Spreadsheet Model: Business Memo

Erik Aune and Andy Converse

Hamline University, School of Business

QMBE 3730-1: Advanced Business Analytics

Professor Kennedy Odongo

March 13, 2025

Introduction

Alfred, a 37-year-old butler, has been working for a wealthy family for several years now. He has become the sole caretaker of the family's child after a fatal car accident. Financially, he is off very well and is living well. Additionally, he has already started saving for retirement, and his employer provides a great match at 5%. However, he hasn't thought much about retirement and wants better guidance.

Summary of Report

By using models and data tables, our report concludes that with change, he will be able to retire at age 65 and live very comfortably in retirement. For Alfred to do this, we found he should increase his additional retirement contributions to $16,000 annually. We also make other recommendations to his financial lifestyle, such as reducing expenditures in his retired life.

Problem Definition and Scope

The problem introduced in this case is that Alfred, a 37-year-old butler, wants to improve his retirement planning. With two decision variables, the age of retirement and the amount of personal contributions, we are tasked to find what will work best for Alfred. Alfred has outlined some expectations, such as savings growth, salary, contributions, and post-retirement expenses for us to work with, as well as some assumptions we will make. We also want to find out when he will deplete his account balance.

Alfred would like to retire at age 65, but he is open to changing his retirement timeline. He has $43,482.62 in his retirement savings account, and he expects an annual return of 5.1%. Alfred currently makes $95,000 yearly, but he expects his salary to grow by 2% annually. He will automatically contribute 2.5% of his salary to his retirement account, and his employer will contribute 5%.

He expects he will require $80,000 to live in retirement, as well as a 15% tax on his withdrawals. He also expects his account to grow by 4% annually post-retirement.

Our assumption is that Alfred's expected numbers will not change. Inflation will grow at 3% annually, which will affect his retirement expenses. We also aren't accounting for additional incomes or expenses.

This problem raises two decision variables for us to adjust how we see fit. Firstly, the amount Alfred will contribute on top of the percentage that goes straight from his salary. He has limited his additional contributions to $22,500. Finally, the age at which he retires. Alfred has previously expressed that he wants to retire at age 65. However, he is willing to change that if need be. We plan on sticking to this age as best as we can.
We will use this information to analyze how much money Alfred will need to contribute every year to have enough money to retire at 65. We will also look at how changing the age at which he retires will affect his retirement savings. Using this information, we will make recommendations on when to retire, how much to contribute, and other spending habits he may want to consider.

Retirement Models and Outputs

We created two models for this case problem. Firstly, the "Pre-Retirement" model was made. This model finds the ending balance of Alfred's retirement account from age 37 to age 100. This model requires a couple of variables to work. Below is the equation used:

$$\text{Ending Savings}_{\text{Age}}=\text{Beginning Savings}+(\text{Beginning Savings}*0.051)+(\text{Personal Contribution}+\text{Employer Contribution})*\text{Current Salary}+\text{Additonal Contributions}$$

Using Microsoft Excel, we were able to find the Ending Savings Balance for each year. This also allowed for us to account for changes in salary by 2% annually and edit variables to get accurate calculations.

We also created a "Post-Retirement" model. This model was made to find the ending savings balance once Alfred retires and begins to deplete the account's funds. This model also works by finding the age of which Alfred retires to 45 years post retirement. The following is the equation used to calculate:

$$\text{Ending Savings Balance}_{\text{Age}}=\text{Beginning Savings}+(\text{Rate of Return, Post Retirement}*\text{Beginning Savings})-(\text{After Inflation Expenses}*(1+\text{Tax Rate}))$$

Similar to the "Pre-Retirement" model, this model allows us to calculate annual changes in inflation and rate of return. This model also adapts to the changing retirement age. If Alfred were to retire younger, he would have less in his retirement account. Conversely, if he retires when he is older, he will have more in his account. The model changes the starting savings balance and age to adapt to the decision variables chosen. This ensures correct calculations in the accounts' balance and longevity.

Based on our two decision variables, Additional Contributions and Age of Retirement, this model works to find two different outputs, Savings Balance at Retirement and Age when Savings is Depleted. The first output, Savings Balance at Retirement, is found using the XLOOKUP function to find how much will be left at the age of retirement that we choose. The second output, Age when Savings is Depleted, uses the INDEX function to find when the balance will be equal to or less than $0.00 and then returns the accompanying age.

Two-Way Data Table

We created a two-way data table to see how much money Alfred will have at retirement by changing the age he retires and the amount of money he contributes. Based on the table below you can see the more he contributes, and the later he retires the more money he will have, but we would like to highlight the exponential growth of this dollar value. As you look at the table every 10 years you wait to retire you will have roughly double the amount to use for retirement. We highlighted the numbers at age 65 (the year he wants to retire) and as you can see there is a huge difference between contributing $5,000 and $25,000 per year, but we would like to find out what is the least he will need to contribute to have enough to live comfortably after retirement

	$5,000	$10,000	$16,000	$20,000	$25,000
37	$57,825	$62,825	$68,825	$72,825	$77,825
47	$258,023	$329,429	$415,117	$472,242	$543,648
57	$609,088	$789,698	$1,006,429	$1,150,916	$1,331,526
65	$1,065,158	$1,381,957	$1,762,116	$2,015,555	$2,332,354
77	$2,238,667	$2,894,176	$3,680,787	$4,205,194	$4,860,704
87	$3,964,861	$5,106,013	$6,475,396	$7,388,318	$8,529,470
97	$6,851,777	$8,791,557	$11,119,292	$12,671,115	$14,610,895
100	$8,046,960	$10,314,697	$13,035,981	$14,850,171	$17,117,908

Recommendations

Based on our models, and using the average male lifespan of 73 years as a reference, we believe Alfred should retire at the age of 65, and he should contribute $16,000 per year. Doing so will give him $1,762,116 at retirement. Based on the information of inflation, taxes, and expected spending of $80,000 a year after retirement, we foresee this amount lasting him till he is roughly 86. This gives him a significant buffer from the expected lifespan of 73 while also meeting his goal of retiring at 65 and limiting his contributions so he will be able to use that money currently.

Conclusion

The more money Alfred contributes and the longer he works, the easier his retirement will be. We also suggest that he spend less per year in retirement and find ways to make passive income throughout retirement through investments, real estate, or dividends. We also recommend to account for leaving money behind for the people he cares about, such as the child he currently cares for. Based on our models, Alfred can retire at his desired age of 65 and live a very comfortable retirement life, as long as he makes the consistent minimum contribution of $16,000 every year.