
% diff				0.0%		
Rate #13						
% diff					0.0%	
Rate #18						
% diff						0.0%
Calc #16						
% diff		0.0%	0.0%	0.0%	0.0%	0.0%
Calc #17						
% diff		0.0%	0.0%	0.0%	0.0%	0.0%
Calc #28						
% diff		0.0%	0.0%	0.0%	0.0%	0.0%

2. Setup a profile of your choosing and use Excel's Data/What-If Analysis/Goal Seek feature to determine the minimum pre-retirement growth rate for a particular growth rate.

3. Setup a profile of your choosing and use the Excel Data/What-If Analysis/Data Table feature to evaluate the results of change two variables. (Hint: This feature must be used on the same sheet you are evaluating.)

   Example:

		Inflation rate (#5)						
	-$5,063,083	1%	1.50%	2%	2.50%	3%	3.50%	4%
Growth Rate after Retirement (#18)	7%	(2,458,003)	(3,015,826)	(3,619,113)	(4,272,187)	(4,979,808)	(5,747,216)	(6,580,185)
	7.50%	(2,384,073)	(2,974,983)	(3,613,240)	(4,303,300)	(5,050,064)	(5,858,928)	(6,735,832)
	8%	(2,270,956)	(2,897,502)	(3,573,389)	(4,303,211)	(5,092,019)	(5,945,371)	(6,869,379)
	8.50%	(2,111,036)	(2,775,982)	(3,492,381)	(4,264,973)	(5,098,964)	(6,000,082)	(6,974,619)
	9%	(1,895,510)	(2,601,854)	(3,361,890)	(4,180,509)	(5,063,083)	(6,015,513)	(7,044,285)
	9.50%	(1,614,227)	(2,365,222)	(3,172,283)	(4,040,460)	(4,975,297)	(5,982,880)	(7,069,891)
	10%	(1,255,506)	(2,054,682)	(2,912,442)	(3,834,004)	(4,825,091)	(5,891,981)	(7,041,566)
	10.50%	(805,924)	(1,657,112)	(2,569,557)	(3,548,652)	(4,600,308)	(5,731,006)	(6,947,853)
	11%	(250,085)	(1,157,444)	(2,128,899)	(3,170,025)	(4,286,930)	(5,486,308)	(6,775,493)
	11.50%	429,643	(538,403)	(1,573,559)	(2,681,593)	(3,868,822)	(5,142,158)	(6,509,175)
	12%	1,253,423	219,788	(884,162)	(2,064,395)	(3,327,445)	(4,680,458)	(6,131,257)
	12.50%	2,244,284	1,139,733	(38,537)	(1,296,709)	(2,641,543)	(4,080,428)	(5,621,451)
	13%	3,428,487	2,247,237	988,646	(353,692)	(1,786,775)	(3,318,249)	(4,956,473)
	13.50%	4,835,944	3,571,712	2,226,286	793,025	(735,318)	(2,366,660)	(4,109,645)
	14%	6,500,687	5,146,647	3,707,312	2,175,796	544,586	(1,194,514)	(3,050,451)
	14.50%	8,461,387	7,010,123	5,469,198	3,831,467	2,089,140	233,726	(1,744,039)