



Simulating the Case against Stock Picking

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Abstract

In simulating a portfolio of 100 security prices the median terminal price was regularly below that of the average mean portfolio price. In that picking a single security would likely choose the median terminal price, a case can be made against stock picking.

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C60 Mathematical and
Simulation Modeling

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1. Introduction

Notwithstanding the body of evidence that holding a diversified no-load low expense ratio mutual fund or exchange traded fund is the most efficacious choice toward maximal portfolio returns (see Elton, Gruber, 1995 & Elton et al., 1993 and Lorie & Hamilton, 1973) many individuals still think that a possibility exists to beat the market.

2. Simulation

Simulated index portfolios were created and their average mean returns were compared to the most likely cases of the median securities chosen there from. The simulations in order to be realistic had monthly standard deviations of 2, 3, and 4 percent and thus yearly standard deviations of 6.9, 10.4, 13.9 percent respectively (square root of the 12 months times the monthly return). Each monthly price was determined from the prior month's price by:

$$P_t = P_{t-1}(1+s\sigma) \text{ where } \sigma = (-2\ln(\check{r}_1))^{1/2}\sin(2\pi\check{r}_2)$$

and that $\check{r} = U(0,1)$ or $= \text{RAND}()$ in Excel or $\text{RND}(1)$ in Basic and s is the monthly standard deviation.

3. Results

The simulation produced a more realistic security price distribution with no negative prices and the possibility that some extraordinary high priced securities may result. Here's a graphic from previous simulations:

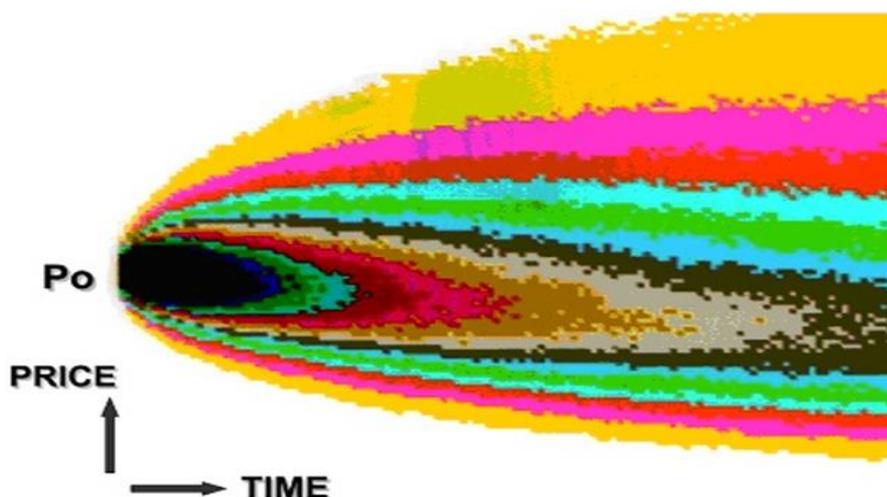


Fig-1. Simulated Stock Prices across Time

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A portfolio of 100 security prices was simulated across 12 months with 1000 simulated runs each. The results showed that the median terminal price of a single selected security was regularly below that of the average mean portfolio price.

The results of three independent simulated runs of 1,000:

Std. Deviaton	Medians	Average
Monthly Yrly.	Above	Difference
2%	12	1.19%
3	25	1.49
4	28	1.90

In a simulation of 1000 runs with a .02 monthly standard deviation there were 12 cases when the median selected security beat the portfolio mean with an average 1.19 percent lower difference between the two. For an independent run with a .03 monthly standard deviation there were 25 cases when the median beat the portfolio mean average with an average differential of 1.49 percent below the portfolio average. With another run with a .04 percent monthly standard deviation there were 28 cases when the median beat the portfolio average with an average differential of 1.90 percent below the portfolio average.

4. Conclusion

Thus one should be able to conclude that picking a single security would likely beat the market is unlikely and moreover adds to the evidence against stock picking (see Higgins, 2013 and Bodie, Kane, & Marcus, 2001). In addition, while the classic approach here is to minimize risk (see Markowitz, 1959), it seems appropriate here to also note that in holding a diversified index portfolio that one is more likely to achieve a superior return as well as minimize risk. Furthermore (and not generally observed) in holding a diversified index portfolio one always includes the otherwise difficult to select stellar superior winners. And unlike other gambles, the return to the stock market is generally positive. That is to say while betting on black and red in say roulette that one would on average lose, that holding the entire portfolio with an average positive return one tends to win and more so as costs are lowered with lower expense ratios and load charges. See/hear also my YouTube/DrCinvests video (Higgins, 2018).

Of course it is no surprise given that the security price distribution here as well as the case generally in the real world is asymmetric and that one would expect the median to be below that of the mean (see Investopedia). Consider:

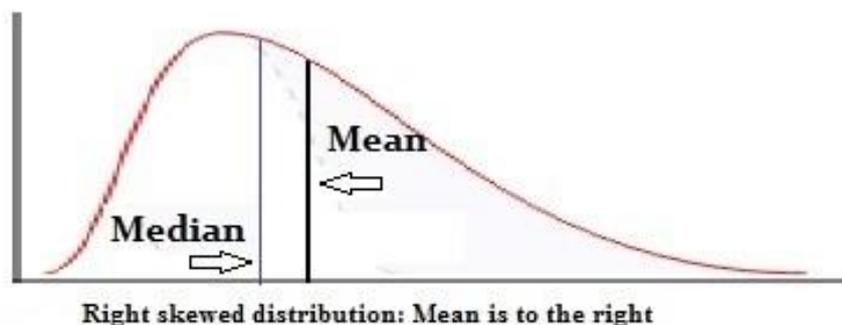


Fig-2. Asymmetric Security Price Distribution
 Statistics How To: Statistics for the Rest of Us!

5. Computer Program

Here's the Basic computer program:

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10 PI=3.14159*2
20 TW=-2
30 N=100:N2=N/2 :REM portfolio size & median
40 DIM A(N)
50 T1=0:T2=0:U=0 :REM counters & mean difference
60 F=0:S=.02 :REM counter & std. deviation
70 FOR Z=1 TO 100:REM number of simulations
80 FOR K=0 TO N :REM portfolio creation
90 P=100 :REM seed price
100 FOR J=1 TO 12:REM monthly run
110 R=SQR(TW*LOG(RND(1)))*SIN(PI*RND(1))
120 P=P*(1+R*S)
130 NEXT J
140 A(K)=P
150 U=U+P
160 NEXT K
170 U=U/(1+N) :REM mean of portfolio
180 Y=0 :REM bubble sort start
190 FOR I=1 TO N
200 IF A(I)>A(I-1) THEN X=A(I-1):A(I-1)=A(I):A(I)=X:Y=1
210 NEXT I
220 IF Y=1 THEN 180
230 IF U<A(N2) THEN T1=T1+1 :REM compare mean vs median
240 F=F+U-A(N2) :REM compute difference
250 T2=T2+1
260 PRINT T1:T2:F :REM report totals, differences
270 NEXT Z
OK
    
```

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