Short Paper

Retirees Beware!

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A key element in retirement planning is projecting the future value of a retiree's investments. If we assumed an annual rate of return of 12 percent, a $500,000 portfolio today would seem to be worth $1,552,924 (or $500,00 $(1.12)^{10}$) after 10 years. Yet, it is also possible that the same 12-percent average return could produce markedly different ending values. For example, if the portfolio earned 18 percent in each of nine years and lost 42 percent in one year, the average will again be 12 percent but the future value would be $1,286,282 (or $500,000(1.18)^9(0.58)$). If the portfolio alternated returns of 24 percent and -12 percent for 10 years, the average will remain 12 percent but the portfolio would be worth $773,556 (or $500,000(1.24)^5(0.88)^5$).

The explanation lies in the misuse of the arithmetic average. Its implicit assumption of simple interest acts to overstate values. The geometric average, on the other hand, assumes compound interest and leads to more reliable results. Since arithmetic and geometric averages are the same when returns are constant, the ending value above of $1,552,924 is possible only if 12 percent were earned every year. The geometric average when returns are 18 percent in nine years and -42 percent in one year is 9.91 percent (or $(1,286,282/500,000)^{1/10} - 1$). For alternating returns of 24 percent and -12 percent, the geometric mean is 4.46 percent (or $(773,556/500,000)^{1/10} - 1$).

Unfortunately, some retirees will not distinguish between arithmetic and geometric averages and expect a 12-percent average return to improve their current portfolios by 211 percent (or 1,552,924/500,000 – 1) over a 10-year span. The geometric averages of 9.91 percent and 4.46 percent produce gains of only 157 percent (or 1,286,282/500,000 – 1) and 56 percent (or 773,556/500,000 – 1), respectively.

The consequences of overstated ending wealth can be enormous. One example is a retiree's required minimum distribution (www.fidelity.com/learnRMD). According to RMD tables, a 70½-year-old retiree with a wife not more than 10 years younger might expect a first-year distribution of $56,676 (or 1,552,924/27.4) but instead receive only $46,945 (or 1,286,282/27.4) or even $28,232. Too, accounts that can be annuitized serve as another scary example. An annuity based on an ending wealth that is more expected than realized could simply result in running out of money. Retirees beware!