

A Pseudo-Life Annuity: Guaranteed Annual Income for 35 Years

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Article Highlights

- A portfolio with virtually a 100% probability of lifetime income can be created by laddering zero-coupon Treasuries.
- Three plans, using varying maturity and reinvestment dates are presented.
- Risks to a pseudo-life annuity include an extraordinarily long lifespan or a premature death that prompts unanticipated distributions.

A portfolio allocation mix of 60% stocks and 40% bonds combined with an annual withdrawal equal to 4% of the initial portfolio amount and increased annually by an inflation rate is recommended to retirees by practitioners and scholars.

This strategy is based on research by Larry Bierwirth and William Bengen as a means of maintaining constant dollars of income during the remainder of one's lifetime, or 30 to 35 years in retirement. The 4% initial withdrawal rate in particular has become the benchmark for retirees.

Scholarly articles on this topic usually include a comprehensive literature search directing the reader to all the variations of asset mixes, modified withdrawal rates, or the combination of "safe savings rates" and "safe withdrawal rates." The "drawback" to all of the research is that there will always be risk associated with any funds invested in stocks, and therefore no equity-based strategy can offer a guarantee of extracting the full amount of the initial retirement portfolio before death.

As an alternative to the equity-based strategies, this article shows what an individual investor who had a \$1 million portfolio on March 19, 2012, could have invested the money in to have virtually a 100% probability of not outliving his money and of leaving a legacy for his heirs at death. (Investors with lesser wealth can prorate the amounts as a percent of \$1 million.)



The Concept

A bond is an investment vehicle that provides a guaranteed stream of interest income during a stated term. Bonds also offer additional cash equal to the face value of the bond at maturity, unless the issuer defaults. A bond is an "IOU" that is an interest-only debt until a maturity date, at which time the principal is repaid. The bond is comprised of two elements—the

principal ("corpus") and the interest payment mechanism ("coupons"). The cost of the bond is the sum of the present values of these two elements. Typical bonds issued in the U.S. pay interest semiannually; therefore, there are two coupons for each year of the bond's duration.

A bond's yield, which is the coupon (interest) rate divided by the bond's current price, often differs from the actual coupon rate. The yield can be higher than the interest rate—signaling that the bond is trading at a discount—or the yield can be below the interest rate—signaling the bond is trading at a premium. Unlike with equities, the stated principal, coupon and yield of a bond give an investor a specific dollar amount of return—assuming, of course, that the bond issuer does not default.

Given this backdrop, suppose you had accumulated \$100,000 in stocks and now wished to secure an annual withdrawal of \$20,000 for each of the next five years. To avoid any market volatility that could affect this stream of income, you decide that a conversion from stocks to bonds is a viable alternative. Also suppose on that the date of conversion, bonds maturing in one, two, three, four and five years are

available with 3% annual coupons and 3.5% yields to maturity after transaction costs. Based on the implied discounts, the total cost would be \$98,603.25. This conversion would leave \$1,396.75 to invest elsewhere. Then, during each year you would receive \$600 in coupon interest (3% of the bond's \$20,000 face value) for each bond that has yet to mature. You would also receive the \$20,000 face value for the bonds that matured at the end of each year.

Suppose, however, that on the conversion date, the yield rate for each of the bonds was 2.5% instead. This conversion would be at a premium, with a total assumed cost of \$101,425.04. Obviously, your \$100,000 would be insufficient by \$1,425.04 to fulfill your goal; an alternative is needed.

The foregoing approach to portfolio security is referred to as laddering bonds. It is a process that can be used in an accumulation phase also, so as not to be locked into "current" yields for long durations, especially if prevailing interest rates are low and you think future yields will increase. However, there is always reinvestment risk when each bond matures; the future yield may be less than the maturing yield. Although bond laddering may be used for both accumulation and depletion of funds, this article is restricted to the discussion of depletion of funds.

Zero-Coupon Bonds

In the early 1960s, the idea of selling each part of the bond separately was introduced. That is, the corpus and coupons were separated. The corpus was sold as the principal and each coupon was sold as a "smaller" principal. These investments are stripped coupon bonds, often referred to as zero-coupon bonds or Separate Trading of Registered Interest and Principal Securities (STRIPS). However, because the Internal Revenue Service negated an initial tax advantage for STRIPS, the concept lost popularity for investments other than qualified retirement funds such as IRA accounts.

A \$20,000 zero-coupon bond maturing in five years with a 3.5% yield

Table 1. U.S. Treasury Stripped Coupon Bonds—Quoted on March 19, 2012

Maturity	Asked Price (% of Face Value)	Asked Yield (%)	Maturity	Asked Price (% of Face Value)	Asked Yield (%)
2012 May 15	99.987	0.09	2027 May 15	25.000	3.36
2013 May 15	99.780	0.19	2028 May 15	57.710	3.43
2014 May 15	99.098	0.42	2029 May 15	55.498	3.46
2015 May 15	97.918	0.67	2030 May 15	53.292	3.50
2016 May 15	95.797	1.04	2031 May 15	51.042	3.54
2017 May 15	93.413	1.33	2032 May 15	48.940	3.58
2018 May 15	90.589	1.61	2033 May 15	46.942	3.61
2019 May 15	87.409	1.89	2034 May 15	45.047	3.63
2020 May 15	83.871	2.17	2035 May 15	43.282	3.65
2021 May 15	80.554	2.38	2036 May 15	41.646	3.66
2022 May 15	77.208	2.56	2037 May 15	40.014	3.67
2023 May 15	73.761	2.75	2038 May 15	38.385	3.69
2024 May 15	70.244	2.93	2039 May 15	36.907	3.70
2025 May 15	66.659	3.11	2040 May 15	35.577	3.70
2026 May 15	63.277	3.26	2041 May 15	34.196	3.71

Source: J.P. Morgan Pricing Direct Inc. via www.sstbond.com.

would cost \$16,814.57 and one with a 2.5% yield would cost \$17,663.62. Investing under either yield rate will provide proceeds (annual income) of \$20,000 in five years. The purchase at either yield rate leaves a residual that could be at risk if invested in equities (\$3,185.43 with the higher yield and \$2,336.38 with the lower yield). Since the goal is to reduce risk to zero, we would want to invest the full \$20,000 in bonds. Thirty-year U.S. Treasury STRIPS could be used, since they can be purchased in increments of \$100. This enables the purchase of bonds with cumulative face values of \$23,700 and \$22,600, respectively, and these amounts could be the income received in five years (fully invested within \$88.89 and \$45.42, respectively, of the starting portfolio amount).

The accepted absolute guarantee of that income is a bond issued by a stable government, and the "gold standard" has been the U.S. Treasury. The investor could look forward for any number of years, but this article is limited to 35 years. Using the Social Security earliest elective retirement age of 62, the funds would last to age 97. The probability of a 62-year-old male or female living to

this age is about 4% or 9%, respectively.

As of this writing, the Market Data Center of The Wall Street Journal website showed tables of Treasury bonds (Stripped Principal and Stripped Coupon) with maturity dates on the 15th of February, May, August, and November, the auction dates of 30-year Treasury bonds. The May 15 date was selected, and the asked price (% of face value) and asked yield (%) were extracted and are shown in Table 1. Since securities are sold at the "bid" and bought at the "ask," the cost to the investor will include transaction fees charged by the broker. As a simplified test of the practicality of this analysis, I had three bonds priced on March 19, 2012. The bid price for a May 15, 2012, bond was 99.984% of face value. The bid price for a May 15, 2026, bond was 63.189% of face value. The bid price for a May 15, 2041, bond was 34.099% of face value. This analysis assumes that the investor pays the "asked price" shown in Table 1, not the bid prices above.

Since STRIPS are only available for 30-year maturities, the years 31 through 35 must be planned for at the initial purchase. The term "bond" in the following is to be interpreted as a sufficient

Table 2. Purchasing Two Bonds Maturing at Five-Year Intervals

Maturity Date	Yield (%)	Bond Maturity (\$)	Bond Cost (\$)	Total Cost (\$)	Annual Withdrawal (\$)	Residual Portfolio (\$)	Annual Income (\$)
2012 May 15	0.09	40,000	39,995	920,304	3,045	76,650	43,045
2016 May 15	1.04	80,000	76,638		3,428	75,759	83,428
2021 May 15	2.38	80,000	64,443		3,974	71,915	83,974
2026 May 15	3.26	80,000	50,622		4,606	64,012	84,606
2031 May 15	3.54	80,000	40,834		5,340	50,656	85,340
2036 May 15	3.66	80,000	33,317		6,191	30,071	86,191
2041 May 15	3.71	40,000	13,678		7,177	0	47,177
Growth of Residual Cash—May 15, 2042						258,483	

number of multiples of \$100 to achieve the amount to be purchased.

In addition to the 30 bonds purchased for the annual income each year, one “extreme” option is to purchase five additional bonds on the initial date (March 19, 2012, for this analysis), to be reinvested in each of the next five years as follows. Assuming there will be a bond auction on May 15, 2012, you could purchase one bond that will mature in 2042 and purchase four bonds that will mature in 2013. In 2013 you could purchase one bond that will mature in 2043 and three that will mature in 2014. Continuing this process until May 15, 2016, there will be one excess bond to purchase for May 15, 2046. The negative aspects of this process are that the short-term yields are low and that there is a high cost to purchase the excess bonds in each of the first five years.

The other “extreme” option is to purchase one bond maturing in each of the first 30 years and five additional bonds maturing in year 30 (2041) and then, assuming survival until then, purchase one bond for each of the following five years at that time. This alternative will have a smaller total initial cost and would be able to capture any increase in yields that might be available in 30 years.

Within these extremes, other scenarios are available depending upon the investor’s judgment of reinvestment rate risk. For example, the five additional bonds could be purchased to mature in year 2016, or any other year in order to purchase five bonds for years 31 through 35. Another scenario: On May

15, 2012, purchase two bonds to mature in year 2016 (one for income in 2016 and one to purchase a 2042 maturity), two bonds to mature year 2021 (one for income in 2021 and one to purchase a 2043 maturity) and the same for 2026, 2031 and 2036.

Examples of Pseudo-Annuities

To show examples of how you could build your own pseudo-annuity, I have created examples using STRIPS, laddered for 30 years, to provide 35 years of fixed maturity values.

The ideal annual income is stipulated to be 4% of the initial portfolio and will be achieved by purchasing the principal (bond corpus) part of the STRIPS, which will be referred to as the bond. The number of bonds may be constant each year. The initial portfolio is \$1 million. Other annual amounts would be prorated against this value. Any residual cash from the purchase is assumed to earn 4% per year over the 30-year period.

The reference to each year implies a fiscal year from May 15 to May 14 the following year, and all purchases occurred on March 19, 2012.

Plan A: Purchase Bonds for Years 2042–2046

On March 19, 2012, purchase one bond for each of the years 2012 through 2041 and purchase five bonds to mature in 2013. In May 2013, use the income from one maturing bond to purchase a 2042 maturity, and use the income

from four maturing bonds to purchase bonds maturing in 2014. Similarly, in 2014, the income from one maturing bond would be used to purchase a bond maturing in 2043, and the income from three maturing bonds would be used to purchase bonds maturing in 2015. In 2015, the income from one maturing bond would be used to purchase a bond to mature in 2044, and the income from two maturing bonds would be used to purchase two bonds to mature in 2016. In 2016, the income from one maturing bond would be used to purchase a bond maturing in 2045, and the income from the remaining maturing bond would be used to purchase a bond maturing in 2017. The income from this final bond would be used in 2017 to purchase a bond maturing in 2046.

This plan would require the highest cost. The total cost on March 19 for the six bonds would be 5.99922 ($6 \times 99.987\%$, see Table 1) times the face value of the bonds. Using 4% of the \$1 million, the six \$40,000 bonds would cost \$239,968, almost 24% of the fund, and the total cost would be \$987,352. Although Plan A is a possible option, there are better plans that could be used for the 35 years of income.

Plan B: Purchase Two Bonds Maturing at Five-Year Intervals

This option involves having a fixed annual income from maturing bonds of \$40,000 per year beginning on May 15, 2012, and terminating on May 15, 2046. Bonds worth \$80,000 will be purchased to mature on May 15, 2016, 2021, 2026, 2031, and 2036. Forty thousand dollars will be used for income in each of those years, and \$40,000 will be used to purchase bonds maturing in 2042, 2043, 2044, 2045 and 2046, respectively.

The yield rates listed in Table 2 indicate that this can be accomplished at a purchase cost of \$920,304, leaving residual cash of \$79,696. This residual may be used to supplement the bond income with annual withdrawals and may be increased to offset, somewhat, the effects of inflation. Alternatively, it can be left to accumulate as a legacy. The withdrawals would begin with \$3,045 in

2012, increased by 3% per year, and end with \$7,177 in 2041 if the rate of return is 4%.

Table 2 shows the results of this option, with a possible legacy amount of \$258,483 on May 15, 2042, if the residual cash is not depleted by annual withdrawals and is not subject to required minimum distributions. However, if placed in equities, market volatility could affect the actual annual cash amount or the legacy amount.

Plan C: Purchase Six Bonds Maturing at Year 30

Rather than purchase two bonds to mature every five years, another alternative would be to purchase six bonds to mature in year 30, on May 15, 2041. One of the bonds would be the income for the year, and the remaining five bonds would be used to purchase bonds maturing in 2042 through 2046.

This option would provide \$40,000 in annual income for 30 years. On the maturity date of the 30th anniversary, \$200,000 from the additional maturing bonds would become available to purchase five bonds to mature in 2042 through 2046. The total cost of this option would be \$855,770 with residual cash of \$144,230. Assuming a 4% return on investment, this cash could supply additional annual income, beginning with \$5,511 and increased by 3% per year to a final amount of \$12,988 to mitigate the effects of inflation. If there are previously taxed investments that could deliver the same results, the cash could be left as a legacy amount of \$467,795 on May 15, 2042, subject to required minimum distributions. As with Plan B, if left in equities, market volatility could affect these values.

The results of this option are shown in Table 3.

The Decision

In order to facilitate a decision, Table 4 provides a summary of the results of the three plans discussed here. Plan C provides the largest first year and final year annual cash flow. In addition, Plan C provides the largest

Table 3. Purchase Six Bonds Maturing at Year 30

Maturity Date	Yield (%)	Bond Maturity (\$)	Bond Cost (\$)	Total Cost (\$)	Annual Withdrawal (\$)	Residual Portfolio (\$)	Annual Income (\$)
2012 May 15	0.09	40,000	39,995	855,770	5,511	138,719	45,511
2022 May 15	2.56	40,000	30,883		7,407	127,948	47,407
2032 May 15	3.58	40,000	19,576		9,954	85,389	49,954
2041 May 15	3.71	40,000	13,678		12,988	0	52,988
2041 May 15	3.71	200,000	68,392		0	0	200,000
Growth of Residual Cash—May 15, 2042						467,795	

possible legacy at the end of 30 years.

Incorporating Life Expectancy Into the Plans

Any stream of annual income is defined as an annuity, and there are two broad categories of annuities—life and certain (“fixed term”). Life annuities are usually obtained from insurance companies, but if an individual planned on creating his or her own life annuity, he or she would have to plan for a term that is to the end of a life table—to age 115 or 120—just as an insurance company does, with an accompanying reduction of the annual amount. The probability of survival to either of these ages can be considered to be 0%.

A further problem would be that, because of the large number of bonds that would mature at 30 years, if the investor is still alive, the required minimum distribution (RMD) might necessitate a rather large withdrawal from the retirement fund. The term, 35 years, defines the stream of income as a pseudo-life annuity in that the number of payments is certain.

Given a group of people at a given age, the life expectancy age is simply an indicator that a proportion of those people will die before reaching that age and the remainder will die after reaching that age. Then the selected term must extend beyond that age in the event that our investor is in the latter group. According to data from the U.S. Department of Health and Human Services 2004 U.S. Life Tables, life expectancies are shorter than the planned 35-year term for retirement ages of 55, 62, 66 or

70. For a person who will retire in 2012 at age 66, the probability of surviving 35 years is less than 2% for a male and less than 4% for a female—essentially 0%.

There is a secondary consideration for laddered bonds in the withdrawal phase of retirement. If death occurs before 35 years, the remaining STRIPS would have to be distributed according to the rules for required minimum distributions (RMDs). This might necessitate the sale of STRIPS prior to maturity if there is no surviving spouse. The proceeds would depend upon the time to maturity and the yield rate at which the bond(s) would be sold. Those proceeds could be greater or less than the face value of the bonds.

Conclusion

It is inconceivable that the U.S. government would ever default on its obligations and, consequently, it will always remain the safest of all investment venues. However, the trade-off for using U.S. Treasury STRIPS to guarantee 35 years of known annual income is that you gain stability but do not optimize returns. This trade-off is the price of the guarantee.

For those investors who do not have inherent opposition to some volatility, having a guaranteed income equal to 4% of the initial portfolio each year plus a significant amount in a residual fund that could be exposed to equities could be achieved, as shown. The residual cash in all the plans is a “theoretical” amount in that transaction costs may reduce or deplete that cash.

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However, what if you took a different approach? What if you said, “I’m going to spend the next two months deciding what to do, and if I don’t find anything better, I’m going to buy X.” Or you could say, “While I wait for something better to do, I’m going to do Y.”

If we understand that there’s a tremendous role for a default option, for the path of least resistance, then we want to think very carefully about what this default is. And, in particular, we want to think if we want to let the default be the choice of having the money in a money market, basically, or checking. That’s a very bad default option.

So the complexity of choices actually has two components: complexity and default. As the complexity increases, our reliance on the default option increases—which means that at some point we don’t make decisions. As the amount of choices increases, we actually make fewer and fewer active decisions, and we make more and more passive decisions. So if we understand it, then we want to say, “If that is the case, let

me control my passive decisions. I don’t want them to be left to chance.” So that would be my main suggestion.

CR: *And would that also hold true for someone who sees choices but maybe is distrustful of their advisers and Wall Street? Would you suggest that they have a default option?*

DA: Yes. We can never know for sure, right? The next financial crisis could come very quickly, and a money market account might be the best thing to do with our money. I mean, it’s possible. But in principle, the problem is that we get out of the market and we miss some of the market increases, and these are things that are incredibly hard to recuperate from. So there are people, I think, who left the market in a bad situation and basically have lost their ability to retire. It’s incredibly, incredibly sad.

CR: *Lastly, do you have suggestions on how investors can prevent the most common behavioral errors?*

DA: There are two ways to overcome these problems. The first one is

that when we think about our money, and when we think about changes, what we don’t want to do is to look at our portfolio and then make the decision. If that’s what we do, then we will be inherently focusing on the past. All of the websites that we see, that give us information, they basically focus on the past. They try to overwhelm us with information and to make us feel that we’re getting some value, but they show us all this information about the past, which is mostly irrelevant. So the thing to do is to make decisions without looking at how our individual portfolio has done compared to the past. So that’s one thing: Not to be reactive to the movement of the stock market, but instead be thoughtful.

The second thing to do is the exercise I described earlier, which is to periodically imagine that somebody came at night and sold everything you own. And then think about what you would want to own if you had nothing. And that would help liberate you from those thoughts. ▲

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Portfolio Strategies

Table 4. Summary of Results

	Annual Income 2012 – 2041 (\$)	Annual Cash First Year – Last Year (\$)	Total Cost (\$)	Possible Legacy (\$)
Plan A	40,000 – 40,000	483 – 1,184	987,352	41,022
Plan B	40,000 – 40,000	3,045 – 7,177	920,304	258,483
Plan C	40,000 – 40,000	4,121 – 9,711	855,770	467,795

(continued from page 29)

The transaction costs may necessitate the reduction of the maturity value of each STRIPS and the residual

amounts of cash and or equities (perhaps not significantly), depending upon the purchase venue, such as Fidelity Investments or Wells Fargo Advisors. With

the former, the investor would have to do all the calculations to ensure the best utilization of the money. With the latter, the adviser would determine all the purchases.

This analysis shows that investors have several alternatives for guaranteeing acceptable, and known, retirement income for 35 years—essentially a pseudo-life annuity for those investors aged 55 and older.

Additional options for Plans B and C are included as an appendix to the online version of this article. ▲

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