

## RETIREMENT PLANNING

### Retirement Needs Analysis (Topic 59)

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#### **Retirement Needs Analysis**

As the population ages, the emphasis in financial planning may shift from planning for premature death to planning for living too long. Life expectancy has increased dramatically in the last century, making plans to retire for ten or fifteen years obsolete. Due to advances in medical science, the current retirement is closer to 25 years.

#### **Three Phases of Retirement Planning**

In retirement planning there are three phases: accumulation, consolidation, and distribution. The accumulation of capital occurs during one's working years, roughly between ages 30 and 55. In the second phase of consolidation, the client restructures the investment portfolio to a more conservative allocation that will be subject to less fluctuation in asset value. The third phase is the distribution period when the retiree is collecting from private investments, Social Security, any employer-sponsored qualified or non-qualified plans, and individually directed qualified plans, such as IRAs and Roth IRAs. At each phase there is an interaction between inflation and current interest rates, which affects the outcome of how much one can accumulate and what the capital sum will yield at retirement.

Yearly saving during one's working years is absolutely essential to accomplish an adequate fund for retirement. Some conservatives set an objective of 10% of gross income devoted to savings. That is a goal which few can attain. What is important is setting a

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percentage which is attainable and putting those dollars regularly into a savings or investment vehicle which is appropriate for one's risk tolerance.

### **Assumptions for Retirement Planning Calculations**

The financial planner will use several assumptions in the calculations. It is important that these assumptions be reasonable and are understood and accepted by the client.

### **Inflation Rate**

The client needs to make an assumption regarding the effects of inflation during the period necessary to accumulate assets, as well as during the distribution phase in retirement.

### **Retirement Period and Life Expectancy**

Clients need to determine how long they plan to be in retirement. In other words, clients need to make an educated guess on how long they will live. Clients can look to mortality tables (single or joint life tables) and then adjust this time up or down based on their health status and how long their relatives live.

### **Lifestyle (Distribution Rate)**

Clients need to determine how much they will need for living expenses in retirement. A client's lifestyle will be the biggest factor in determining this amount, especially if the client enjoys a high-society lifestyle or enjoys traveling the world.

### **Total Return**

The retirement account balance will provide the annual income during each year of retirement. The total return rate will assume how the corpus of the account will grow during that time period.

### **Income Sources**

As part of the retirement income analysis method, clients should project all reliable sources of income. This projection should include consideration of options under employer-sponsored pension or deferred-compensation plans and Social Security. If there are lump-sum settlements available from profit-sharing or money-purchase pension plans, clients should consider investing these sums in growth investments to hedge against inflation. Striking a balance between conservative and aggressive investments is a challenge, particularly for retirees who have no current salary.

### **Projection of Retirement Income (Financial Needs)**

There are two ways to set up a projection of desired retirement income:

- (1) Income replacement ratio
- (2) Retirement income analysis

The income replacement ratio method requires a client to estimate a ballpark percentage of preretirement income which appears to be

adequate to provide a standard of living at retirement, comparable to that being enjoyed preretirement. This method is appropriate when retirement is a decade or more in the future.

The percentage of replacement income required has been found to decline as the client's current income increases:

<u>Client Current Earnings</u>	<u>Replacement Ratio</u>
\$15,000 to \$60,000	72% to 82%
\$60,000 to \$90,000	72% to 78%
\$90,000 to \$120,000	60% to 75%

These rough estimates should be refined as the client gets closer to retirement age and develops a consistent lifestyle and more predictable budget.

The retirement income analysis method requires more systematic gathering of client information and should be used when the client approaches retirement. The client should be encouraged to put together a formal budget of expenses. A financial planner should help the client estimate the amount of income that will be needed during retirement to maintain the desired lifestyle. A client will need to recognize that during retirement, some categories of expenses will increase, some will decrease, some will stay the same, and a new category or two may be added. Continuing expenses will include food, clothing, and shelter, but the bottom line may change if the client decides to move into a retirement/assisted-living facility. Those expenses which may disappear are tuition payments, mortgage payments, and car payments. Those expenses which may increase include prescription drugs and medical and dental care. New categories which might enter the picture are travel and entertainment, gifts for grandchildren, and charitable giving.

The planner must assimilate all of these factors in determining the relationship between current expenditures and those anticipated at retirement. This process allows an initial projection of retirement income. For planning purposes, this income figure needs to be inflated to future dollars at retirement.

**Calculation of the First  
Year in Retirement  
Income Need**

For example, if the planner determines that the retirement income need in 28 years is \$52,000 in today's dollars, that number must be inflated to equal the future dollars at the selected retirement age.

If the planner determines that the Spencer family would need \$52,000 of retirement income in today's dollars, subtracting

\$14,000 of anticipated Social Security income leaves a net amount of \$38,000. The planner then must inflate this income figure (pv), using the assumed inflation rate (i), the number of periods to retirement (n), to arrive at its value at retirement (fv):

$$\begin{aligned}i &= 3\% \\pv &= \$38,000 \\n &= 28 \\fv &= \$86,941\end{aligned}$$

**Calculation of Additional Funds Needed to Meet Objectives**

Once the first year in retirement income amount is determined, the planner will be able to begin to estimate the fund necessary at retirement to sustain the desired level of income through the retirement period.

**Calculation of the Retirement Fund**

To determine the retirement fund necessary at retirement (pv), the variables must be entered as follows:

- i – An inflation-adjusted interest rate must be used. This rate may be determined using a financial calculator or by using the following formula:

$$\left[ \left( \frac{1 + \text{Assumed interest rate}}{1 + \text{Assumed inflation rate}} \right) - 1 \right] \times 100$$

Using an assumed after-tax return of 9% and an assumed inflation rate of 3%, the inflation-adjusted rate of return would equal 5.8252%. The above formula is applied as follows:

$$[(1.09/1.03) - 1] \times 100 = 5.8252$$

An inflation-adjusted rate of return will result in a serial payment, that is, a payment that increases each year by the assumed rate of inflation. This is critical for retirement income projections.

Most financial calculators can provide an inflation-adjusted rate of return with specialized keystrokes:

- n – The number of payments during the retirement period may be determined by using mortality tables. However, mortality table figures are based on averages. It may be more accurate to adjust the anticipated period based on other factors, such as family history and medical issues. It may be prudent to assume a longer life expectancy than the tables suggest.

pmt – This is the first year's income need, which was determined earlier. Because an inflation-adjusted rate of return is used, this payment will increase each year during retirement by the inflation factor.

pv – Solve for present value. This amount will be needed at retirement (point R) and will grow at the assumed rate of return, providing an inflation-adjusted income each year, which expires after the designated number of years at point E.

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**Example:**

Frank and Donna Spencer would like to retire when Frank reaches age 65, with a retirement income of \$52,000 (today's dollars). Frank is now 37 and Donna is 35. During retirement, they will need this income to keep pace with inflation, and they have determined that they need to plan for retirement income to last until Donna reaches age 95. They assume that their retirement assets will earn 7% after taxes during their retirement years, and that inflation will average 3%. What will the Spencers need to accumulate for retirement under these assumptions (based on today's dollars)?

To calculate the amount of retirement resources necessary at retirement for the Spencers:

1. The first year's inflation-adjusted figure for retirement income after Social Security benefits has already been calculated to equal \$86,941.
2. The number of years of retirement between R and E will be 32 years.

$$n = 32$$

3. The Spencers are assuming that their assets will grow during retirement at an after-tax rate of 7%, and that inflation will average 3%. Their inflation-adjusted rate of return will be:

$$[(1.07/1.03) - 1] \times 100 = 3.8835$$

$$i = 3.8835\%$$

4. During retirement, it is assumed that payments will be made at the beginning of the year, so the calculator must be

set at “begin.” Using the above assumptions, solve for present value (pv).

The answer calculates to \$1,638,515.

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If the Spencers have this level of assets, they will meet their retirement goals. Their first year’s withdrawal from their assets will be \$86,941. At the beginning of their second year of retirement, their retirement assets will have grown 7%, and their withdrawal from those assets will be increased by 3%, to \$89,549. It is also assumed that the Social Security payment will be increased by inflation to provide a totally inflation-adjusted income. At the end of 32 years, the assets will be depleted, based on these assumptions. This assumes capital utilization or using up all of the assets. A capital preservation model would use the income from the investments but leave the principal intact (these models will be discussed in more detail later).

**Calculation of  
Additional Funds  
Needed to Meet  
Objectives**

Up to this point, we have concentrated on the distribution period, the period during which income will be taken. The planner must now review current assets to determine whether they are sufficient to create the necessary amount needed at retirement.

N-----R-----E  
(Accumulation Phase) (Distribution Phase)

At this point, the planner analyzes current assets and projects their growth from now (N) to retirement (R). This amount is then compared to the need projected earlier to determine if sufficient assets exist or if additional savings are necessary.

Assume that the Spencers have accumulated assets which can be earmarked for retirement purposes, which equal \$90,000. The Spencers expect to average 9% on their preretirement savings.

The planner can now estimate the future value of these assets as follows:

$$n = 28 \text{ years}$$

$$i = 9\%$$

$$pv = \$90,000$$

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During the accumulation phase, the planner will set the calculator to the "end" mode, using an assumption that savings payments will be made at the end of the year.

The future value of the current investments calculates to \$1,005,043. The previously estimated amount needed at retirement was \$1,638,515. The shortfall is:

Amount needed at retirement	\$1,638,515
Minus value of current assets	(1,005,043)
Shortfall needed at age 65	\$ 633,472

There are two methods that the Spencers can use to accumulate the necessary additional assets: level payments or serial payments.

**Level Payments  
Calculation**

**Level payments:** This method assumes that the Spencers will save a level amount each year during the accumulation period in order to reach the goal of \$633,472. It accounts for inflation since the \$633,472 is the dollar amount needed by age 65. The calculation is as follows:

$$n = 28$$

$$fv = \$633,472$$

$$i = 9\%$$

Solve for payment.

$$pmt = \$5,607.52$$

The Spencers will need to save \$5,607.52 each year for the 28 years of the accumulation period, assuming a 9% average rate of return, in order to accumulate the \$633,472 of additional assets needed, along with their current assets, to be able to provide the inflation-adjusted income during the distribution period.

**Serial Payments  
Calculation**

**Serial payments:** Serial payments increase each year by the inflation assumption. As such, they provide an inflation adjustment to the accumulation period because the payments increase each year to keep pace. In order to calculate the first year's serial payment, the planner must recognize that inflation must be removed from the age 65 value since it will be accounted for in the serial payments and cannot be accounted for twice. In order to accomplish this, the planner will deflate the age 65 value of \$633,472 by the following method:

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$$n = 28$$

$$i = 3\%$$

$$fv = \$633,472$$

Solve for present value.

$$pv = \$276,876$$

A serial payment is determined by using an inflation-adjusted interest payment in the same manner it was used to determine the annually increasing income payment during the distribution phase.

The assumed rate of return during the accumulation phase is 9%, and the inflation rate assumption is 3%. The calculation for the inflation-adjusted rate of return is performed as follows:

$$[(1.09/1.03) - 1] \times 100 = 5.8252$$

To calculate the first year's serial payment, the planner now inputs the following:

$$n = 28$$

$$i = 5.8252\%$$

$$fv = \$276,876$$

Assuming payments are made at the end of the year, the payment (pmt), calculates to \$4,155.92. This amount must now be increased by the inflation rate (3%) to provide the first year's serial payment:

$$\begin{array}{r} \$4,155.92 \\ \underline{124.68} \\ \$4,280.60 \end{array}$$

The Spencers may begin increasing annual savings at \$4,280.60 but must increase the savings amount each year by 3% in order to accumulate \$633,472 by retirement.

Either method – level payment or serial payments – will bring the Spencers to the same savings amount at retirement.

**Straight-Line Returns  
vs. Probability Analysis**

A financial planner should always remember the sensitivity of variables when evaluating a client's retirement needs analysis. One

## Application Questions

Use the following fact set to answer Questions 1-3.

Paul and Lucinda Reynolds (ages 57 and 56, respectively) have determined that they will require retirement income equal to \$63,000, based on current income. They plan to retire in 8 years and wish to assume an after-tax return on their investments, prior to retirement, of 8%. They plan to readjust their assets after retirement and believe that their net return will drop to 6%. Paul's parents are both in their late eighties, and Lucinda's parents are in their seventies. Paul and Lucinda assume that retirement will last for 30 years, and that inflation will average 2%.

1. What will be their first year's income at retirement?

- A. \$ 63,000
- B. \$ 73,815
- C. \$ 79,807
- D. \$ 99,954
- E. \$116,609

2. What is the amount of capital necessary to support their income need? (Answer within \$25.)

- A. \$897,467
- B. \$1,077,007
- C. \$1,089,492
- D. \$1,288,655
- E. \$1,339,182

3. If the Reynolds decided to count their projected Social Security benefits of \$14,251 per year, what would be the capital amount necessary?

- A. \$1,036,247
- B. \$1,265,801
- C. \$1,444,781
- D. \$1,476,712
- E. \$1,539,971

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Use the following fact set to answer Questions 4 and 5.

Phil Pattison wants to retire in 15 years at age 65. He has determined that he will need a capital sum of \$2,354,000 at that time to provide his retirement income. He presently has a retirement plan with a balance of \$350,000, to which he will add \$26,000 per year. Phil assumes that his preretirement and postretirement rates of return will be 8%, and that inflation will average 3%. He will not consider Social Security in his planning. He expects to live to at least age 80 but wants to use age 95 for all calculations.

4. How close will Phil come to his goal of a capital sum of \$2,354,000?

- A. He will be short by \$537,786.
- B. He will be short by \$1,086,435.
- C. He will achieve his goal, with a surplus of \$156,900.
- D. He will achieve his goal, with a surplus of \$253,895.
- E. There is not sufficient information to determine whether he will achieve his goal or not.

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5. What does Phil expect his first year's retirement income to equal?

- A. \$120,099
- B. \$143,626
- C. \$145,839
- D. \$150,598
- E. \$209,100

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Use the following fact set to answer Questions 6 and 7.

Frank Aldrich has been working at Regal Associates for many years and is planning to retire in 12 years. He needs to accumulate a capital sum of \$1,157,899 by retirement. Based on current projections, his current assets will equal \$980,000 at retirement. Frank realizes that he needs to save additional money for retirement and wishes to know how much. Assume that inflation will equal 3%, and after-tax investment return will be 7%.

6. On a level savings basis, how much should Frank save each year to achieve his goal?

- A. \$8,912
- B. \$9,294
- C. \$9,945
- D. \$11,473
- E. \$11,919

7. If Frank decides to use a serial payment, what would be his first year's savings amount?

- A. \$7,839
- B. \$8,047
- C. \$8,360
- D. \$8,610
- E. \$8,792

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8. (Published question released January, 1999)

Billy Smith, age 55, has been a member of the union for 30 years and, as a result, has been excluded from his employer's retirement plan. Billy has been offered a management position with his firm, which will make him eligible to participate in the company's 401(k) plan.

Billy's objective is to retire at age 65 with \$2,000 in monthly retirement income, exclusive of Social Security benefits. He assumes a life expectancy of age 95. The union retirement plan will provide him with \$1,000 monthly. There are no matching contributions from Billy's employer to the 401(k) plan, and his income is adequate to have the required level of contributions fall within the deferral limits of the 401(k) plan. Contributions and payments, as appropriate, are made at the beginning of each month.

If the return in the company's 401(k) plan is 10%, what monthly amount will Billy have to contribute to that plan for 10 years to meet his objective?

- A. \$556
- B. \$566
- C. \$576
- D. \$747
- E. \$1,113

## Answers and Explanations

- 1. B** is the answer. Current income need (\$63,000) should be adjusted by the inflation factor (2%) for the time period until retirement (8 years). To solve this problem on your financial calculator, you need to input  $n = 8$ ,  $I = 2$ ,  $PV = 63,000$ , and  $PMT = 0$  and then solve for  $FV$ , which is \$73,815.
- 2. E** is the answer. The capital required is calculated using a first year's income of \$73,815, an inflation-adjusted rate of return of 3.9216% [ $i = (1.06/1.02 - 1) \times 100$ ], and 30 years of retirement. To solve this problem on your financial calculator, you need to set the calculator for the "begin" mode and then input  $n = 30$ ,  $I = 3.9216$ ,  $PMT = 73,815$ , and  $FV = 0$  and then solve for  $PV$ , which is \$1,339,182.
- 3. A** is the answer. Since Social Security payments are inflation indexed, the \$14,251 must be subtracted from the current value of \$63,000. The result is then inflated to retirement and used to determine the capital sum necessary on your calculator with  $n = 8$ ,  $I = 2$ ,  $PV = 48,749$ , and  $PMT = 0$  and then solve for  $FV$ , which is \$57,117. The next step is to solve for the amount of capital based on this new payment amount. To solve this problem on your financial calculator, you need to set the calculator for the "begin" mode and then input  $n = 30$ ,  $I = 3.9216$  [ $i = (1.06/1.02 - 1) \times 100$ ],  $PMT = 57,117$ , and  $FV = 0$  and then solve for  $PV$ , which is \$1,036,243.
- 4. A** is the answer. The current plan assets with annual contributions will grow at 8% for 15 years, to a value of \$1,816,214 ("end" of year mode), which is \$537,786 (\$2,354,000 - \$1,816,214) short of his goal. To solve this problem on your financial calculator, you need to set the calculator for the "end" mode and then input  $n = 15$ ,  $I = 8$ ,  $PV = 350,000$ , and  $PMT = 26,000$  and then solve for  $FV$ , which is \$1,816,214.
- 5. B** is the answer. To solve this problem on your financial calculator, you need to set the calculator for the "begin" mode and then input  $n = 30$ ,  $I = 4.8544$  [ $I = 1.08/1.03 - 1 \times 100$ ],  $PV = 2,354,000$ ,  $FV = 0$  and then solve for  $PMT$  which is \$143,626.
- 6. C** is the answer. His shortfall is \$177,899 (\$1,157,899 - \$980,000). To solve this problem on your financial calculator, you need to set the calculator for the "end" mode and then input  $n = 12$ ,  $I = 7$ ,  $PV = 0$ , and  $FV = 177,899$  and then solve for  $PMT$ , which is \$9,945.
- 7. D** is the answer. Inflation must first be removed from the difference by inputting  $n = 12$ ,  $I = 3$ ,  $PMT = 0$ , and  $FV = 177,899$  and then solve for  $PV$ , which is 124,775. This answer becomes future value (fv), and an inflation-adjusted rate of return (which puts inflation back into the equation) is used to determine the payment after setting the calculator to the end mode. The final step is to increase the answer by one year's inflation (3%), to arrive at the first serial payment. To solve this problem on your financial calculator, you need to set the calculator for the "end" mode and then input  $n = 12$ ,  $I = 3.883$  [ $I = (1.07/1.03 - 1) \times 100$ ], and  $PV = 0$ ,  $FV = 124,775$ , and then solve for  $PMT$ , which is \$8,360. In order to solve for the first payment, multiply \$8,360 by 1.03 (to add the 3% inflation), which is \$8,610.

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8. **A** is the answer. This question requires you to calculate the present value of the fund that will be needed at retirement to provide an additional \$1,000 of monthly retirement income for the 30 years that Billy Smith expects to be retired. After this fund is computed, you need to compute the monthly amount of savings that will be required over the next 10 years to provide this fund. The plan will produce a 10% return both during Billy Smith's accumulation period and during retirement. The calculation on an HP-10B financial calculator is as follows:

Set the calculator for beginning-of-period payments. Enter \$1,000 as the payment, 360 as the number of payments, and 10/12 as the monthly interest rate. Solve for  $pv$ , which = \$114,900. This amount is the fund needed at 65.

Clear the calculator. Enter \$114,900 as the  $fv$ , 120 as the number of deposits, and 10/12 as the interest rate. Solve for  $pmt$ , which = \$556.28.