

# Compound Interest and Simple Interest when it make an impact

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# **1 Introduction**

I have been contemplating the circumstances under which compound interest significantly diverges from simple interest in terms of financial returns. To gain a clearer understanding, I plan to conduct an analysis across various scenarios, considering different expected annual returns over multiple investment horizons, specifically 10, 25, 50, 75, and 100 years.

This investigation aims to delineate the thresholds at which compound interest truly manifests its impact compared to simple interest.

The initial capital is always 1000\$.

## 2 Results

Upon careful examination of the outcomes, it is evident that there is a significant disparity in returns, particularly over extended periods, which aligns with our expectations.

However, there are two noteworthy observations:

1. With a return of 2.5%, the variance observed over a decade is minimal, amounting to merely 2.70%.

	Interest Type	Simple - End (\$)	Compound - End (\$)	Delta (USD)	Delta (%)
0	10 Years	1250.00	1283.69	33.69	2.70
1	25 Years	1625.00	1867.03	242.03	14.89
2	50 Years	2250.00	3485.81	1235.81	54.92
3	75 Years	2875.00	6508.11	3633.11	126.37
4	100 Years	3500.00	12150.85	8650.85	247.17

(a) ROI: 2,5%

2. In the context of ultra-long-term investments, spanning over 75 years, the returns are substantially elevated.

This observation prompts thoughtful consideration regarding the concept of "generational wealth." Even with a relatively modest initial investment, the potential for substantial impact on successive generations becomes apparent.

	Interest Type	Simple - End (\$)	Compound - End (\$)	Delta (USD)	Delta (%)
0	10 Years	1500.00	1647.01	147.01	9.80
1	25 Years	2250.00	3481.29	1231.29	54.72
2	50 Years	3500.00	12119.38	8619.38	246.27
3	75 Years	4750.00	42191.09	37441.09	788.23
4	100 Years	6000.00	146879.45	140879.45	2347.99

(a) ROI: 5%

	Interest Type	Simple - End (\$)	Compound - End (\$)	Delta (USD)	Delta (%)
0	10 Years	2000.00	2707.04	707.04	35.35
1	25 Years	3500.00	12056.95	8556.95	244.48
2	50 Years	6000.00	145369.92	139369.92	2322.83
3	75 Years	8500.00	1752717.17	1744217.17	20520.20
4	100 Years	11000.00	21132414.60	21121414.60	192012.86

(b) ROI: 10%