

Investing: Time matters

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Starting investing early

There are several advantages to starting early:

- \$10 000 invested (at 5% p.a.) at the age of 20 will be worth \$115 000 when you are 70, but it will grow to only \$26 500 if you start at 50 — this is the well-known effect of compounding;
- a more subtle difference is that when you invest early you can afford setbacks, since you have time to make up for them; consequently you can invest in riskier portfolios, so one should compare a real return of (say) 6% p.a. for 50 years to 5% for 20 years: a gain of \$175 000 against \$16 500 (in today's money);
- also note that the stock market has gone nowhere in the past decade, so someone who started investing ten years ago to retire today may be unable to; on the other hand, it is quite unlikely that markets will perform very poorly for decades on end, so the earlier you start the less you must rely on strong market performance during a specific period.

A portfolio for every age

When you are decades away from retirement your main purpose should be to grow your money, so you focus on

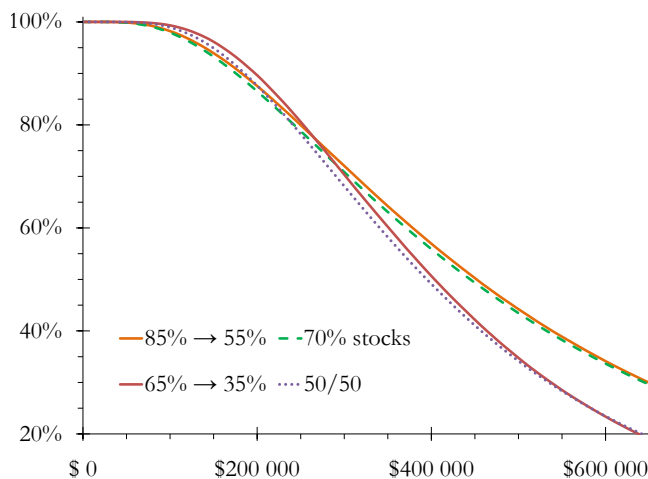


FIG. 1: Cumulative distribution for \$100 000 invested for thirty years: constant allocation and linearly decreasing stock allocation.

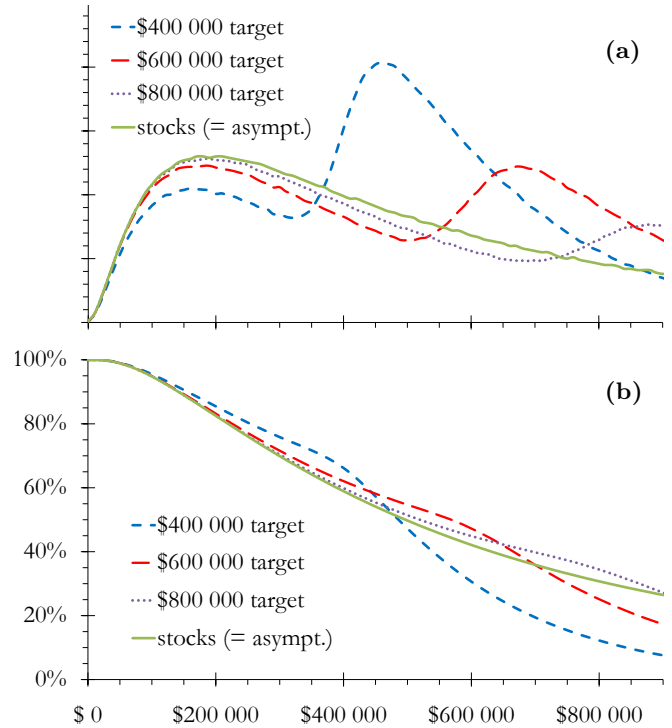


FIG. 2: (a): Possible value (in today's money) of \$100 000 invested for thirty years with an active allocation. (b): Cumulative distribution.

high-return asset classes. As time passes and retirement nears, you become more careful since a negative market move could rob you of money you will not have time to recover. A typical advice is to invest your age in bonds (some say age - 10): if you are 40, this means holding 40% of bonds and 60% of stocks (or 30-70). Figure 1 shows that this strategy gives only slightly better results than static asset allocations. Myth busted?

Active allocation

Chances are that you will change your asset allocation (and possibly your plans) based on the performance of your portfolio. Had you invested USD 5 000 every January in the S&P 500 starting in 1980 (no great feat there), you would have been a (U.S. dollar) millionaire in twenty years. In such a situation, you probably want to lock in your gains by decreasing your stock allocation (regardless of your age): you have enough money already, so

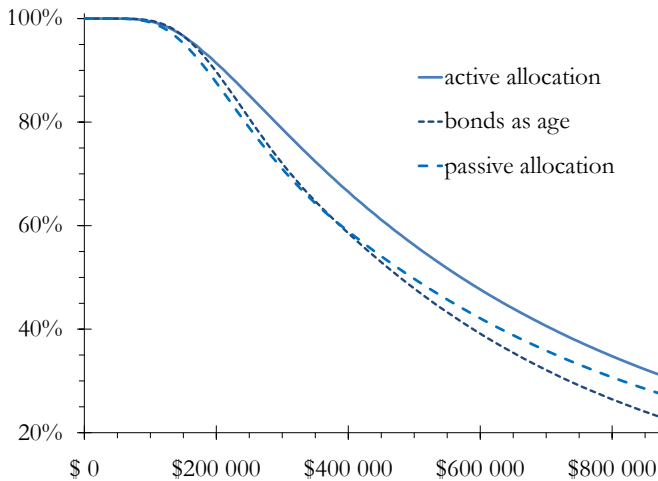


FIG. 3: Cumulative distribution for \$100 000 invested for thirty years.

your main goal is to avoid losing it.

The dashed red curve in Fig. 2 corresponds to a strategy aimed at growing \$100 000 to \$600 000 in thirty years. Figure 2(b) shows that the probability of having much more than \$600 000 is indeed low: when the portfolio value nears \$600 000 the allocation is switched to safer assets to avoid a big loss so close to the target. This active allocation yields \$575 000 on average but with a median of \$590 000, even higher than pure equity. (No constant asset allocation has a median higher than its average.)

The solid line in Fig. 3 shows the outcome of tuning the strategy to one’s 30-year target. This active allocation can outperform a constant allocation (dashed line) by

nearly 10% (around \$350–400 000), and outperforms by at least 5% on the whole [\$230 000, \$800 000] range. By changing one’s allocation based on market moves, it is possible to quite improve the odds of reaching one’s goal.

One can see in Fig. 3 that investing one’s age in bonds has some success up to \$350 000 but for higher values the optimal static portfolio is 100% equity and no portfolio that ends with at least 30% in bonds can compete. So this strategy is only marginally better than a static allocation at best and can be quite worse for people who want to do better than multiply their money by 3.5 over thirty years.

Methodology for active allocation

The allocation is reoptimized every year. Based on the current value of the portfolio, one calculates the real rate necessary to reach amount X after thirty years. If after n years the portfolio is worth p_n then one needs to grow at an annual rate r_n such that

$$p_n(1 + r_n)^{30-n} = X. \quad (1)$$

The value of X is set to the target times

$$1 + 3\% \times (30 - n), \quad (2)$$

so as to be automatically more cautious as time passes. The corresponding asset allocation can be found from the fact that r_n is a linear combination of the returns of stocks and bonds. (The equity allocation is always kept between 30% and 100%.) The values 3% and 30% have been chosen because they maximize returns.