

Instructions for Computing IRA returns

There are two programs associated with this project. First, a reminder of how ALAMA programs treat variables. When a program is entered into input and subsequently saved, all the existing variables are saved as well. However, when that same program is loaded, it will load the values of these variables only if they do not already exist in the current session.

There are two program files associated with this project. The first program is `IRAreturnsInitialize.alm`, which actually contains no program lines, but does contain the default values for the key variables of this project (A, B, C, P, Q and U). This loading this program will load the default values of these variables, provided that they do not already exist in the current session. The second program is the main program, `IRAreturnsForYearAgeRange.alm`, which also contain default values for the key variables as well as code for the program. So it is a good idea to clear history (execute `Edit->History->Clear All`), before loading the main program. If one wants to modify the key variables, first load `IRAreturnsInitialize.alm`, which has no code, and redefine these variables (excluding A, which is strictly reserved) either at the command line or using the Editor. To save them, simply clear any input commands (`Edit->History->Clear History`) and save the input (an empty program, but includes all existing variables) to `IRAreturnsInitialize.alm` or any name of your choice. When finished modifying the variables, user should load the main program and run it. Saving it will also save the modified variables. Upon loading the main program it can be executed with the command `'Rpt(1,1)'`.

NB: This program assumes that the RMD is always withdrawn at the end of the year.

Following are the key variables:

1. Owner age range $P = [P(1), P(2)]$ with $72 \leq P(1) < P(2) \leq 100$. The default is $P = [73, 85]$.
2. Range of initial years of sequential testing of annual returns data $Q = [Q(1), Q(2)]$ with $1926 \leq Q(1)$ and $Q(1) < Q(2) \leq 2022 - (P(2) - P(1) + 1)$. The default is $Q = [1974, 2020]$.
3. Initial IRA value at initial year 1 is in C, so $C > 0$. The default is $C = 1000000$.
4. $U = [U(1), U(2), U(3), U(4), U(5)]$, where $U(1)$ is the percent of C in S&P, $U(2)$ is percent in Nasdaq, $U(3)$ percent in bonds, $U(4)$ and $U(5)$ are left open. User can change any of these, but must respect $0 \leq U(j) \leq 100$, $j = 1, 2, 3, 4, 5$ and $U(1) + U(2) + U(3) + U(4) + U(5) = 100$. The default is $[30, 30, 20, 20, 0]$.
5. Row 1 of matrix B is reserved for years. Other rows have default values of annual returns as percentages: row 2 for S&P annual returns starting at year 1926, row 3 for annual Nasdaq returns starting at 1972, row 4 for Dow Jones returns starting at 1926 and row 5 for bonds at constant 3.6% annual yield starting at 1926. Sixth row is open for other investments. If there are no others, leave this row filled with zeros. Note a fund has zero returns for years that it did not exist. Again, user can change any of rows 2-6, but be careful.

Output of program: Matrix V with first row the starting year of of return data in the corresponding column, second row the final returns of initial value C of IRA that assume retirement yearly yields ranging over all possible non-overlapping sequences of length $P(2) - P(1) + 1$ years, with starting years ranging from $Q(1) \geq 1926$ to $Q(2) > Q(1)$, with $Q(2) \leq 2022 - (P(2) - P(1) + 1)$. RMD withdrawals are assumed at the end of the year. The third row shows the percentage return over each period, the next five rows in each column show the final earnings percentages of each investment (discounting any withdrawals and independently of the relative amounts in U) and the final row show the total income taken out over that period as a result of the RMD. User can view the output V via the editor or simply issuing the command 'V' to display it.

Some historical facts: My S&P and Dow numbers go back to 1926. However, official S&P 500 numbers do not start until 1957, Nasdaq numbers do not start until 1972 (zeros before that). Further, the RMD rules were instituted in 1974 when ERISA was enacted. Finally, these numbers do not

account for the recently passed SECURE 2.0 Act.

Regarding the default settings: If user simply runs the program with default $P=[73,85]$, $Q=[1974,2020]$ and $U=[30,30,20,20,0]$, the resulting columns in V date from 1974, 1987 and 2000 and do three $P(2)-P(1)+1=13$ year runs. While the second period (1987) is golden, the third period (2000) is a disaster, unfortunately (think of national events in the period 2000 to 2013). As the saying goes, "Past performance is no guarantee of future returns."

Finally, if user is only interested in returns, without accounting for RMD withdrawal, run the main program once. Then use the editor to change $u(7)$ from 1 to 0. Reissue the command 'Rpt(1,1)' and you get the results with zero RMDs take out.