



Prize Winner

Can Artificial Intelligence/Large Language Models Help Me with Retirement Planning? An Individual Perspective

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Note: ChatGPT was the artificial intelligence/large language model chosen for illustrative purposes in this essay.

Retirement planning is a complex undertaking, involving many different factors and a household's personal situation. Prior SOA research indicates that there are considerable gaps in retirement planning and financial literacy.

BACKGROUND: GAPS IN PLANNING AND FINANCIAL LITERACY

- Many Americans do not understand how compound interest works or the time value of money.
- Many Americans do not understand how various types of investments work, or what a mutual fund is.
- Financially fragile individuals often plan paycheck-to-paycheck or for less than a year.
- It is common to make decisions to retire without a longer-term financial analysis.
- For some individuals, retirement planning is very short term focused and focused on predictable cash flows.
- Some individuals do not plan for risks but rather say they will deal with them when they happen.

These gaps have existed for a long time, but the situation does not seem to be improving.

Household finance is not something that is routinely taught to young people as a basic life skill.

Households who are interested can find very large amounts of information about retirement on the internet, in magazines and books, in information from their employers, from friends, and more. There are also many calculators and support tools targeted at different questions. But the quality of this information varies, and some of it is focused to advance a particular point of view or support the use of a product or approach. Some of it is also wrong and misleading. That leaves individuals not knowing which information is helpful to them and not knowing what to believe when they find conflicting information.

We should remember this background as we think about how AI can help and whether it might hurt us.

As an actuary and a retiree with considerable background in both of these topics, I decided to try to learn more about ChatGPT, its virtues and limitations. I learned several things in general:

- ChatGPT responds to questions asked right away. It allows the user to ask a series of questions building on prior answers.

- Usually, the answers appeared to have reasonable content, but they could be incomplete or wrong. “Hallucination” is often used to describe AI getting things wrong.
- ChatGPT can summarize information and present it in different ways.
- The user writes questions or “prompts” to get information from large language models such as ChatGPT.
- An average user would probably often not be able to recognize wrong answers and why they were wrong.
- It is easier and faster to get information using ChatGPT than using a conventional internet search.

I conducted several conversations with ChatGPT to try to understand what types of retirement planning answers I could get.¹ **This essay includes examples of ChatGPT responses, and they will be marked and discussed.** In addition to conducting these conversations, I read about ChatGPT and listened to several webcasts.²

ChatGPT Analysis or Calculations: I tried several times to ask questions with limited information. For most of the questions, ChatGPT wanted more information, but the responses were general and not very complete. For one question, ChatGPT tried to do a calculation and gave a very incomplete and incorrect answer. The question and answer are as follows:

Question

“Susie is 60 years old and earns \$125,000 a year. She started working at age 23 and has worked all but 4 years before turning age 60. She owns a \$300,000 house without a mortgage and has investment accounts of \$150,000. When can she retire?”

ChatGPT Answer

“Determining when someone can retire involves considering various factors, including their financial situation, lifestyle, and retirement goals. In Susie’s case, we can make some assumptions and calculations based on the information provided.

Financial Assets

- *Susie earns \$125,000 a year.*
- *She has a \$300,000 house without a mortgage.*
- *She has investment accounts of \$150,000.*

Work History

- *Susie started working at age 23.*
- *She has worked all but 4 years before turning 60.*

¹ ChatGPT 3.5 was used for these conversations.

² This essay focuses on the individual. There is a second essay that focuses on the professional involved in supporting retirement processes and planning. The research feeds both.

Assumptions

- We'll assume that Susie's current expenses are manageable with her income and assets.
- We'll assume a life expectancy of around 85 years old for planning purposes.

Now, let's make some basic calculations to get an idea of Susie's retirement readiness.

Savings

- Susie's total financial assets: $\$125,000$ (annual income) * $(60 - 23 - 4) + \$150,000$ (investment accounts) = $\$2,550,000$

Expenses

- Without details on Susie's annual expenses, it's challenging to estimate her retirement needs accurately. However, she has a paid-off house, which is a significant asset.

Retirement Age

- The age at which Susie can retire depends on her desired retirement lifestyle, expenses, and how much she has saved. A common rule of thumb is the 4% rule, which suggests that if Susie can live on 4% of her savings annually, she could potentially retire.

Example

- If Susie can live on $\$102,000$ (4% of $\$2,550,000$) per year, she might be able to retire comfortably.

Keep in mind that these are simplified calculations, and it's highly recommended for Susie to consult with a financial advisor who can provide a more accurate analysis based on her specific situation, expenses, and goals. Factors such as inflation, healthcare costs, and unexpected expenses should also be considered in retirement planning.”

The calculation and write-up for this example were **grossly incorrect** and included a number of major errors or approximations:

- ChatGPT ignored Susie's expenses. It seemed to assume that she had saved all her income and that she had additional income that would cover expenses in retirement or that there would be no expenses. The output included a category for expenses which made no sense at all.
- ChatGPT provided a two sentence response on retirement age. The first sentence made sense and said it depends, but it was not complete. The second sentence made no sense in response to the retirement age question.
- ChatGPT ignored the fact that Susie would most likely receive Social Security.
- ChatGPT assumed that Susie's earnings were the same in all years that she worked.
- ChatGPT ignored that invested money earned investment income and interest needed to be considered in the calculation.
- ChatGPT assigned her a life expectancy, but it is unclear how it arrived at the value or what was done with the information.

The ChatGPT output included a category for assumptions but did not include mention of many of the assumptions needed for an actuarial calculation.

Based on my research, it is my opinion that ChatGPT should not be used for calculations unless there is a reliable way to check the results. This question and response clearly confirmed that, and I strongly recommend against using calculations from ChatGPT without good quality control. This would make them unsuitable for use by individuals who are trying to plan on their own.

I developed a second example. This time I focused on a relatively recent widow with a lot of her money in her house. I provide a series of three questions in this example.

Question

“Carolyn was widowed at age 60. Her husband was age 66 when he died. She is now age 64 and is working and earning \$40,000 a year. She inherited a house worth \$1,000,000. Can she afford to retire? When should she retire?”

ChatGPT Answer

“Determining whether Carolyn can afford to retire involves assessing her financial situation, including her income, assets, and expenses. Here are some key considerations:

Income

- Carolyn is currently earning \$40,000 a year from her work. It's essential to factor in this income when assessing her ability to retire.*

Assets

- Carolyn inherited a house worth \$1,000,000. This asset can potentially contribute to her financial well-being in retirement, either by being sold or used for other purposes.*

Age and Retirement Plans

- Carolyn is currently 64 years old. The decision of when to retire is a personal one and can depend on factors such as health, lifestyle preferences, and financial considerations.*

Social Security

- Carolyn may be eligible for Social Security benefits, and the timing of when she chooses to start receiving them can impact her overall retirement income. The full retirement age for Social Security benefits depends on Carolyn's birth year.*

Expenses

- Understanding Carolyn's current and anticipated expenses in retirement is crucial. This includes living expenses, healthcare costs, and any outstanding debts.*

Investments and Savings

- Carolyn's overall financial picture depends on any additional savings or investments she may have. Assessing the health of her retirement accounts and other savings is essential.*

Financial Goals

- Carolyn should consider her financial goals in retirement. This includes her desired lifestyle, travel plans, and any other significant expenses she may anticipate.

To help Carolyn make an informed decision about retirement, she may want to:

- **Consult a Financial Advisor:** A financial advisor can help Carolyn assess her overall financial situation, develop a retirement plan, and provide guidance on when to retire.
- **Create a Budget:** Understanding current and anticipated expenses is crucial. Creating a detailed budget can help Carolyn determine how much income she needs in retirement.
- **Explore Social Security Options:** Carolyn should explore the different options for claiming Social Security benefits. The timing of when she starts receiving benefits can impact the amount she receives.
- **Consider Healthcare Costs:** Factoring in potential healthcare costs is important, especially as individuals age. Carolyn should explore healthcare coverage options, including Medicare.
- **Evaluate Long-Term Care Plans:** Long-term care needs can be a significant expense in retirement. Carolyn may want to consider long-term care insurance or other strategies to address this potential cost.

The decision of when to retire is a complex one and involves careful consideration of various financial and personal factors. Seeking professional advice and planning can help Carolyn make decisions aligned with her goals and financial situation.”

Completely in contrast to the first example, this was a good answer. The software did not go off the deep end and do a calculation. It offered a rational explanation of what is needed next. However, it completely seemed to miss the idea that her Social Security options may depend on her husband’s earning history.

The responses to the two questions when considered together make it clear that what happens in one conversation may be entirely different than what happens in another. This is entirely different from retirement planning software where input is provided in a consistent way and a consistent analysis can be expected. (Of course, the analysis may be suitable for some situations, but not others, but the tool will do the same thing based on similar input.)

I then decided to explore how the value of the house might be used to help finance retirement.

Question

“Carolyn would like to explore further how to use the value of the house (\$1,000,000) to help her in retirement. What options are available to her?”

ChatGPT Answer

The value of Carolyn's house can be leveraged in several ways to help support her in retirement. Here are some options for utilizing the value of the house:

Downsizing

- Carolyn could consider selling her current house and downsizing to a smaller, less expensive home. This would free up the equity tied up in the house, providing her with a lump sum of cash. The proceeds from the sale could be used to supplement her retirement income, cover living expenses, or invest for future needs.

Reverse Mortgage

- *A reverse mortgage allows homeowners aged 62 and older to convert a portion of their home equity into cash while still living in the house. This option could provide Carolyn with a stream of income or a lump sum payment, and she would not be required to make monthly mortgage payments. However, it's crucial to carefully consider the terms, fees, and potential impact on heirs when contemplating a reverse mortgage.*

Home Equity Line of Credit (HELOC)

- *Carolyn might explore a home equity line of credit, which is a revolving line of credit secured by the home's equity. She can borrow against the line of credit as needed and pay it back over time. HELOCs typically have lower interest rates compared to other types of loans.*

Renting Out a Portion of the Property

- *If Carolyn's house has extra space, she might consider renting out a portion of it. This could provide her with rental income, which can be used to cover living expenses or contribute to her retirement savings.*

Sale-Leaseback Agreement

- *Carolyn could explore a sale-leaseback arrangement where she sells the house to a buyer and then leases it back. This allows her to access the equity while continuing to live in the property. However, the terms of such agreements should be carefully negotiated.*

Home Equity Conversion Mortgage for Purchase (HECM for Purchase)

- *This is a specific type of reverse mortgage designed for seniors who want to purchase a new primary residence. Carolyn could use the proceeds from selling her current home to finance the purchase of a new home using an HECM for Purchase.*

Before making any decisions, Carolyn should consult with financial and legal professionals to fully understand the implications and risks associated with each option. Each choice has its own set of considerations, costs, and potential impacts on Carolyn's overall financial situation and estate planning. It's important for Carolyn to have a comprehensive understanding of these options and to tailor her decisions to her specific needs and goals."

Again, this was a rational set of options. However, my perspective is that it was incomplete in that it did not mention senior housing which includes support. It also could have mentioned that different geographic areas have very different costs and considerations such as climate, access to health care and activities. Other than suggesting financing tools, the response did not focus on the bigger picture of retirement and the importance of housing choice. The response also did not focus on the issue of buy vs. rent, and considerations about whether Carolyn could care for the house. The response focused on the specific question asked and did not broaden the conversation as a good advisor would probably have done. It should be noted that if I had looked at a magazine article or an internet site which discussed the issues of how the house might be used, it is also possible that I would get an incomplete response.

After this question, I expanded the data on Carolyn to see if ChatGPT would do a calculation similar to that in the first example, or to see how it would handle the situation.

Question

“Carolyn does more research into her situation, and she discovers that she also has inherited an Individual Retirement Account with a balance of \$750,000. She has also added up her expenses for the current year and has essential expenses of \$35,000 and discretionary expenses of \$25,000 in the current year. Her recent medical exam shows that she is in very good health. Can she afford to retire if she uses the value of her home to help finance retirement? When could she retire?”

ChatGPT Answer

“With the additional information that Carolyn has inherited an Individual Retirement Account (IRA) with a balance of \$750,000, we can incorporate this into the overall assessment of her ability to retire. Here are some key considerations:

Total Assets

- *Carolyn now has the value of her house (\$1,000,000) and the balance of her inherited IRA (\$750,000) as potential sources of retirement funding. The total value of her assets is \$1,000,000 (house) + \$750,000 (IRA) = \$1,750,000.*

Expenses

- *Carolyn has essential expenses of \$35,000 and discretionary expenses of \$25,000 in the current year. The total annual expenses amount to \$60,000.*

Income

- *Carolyn is currently earning \$40,000 a year from her work. Additionally, she may be eligible for Social Security benefits and can also explore the possibility of generating income from her assets, such as rental income from downsizing or other investment strategies.*

Given these considerations, Carolyn should undertake a more detailed financial analysis, including the following steps:

Detailed Budget and Cash Flow Analysis

- *Carolyn should create a detailed budget that includes both essential and discretionary expenses. This analysis should also consider potential changes in expenses during retirement.*

Social Security Analysis

- *Carolyn should explore her Social Security options. The timing of when she chooses to start receiving Social Security benefits can impact her overall retirement income.*

Asset Allocation and Investment Strategy

- *Carolyn should review the asset allocation of her investment accounts, including the inherited IRA. This involves considering her risk tolerance, investment goals, and time horizon.*

Retirement Income Planning

- *A retirement income plan should be developed, taking into account Carolyn's various income sources, including potential income from the sale of her house, Social Security, rental income, and withdrawals from her IRA.*

Healthcare Considerations

- *Carolyn's good health is a positive factor, but healthcare costs should still be carefully considered. She may need to plan for potential future medical expenses and long-term care needs.*

Consultation with Professionals

- *Carolyn should consult with financial advisors, tax professionals, and potentially estate planning attorneys to ensure a comprehensive understanding of her financial situation and to optimize her retirement strategy.*

Given that Carolyn is 64 years old, she may have several years to consider before reaching a traditional retirement age. The decision of when to retire is personal and depends on Carolyn's goals, preferences, and financial situation.

By working closely with financial professionals and developing a comprehensive retirement plan, Carolyn can make informed decisions about when and how to retire, taking advantage of her assets to support a comfortable and sustainable retirement."

The response was generally similar to the first part of the question about Carolyn and also completely different to the response about Susie. The response summarized the information it had and suggested steps to be taken.

My observations based on the two examples and the series of questions in the second are:

- The system reacted to the two situations with limited facts in entirely different ways. In the first example, it produced an entirely strange and misleading calculation and in the second case, it produced a rational response and focused on encouraging the use of a financial advisor.
- In the second example, it did not offer an alternative helpful direction if someone is not using an advisor. Since most people don't have advisors (and advisors may not be that well equipped to work with people with modest means), it is unclear to me that this will be very helpful to people trying to develop their own solutions.
- I also observed in the second example that the discussion was not expanded to issues beyond the immediate questions. That may be the result of the questions.

CHATGPT AS A SOURCE OF INFORMATION

The examples showed that ChatGPT was a source of reasonably good information in some situations and not in others. The small number of tests indicates that these are possible answers. More research is needed to see if there are common patterns and what other results may occur. I tested a number of questions where I had reasonable knowledge of the information to see what kind of response I would get. My observations were as follows:

- Most of the information provided was in the right direction, but some of it was very general and used technical words, so that it would not be helpful to an individual consumer.
- In some cases, the information provided had important points missing. To test this idea, I queried the system about the differences by gender in the situation of retirees. I used several questions and found information gaps about periods of disability and about living status at high ages.

The following question is focused on living status:

Question

"Why are women more likely to be living alone at older ages?"

ChatGPT Answer

"Several factors contribute to the phenomenon of women being more likely to live alone at older ages. These factors are influenced by social, economic, and demographic dynamics:

Longer Life Expectancy: *Women generally have a longer life expectancy than men. As a result, women are more likely to outlive their spouses and end up living alone in later years.*

Widowhood: *Due to the longer life expectancy of women, they are more likely to experience the death of a spouse. The period of widowhood often results in women living alone, especially in the later stages of life.*

Marriage Age and Age Gaps: *Historically, women have married men who are slightly older. If there is a significant age gap and the husband predeceases his wife, it can lead to a longer period of living alone for the surviving spouse.*

Divorce Rates: *While divorce rates have increased across all age groups, older women who divorce or are widowed may find themselves living alone in later life, particularly if they do not remarry.*

Economic Independence: *As societal norms have evolved, women have become more economically independent. This independence can lead to women choosing to live alone or being able to support themselves if they become widowed or divorced.*

Social Support Networks: *Women often have robust social support networks, including friends and family. This support system can provide companionship and assistance, enabling women to live alone more comfortably.*

Health and Long-Term Care Needs: *Women may have different health and long-term care needs than men as they age. Living alone can allow them to receive specialized care or assistance tailored to their individual requirements.*

Preference for Independence: *Some women may actively choose to live alone as they age, valuing their independence and autonomy.*

It's important to note that these trends can vary across cultures and regions. Societal attitudes, economic conditions, and cultural norms all play a role in shaping living arrangements for older adults. Additionally, as societal dynamics evolve, these patterns may change over time. For the most current and region-specific information, consulting recent demographic studies or reports from reputable sources is recommended."

I was not able to get the system to say that women are less likely to remarry. I also was not able to get it tell me that women are likely to be disabled longer. This may be the result of my skill at framing the prompts, but it would also be a problem for an individual without special training in using the system. I do not know if I would get a similar response with a later version of ChatGPT.

INTERNET SEARCHES VS. CHATGPT

I have done many internet searches looking for information on retirement and other topics. In the case of general internet searches, the sources one finds range from excellent to awful, and it is very important to know the organization providing the information and how reliable it is. My experience is also that even reliable organizations may provide incomplete information.

Comparing my experience doing a conventional internet search and using ChatGPT to make an information request, I have the following observations:

- It is much easier and faster to get information from ChatGPT. The system responds very quickly. It is also possible to ask additional questions using ChatGPT and similar systems so that the information builds over time. Skill is needed to write a series of prompts.
- Both types of requests are subject to providing a range of information which can be very good, but which also may be subject to missing and unreliable information, so hopefully the user will be careful. The key methods of being careful are different depending on how the information was obtained. For internet searches, the source is very important, and a reasonably knowledgeable user knows that they need to be careful about which sources they consult and understands how to vet their sources. For ChatGPT and similar AI tools, the result depends on the data set the tool was trained on. The responses may evolve over time and will change each time there is an update to the training data set.

CONCLUSIONS AND RESEARCH NEEDED

The existence of AI tools expands the resources available to individuals to support retirement planning, but it does not change the gaps in financial literacy and the lack of knowledge about this important subject.

Prior to AI, there was a great deal of information available, but many users did not understand what would be useful to them or how to use it well.

AI changes the format of what is available and makes a lot more available. Some of the new information is completely wrong, but much is useful. AI makes it more important that there is some guidance about how to use the information to get useful results and about what should not be used by individuals. More research and experimentation are needed to identify what steps should be included in such guidance and how AI can help. Good questions for such research may include issues such as:

- Can AI help individuals identify areas to explore when seeking retirement housing?
- Would it be effective in helping individuals understand different types of housing options and what they offer?
- Would it help individuals understand how to evaluate housing options?
- Would it help individuals understand different methods of using assets to produce income in retirement?
- Would it help individuals think through the pros and cons of retiring at different ages?

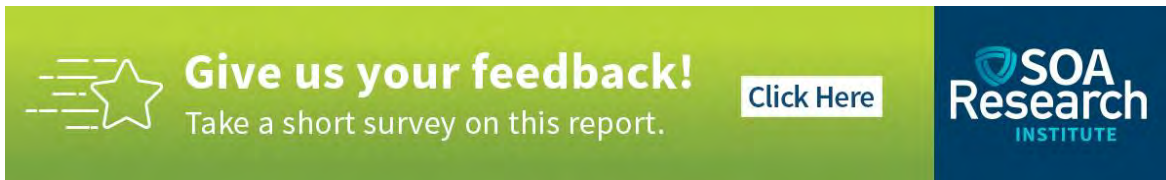
Related to these issues is another research question: Could prompt series be provided that would help individuals understand and design how to write prompts? Alternatively, would it be better to build packages that build on the basic tools?

Particular care is needed about calculations. As indicated in the discussion above, calculations can go completely wrong. Earlier research from the Society of Actuaries Research Institute comparing different software packages also

showed that they can produce very different results.³ The Society of Actuaries Research Institute in partnership with Financial Finesse produced a guide to Retirement Planning Tools⁴ to help the user understand general types of software, and what could be expected in using them. More research is needed to see whether AI can assist the individual trying to do such calculations in finding the right tool, or in comparing results. Traditional tools seem to offer a much better approach to doing calculations, but there is a long way to go to help individuals understand what will be most helpful.

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The banner features a green-to-blue gradient background. On the left, there is a white star icon with horizontal lines extending from its left side. To the right of the star, the text "Give us your feedback!" is written in a bold, white, sans-serif font. Below this, in a smaller white font, is the text "Take a short survey on this report." To the right of this text is a white rectangular button with the text "Click Here" in blue. On the far right of the banner is the SOA Research Institute logo, which consists of a blue shield icon followed by the text "SOA Research" in white and "INSTITUTE" in a smaller blue font below it.

³ <https://www.soa.org/resources/research-reports/2009/retire-planning-software-post-retire-risk/> and

<https://www.soa.org/493884/globalassets/assets/files/research/projects/retirement-planning-software-report.pdf>

⁴ <https://www.soa.org/4a87fe/globalassets/assets/files/resources/research-report/2019/2019-retirement-tools.pdf>