

# Rolling vs. Non-Rolling Periods

IFA has chosen to use monthly rolling periods as the basis for its analysis of risk and return over a fifty year period. An objection may be raised that the overlapping aspect of rolling periods leads to non-independence of the sample of monthly returns, and therefore renders the calculation of standard deviation meaningless. IFA answers this objection with the following points:

1) The sample size of non-rolling (or consecutive) periods is much smaller than rolling periods. For example, for ten year periods, we have 481 rolling periods but only five non-rolling periods. This smaller sample may fail to fully capture the impact of extreme events such as the bear market of 1973 to 1974. Using two-year non-rolling periods, the return of 1973 is combined with 1972 and the return of 1974 is combined with 1975. In the rolling period data, the bear market is fully captured in the return from January, 1973 to December, 1974. To quantify the difference for a Portfolio 90, the worst two-year rolling period (1/73-12/74) had an average annualized return of -22.0% while the worst two-year non-rolling period (1/72-12/73) had an average annualized return of -0.39%.

2) Each rolling period return can be viewed as the experience of an investor who began in the first month of the rolling period. When using rolling periods, IFA is capturing the experience of hypothetical investors who started at the beginning of each month over the fifty year time period and weighing them equally. Not only is the rolling period the experience of an investor, it is also the experience of capitalism. Each period incorporates the returns that resulted from the time series of interaction among market participants, regulatory agencies, and other entities that have a significant impact on the market, such as the Federal Reserve. A Monte Carlo approach (or even the use of non-rolling periods) may fail to capture the impact of governmental actions taken after a catastrophic event, regardless of whether these actions increase or decrease subsequent returns.

3) As seen in the charts below comparing average returns and standard deviations between rolling and non-rolling periods, the use of rolling periods does not appear to bias the average return or the standard deviation in either a positive or a negative direction. In particular, the one-year rolling period line is to the left of the non-rolling line while the two-year rolling period line is to the right of the non-rolling line.

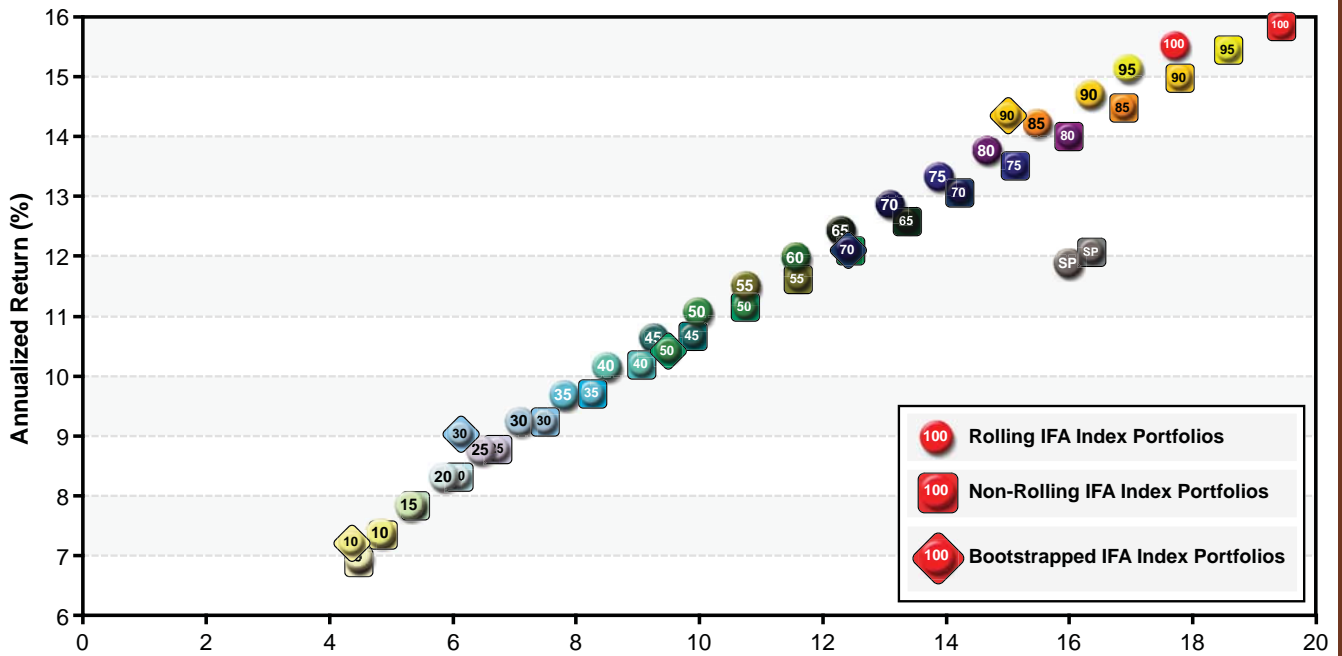
4) IFA has run bootstrapping simulations (250 trials) using monthly returns drawn randomly with replacement and has obtained similar results to the rolling period analysis. The rolling period return can be thought of as one potential set of draws from a bootstrapping simulation. In particular it is the draw that we believe most accurately expresses the variants of investor experience. Other draws will either slightly expand or contract the returns and standard deviation. The average returns and standard deviations for rolling periods, non-rolling periods, and the bootstrapping simulations are shown below for a Portfolio 90.

	1-Year	2-Year	5-Year	10-Year
Rolling Period Average Annualized Return	14.65%	13.69%	13.25%	13.36%
Rolling Period Standard Deviation of Returns	16.30%	10.50%	6.16%	4.21%
Non-Rolling Average Annualized Return	14.96%	13.83%	13.70%	13.62%
Non-Rolling Standard Deviation of Returns	17.76%	8.38%	6.35%	4.81%
Bootstrapping Average Annualized Return	14.33%	14.09%	14.28%	13.70%
Bootstrapping Standard Deviation of Returns	14.96%	11.56%	6.97%	4.78%

5) To summarize, it is IFA's determination that the standard deviation of rolling period returns is the best descriptor of the time diversification of risk.

## 1-Year Non-Rolling (50 Periods) vs. 1-Year Rolling Returns (589 Periods)

50 years - Jan. 1958 to Dec. 2007

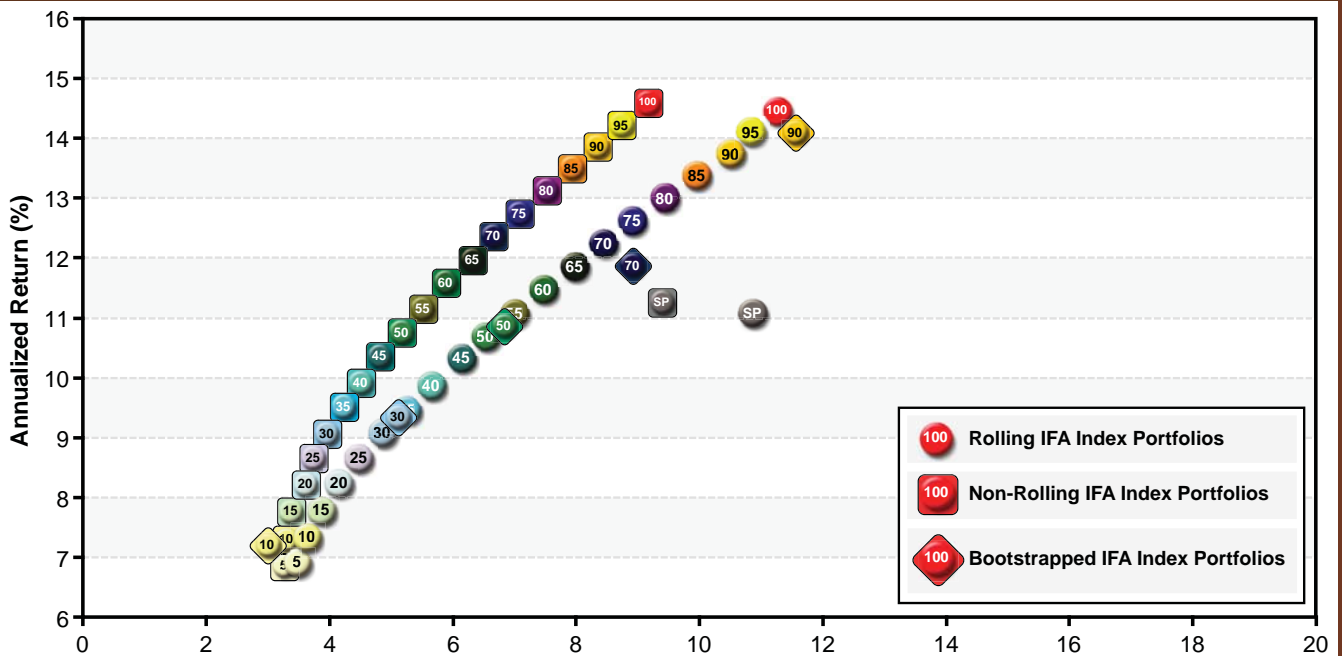


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## 2-Year Non-Rolling (25 Periods) vs. 2-Year Rolling Returns (577 Periods)

50 years - Jan. 1958 to Dec. 2007

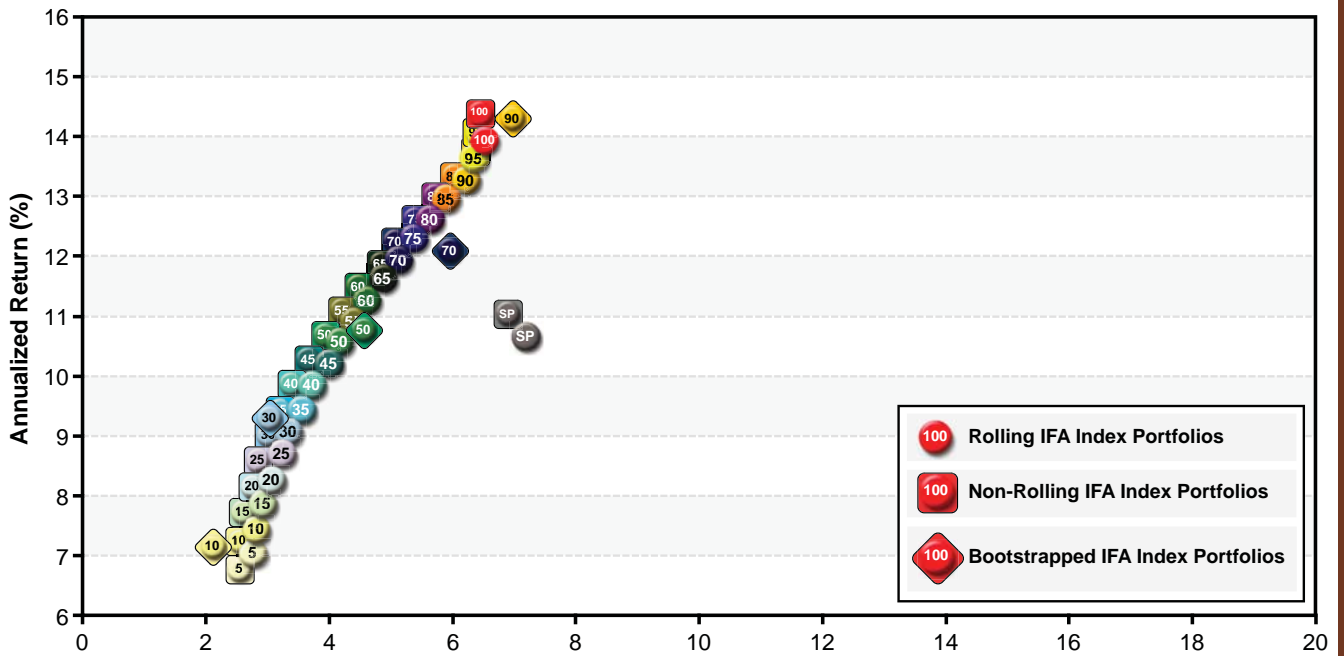


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## 5-Year Non-Rolling (10 Periods) vs. 5-Year Rolling Returns (541 Periods)

50 years - Jan. 1958 to Dec. 2007

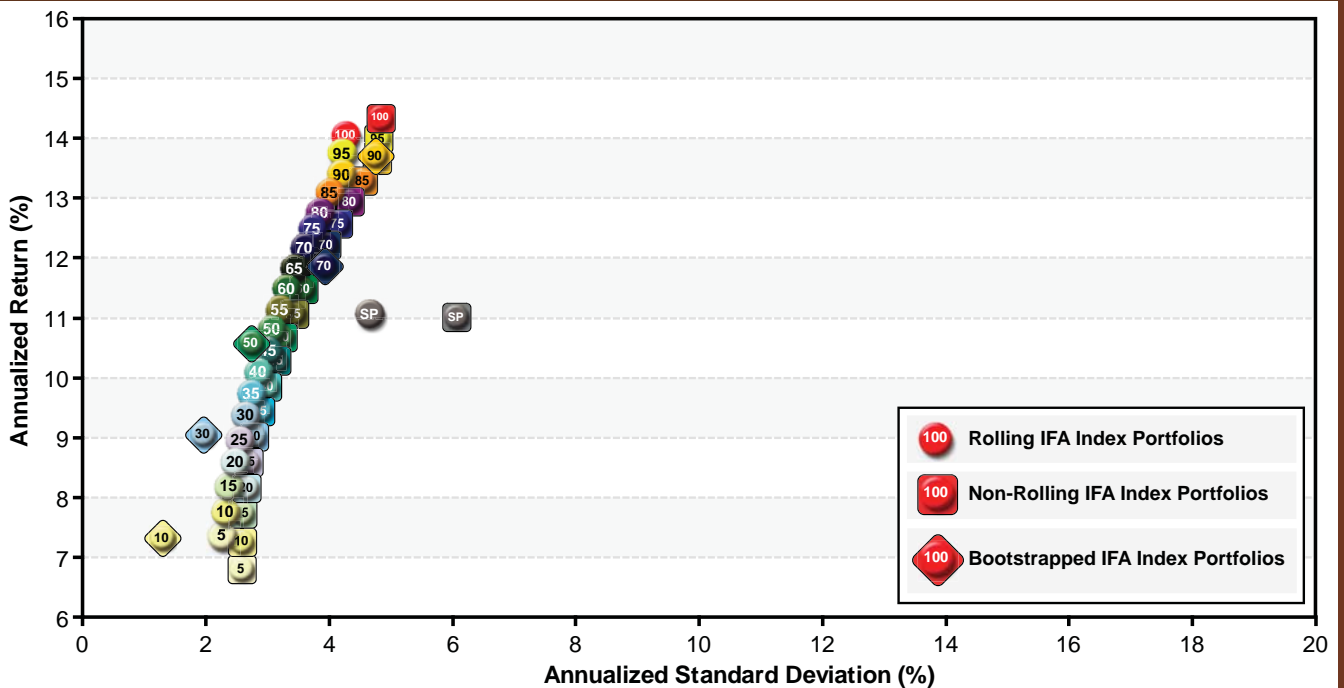


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## 10-Year Non-Rolling (5 Periods) vs. 10-Year Rolling Returns (481 Periods)

50 years - Jan. 1958 to Dec. 2007



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