



How Rate of Return (ROR) is Computed and The Effect of the Sequence of Returns on Retirement Income

Rate of Return (ROR)

Computing and reporting the rate of return (ROR) on an investment is the single most reviewed calculation by investors who are considering a potential investment or who are reviewing the ROR history computed on a current investment. Most investors universally use using the ROR as the primary measure to judge the performance of an investment. It is a logical assumption and provides a direct and mathematically accurate way to judge an investment's value. Regardless, how the ROR is computed can be very misleading and yield significantly different results.

Basically there are two types of ROR. The first is average ROR which as the name implies, merely computes the average return on the investment for a selected time period. You merely add up the net return for each year and divide by the number of years. While this number may be helpful in making an investment decision, in my view it is very misleading as I will demonstrate below.

The second type of ROR is the actual ROR which is computed using the beginning balance, the ending balance and taking into consideration any withdrawals or contributions during the time period being computed. The actual ROR is far more useful and in my view, provides a more accurate measure of the earning power of the investment.

Let me demonstrate using the Dow Jones average since 1930. If you add up every annual number from 1930 through 2013 and divide by 84 years, you get an average ROR of 7.04%. If you compute the actual ROR for the same time period the answer is 5.13%. Why is the difference important? Because if you invested \$1,000 back at the beginning of 1930 at an average ROR of 7.04% you would have grown the account to a whopping \$303,300! The actual ending amount in the account would really be \$66,829 at 5.13%. A shock if you were expecting \$303,300.

Here is an extreme example but easy to understand:

		<u>Balance</u>
Investment		\$100,000
Year 1	100% gain	\$200,000
Year 2	-50% loss	\$100,000
Year 3	100% gain	\$200,000
Year 4	<u>-50% loss</u>	\$100,000
Total	100%	

Average ROR (100% divided by 4 years)	25%
Actual ROR	0%

When reviewing the ROR potential of any investment, you need to understand if you are looking at actual ROR or average ROR. It makes a big difference.



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Sequence of Investment Returns

The second issue to address is how do the sequence of investment returns and the lifetime withdrawals effect your retirement portfolio?

In simple terms, if you are unfortunate to retire in negative years first (such as 2000, 2001, 2002 and 2008 as so many people did) you will run out of money sooner because of the effect the withdrawals have in the negative years. It takes a higher ROR in the following year to make up the loss. If you did not have withdrawals, the order of investment returns would make no difference. But by experiencing the losses in early years, the withdrawals in those years have a dramatic effect on the portfolio. Tables 1 and 2 on the following pages demonstrate the math.

Let's assume that John and Susan start with the same amount of investment of \$500,000, have the exact same average ROR but the sequence of returns is different, in reverse order. John starts with losses early in the portfolio while Susan does not experience the losses until later years. Table 1 shows that the sequence of the returns has no bearing on either account without withdrawals. They both have the same amount of money left after 25 years. Table 2 is a whole different matter. In Table 2 they each take out \$25,000, increased each year by an inflation factor of 3%. John runs out of money after age 82. Susan keeps on earning and spending her retirement.

The sequence of investment returns can have a sobering effect on the remaining balance in a portfolio used for retirement income. There is hope however. There are investment techniques available which can mitigate the effect of the sequence of returns on an investment portfolio. That is a topic for another day.

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Disclosures:

Hypothetical performance should not be considered a guarantee of future performance or a guarantee of achieving overall financial objectives. Asset allocation and diversification do not assure a profit or protect against loss in declining financial markets. The hypothetical performance results in this report are calculated using the returns of benchmark indices for the asset classes and not the returns of securities, funds or other investment products.

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Effective of Sequence of Returns

Table #1-No annual withdrawals

<u>John</u>					<u>Susan</u>				
Age	ROR	Withdrawal	Gain or (Loss)	Balance	Age	ROR	Withdrawal	Gain or (Loss)	Balance
64				\$ 500,000	64				\$ 500,000
65	-10.14%	\$ -	-\$50,700	\$ 449,300	65	12.78%	\$ -	\$ 63,900	\$ 563,900
66	-13.04%	\$ -	-\$58,589	\$ 390,711	66	23.45%	\$ -	\$ 132,235	\$ 696,135
67	-23.37%	\$ -	-\$91,309	\$ 299,402	67	26.38%	\$ -	\$ 183,640	\$ 879,775
68	14.62%	\$ -	\$43,773	\$ 343,175	68	3.53%	\$ -	\$ 31,056	\$ 910,831
69	2.03%	\$ -	\$6,966	\$ 350,141	69	13.62%	\$ -	\$ 124,055	\$ 1,034,886
70	12.40%	\$ -	\$43,417	\$ 393,559	70	3.00%	\$ -	\$ 31,047	\$ 1,065,933
71	27.25%	\$ -	\$107,245	\$ 500,803	71	-38.49%	\$ -	-\$ 410,277	\$ 655,655
72	-6.65%	\$ -	-\$33,303	\$ 467,500	72	26.38%	\$ -	\$ 172,962	\$ 828,617
73	26.31%	\$ -	\$122,999	\$ 590,499	73	19.53%	\$ -	\$ 161,829	\$ 990,446
74	4.46%	\$ -	\$26,336	\$ 616,835	74	26.67%	\$ -	\$ 264,152	\$ 1,254,598
75	7.06%	\$ -	\$43,549	\$ 660,384	75	31.01%	\$ -	\$ 389,051	\$ 1,643,649
76	-1.54%	\$ -	-\$10,170	\$ 650,214	76	20.26%	\$ -	\$ 333,003	\$ 1,976,652
77	34.11%	\$ -	\$221,788	\$ 872,002	77	34.11%	\$ -	\$ 674,236	\$ 2,650,888
78	20.26%	\$ -	\$176,668	\$ 1,048,670	78	-1.54%	\$ -	-\$ 40,824	\$ 2,610,064
79	31.01%	\$ -	\$325,192	\$ 1,373,862	79	7.06%	\$ -	\$ 184,271	\$ 2,794,335
80	26.67%	\$ -	\$366,409	\$ 1,740,271	80	4.46%	\$ -	\$ 124,627	\$ 2,918,962
81	19.53%	\$ -	\$339,875	\$ 2,080,146	81	26.31%	\$ -	\$ 767,979	\$ 3,686,941
82	26.38%	\$ -	\$548,743	\$ 2,628,889	82	-6.65%	\$ -	-\$ 245,182	\$ 3,441,759
83	-38.49%	\$ -	-\$1,011,859	\$ 1,617,029	83	27.25%	\$ -	\$ 937,879	\$ 4,379,639
84	3.00%	\$ -	\$48,511	\$ 1,665,540	84	12.40%	\$ -	\$ 543,075	\$ 4,922,714
85	13.62%	\$ -	\$226,847	\$ 1,892,387	85	2.03%	\$ -	\$ 99,931	\$ 5,022,645
86	3.53%	\$ -	\$66,801	\$ 1,959,188	86	14.62%	\$ -	\$ 734,311	\$ 5,756,956
87	26.38%	\$ -	\$516,834	\$ 2,476,022	87	-23.37%	\$ -	-\$ 1,345,401	\$ 4,411,555
88	23.45%	\$ -	\$580,627	\$ 3,056,649	88	-13.04%	\$ -	-\$ 575,267	\$ 3,836,288
89	12.78%	\$ -	\$390,640	\$ 3,447,289	89	-10.14%	\$ -	-\$ 389,000	\$ 3,447,289

9.66% Average rate of return

8.03% Actual rate of return

9.66% Average rate of return

8.03% Actual rate of return

Table #2-Withdrawals start in year 1 at \$25,000 and increase each year by an inflation factor of 3%

<u>John</u>					<u>Susan</u>				
Age	ROR	Withdrawal	Gain or (Loss)	Balance	Age	ROR	Withdrawal	Gain or (Loss)	Balance
64				\$ 500,000	64				\$ 500,000
65	-10.14%	\$ 25,000	-\$48,165	\$ 426,835	65	12.78%	\$ 25,000	\$ 60,705	\$ 535,705
66	-13.04%	\$ 25,750	-\$52,301	\$ 348,784	66	23.45%	\$ 25,750	\$ 119,584	\$ 629,539
67	-23.37%	\$ 26,523	-\$75,312	\$ 246,948	67	26.38%	\$ 26,523	\$ 159,076	\$ 762,092
68	14.62%	\$ 27,318	\$32,110	\$ 251,740	68	3.53%	\$ 27,318	\$ 25,938	\$ 760,712
69	2.03%	\$ 28,138	\$4,539	\$ 228,141	69	13.62%	\$ 28,138	\$ 99,777	\$ 832,350
70	12.40%	\$ 28,982	\$24,696	\$ 223,855	70	3.00%	\$ 28,982	\$ 24,101	\$ 827,469
71	27.25%	\$ 29,851	\$52,866	\$ 246,870	71	-38.49%	\$ 29,851	-\$ 307,003	\$ 490,615
72	-6.65%	\$ 30,747	-\$14,372	\$ 201,751	72	26.38%	\$ 30,747	\$ 121,313	\$ 581,181
73	26.31%	\$ 31,669	\$44,749	\$ 214,831	73	19.53%	\$ 31,669	\$ 107,320	\$ 656,832
74	4.46%	\$ 32,619	\$8,127	\$ 190,338	74	26.67%	\$ 32,619	\$ 166,478	\$ 790,691
75	7.06%	\$ 33,598	\$11,066	\$ 167,806	75	31.01%	\$ 33,598	\$ 234,774	\$ 991,867
76	-1.54%	\$ 34,606	-\$2,051	\$ 131,149	76	20.26%	\$ 34,606	\$ 193,941	\$ 1,151,202
77	34.11%	\$ 35,644	\$32,577	\$ 128,081	77	34.11%	\$ 35,644	\$ 380,517	\$ 1,496,075
78	20.26%	\$ 36,713	\$18,511	\$ 109,880	78	-1.54%	\$ 36,713	-\$ 22,474	\$ 1,436,888
79	31.01%	\$ 37,815	\$22,347	\$ 94,412	79	7.06%	\$ 37,815	\$ 98,775	\$ 1,497,847
80	26.67%	\$ 38,949	\$14,792	\$ 70,255	80	4.46%	\$ 38,949	\$ 65,067	\$ 1,523,965
81	19.53%	\$ 40,118	\$5,886	\$ 36,023	81	26.31%	\$ 40,118	\$ 390,400	\$ 1,874,247
82	26.38%	\$ 36,023	\$ -	\$ -	82	-6.65%	\$ 41,321	-\$ 121,890	\$ 1,711,037
83	-38.49%	\$ -	\$ -	\$ -	83	27.25%	\$ 42,561	\$ 454,660	\$ 2,123,135
84	3.00%	\$ -	\$ -	\$ -	84	12.40%	\$ 43,838	\$ 257,833	\$ 2,337,130
85	13.62%	\$ -	\$ -	\$ -	85	2.03%	\$ 45,153	\$ 46,527	\$ 2,338,504
86	3.53%	\$ -	\$ -	\$ -	86	14.62%	\$ 46,507	\$ 335,090	\$ 2,627,087
87	26.38%	\$ -	\$ -	\$ -	87	-23.27%	\$ 47,903	-\$ 600,176	\$ 1,979,008
88	23.45%	\$ -	\$ -	\$ -	88	-13.04%	\$ 49,340	-\$ 251,629	\$ 1,678,039
89	12.78%	\$ -	\$ -	\$ -	89	-10.14%	\$ 50,820	-\$ 165,000	\$ 1,462,219