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New thinking for alternative investments

Investing Through Inflation

The Models Aren't Wrong – They're Just Not Always Valid

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Investing Through Inflation

A Series of Papers - Index

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The Models Aren't Wrong – They're Just Not Always Valid

***Summary**: Investment management is built on a bedrock of quantitative models that have earned the originators Nobel Prizes. But it cannot be assumed that these models are infallible. Their underlying assumptions and nuances have to be taken into account before being used for real life purposes.*

There are giants in modern finance with unimpeachable reputations. Nobel winners such as William Sharpe, Harry Markowitz, Myron Scholes have helped define modern finance. Their models and formulas provide the structure and backbone on which we confidently manage our assets. To rail against these giants would equal the folly of Don Quixote charging at the windmills. And yet, I shall.

The arc of my career began as a quantitative equity analyst. In a time before the introduction of the IBM PC – the Precambrian period of personal computing. I studied the work of these future Nobel laureates and practiced the quantitative arts they defined. As time marched on I became an arbitrageur whose purpose and pay were dependent on exploiting the flaws either in the models themselves or exposed by the models. One's perception changes when tilting at windmills.

As the answer to every economic question is supply & demand the answer to any investment decision is risk vs. reward. I had come to believe that this identity could be oversimplified to art vs. science. The art of producing risk-adjusted returns vs. the science of controlling risk. Having worked long enough to have experienced more than my share of financial earthquakes teaches one that there is also an art to the science.

The formulas and models that have formed the bedrock of investment management assumes a stasis in the markets that does not exist. Stated simply, the markets of today are not the same as the markets when the models were created. It doesn't suggest the models are wrong it suggests their application has to be nuanced. An unwillingness to apply a qualitative lens to a quantitative approach will lead to missing the curve in the road. It can't be assumed the road is forever straight. There's a reason every car has a steering wheel.

What exactly is it that I'm questioning when examining the validity of a model? Three elements;

1) variables that are presumed to be independent but are not, and,
2) variables that are presumed constant but are not, and
3) the data backing the model

1) Independent Variables as Illustrated by the Sharpe Ratio

The American economist William Sharpe won the Nobel Prize in Economic Sciences in 1990. In 1966 he published the Sharpe Ratio. A ratio to measure the risk adjusted performance of an asset. In fairness to Professor Sharpe, he himself derides the overutilization of this formula. Nonetheless its continued use to compare assets requires attention. The formula is;

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

where:

R_p = return of portfolio

R_f = risk-free rate

σ_p = standard deviation of the portfolio's excess return

I've highlighted the object of my consternation – the risk free rate. After the Great Financial Crisis the Federal Reserve had seen fit to set and control the risk free rate at or near zero. Professor Sharpe would have presumed that the risk free rate was a market determined variable. His model assumes that it reflects the true rate of return that an investment with no risk would earn. However, if it is not market determined and is controlled by an actor can one assume that the output of the formula accurately risk adjusts an asset's return? Answer – I think not.

2) Constancy of Variables as Illustrated by Portfolio Variance

Harry Markowitz, also an American economist, joined William Sharpe in receiving the Nobel Prize in 1990. He's known as the father of Modern Portfolio Theory, a theory that states a portfolio's variance (risk) can be reduced by selecting assets with low or negative correlations. Hence the calculation of portfolio variance warrants attention.

$$Portfolio\ variance = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2Cov_{1,2}$$

Where:

- w_1 = the portfolio weight of the first asset
- w_2 = the portfolio weight of the second asset
- σ_1 = the standard deviation of the first asset
- σ_2 = the standard deviation of the second asset
- $Cov_{1,2}$ = the covariance of the two assets, which can thus be expressed as $p_{(1,2)}\sigma_1\sigma_2$, where $p_{(1,2)}$ is the correlation coefficient between the two assets

The objective of Modern Portfolio Theory is to design an asset mix with maximum return while minimizing risk. The correlation of the assets is of paramount importance. The calculation is made at a point in time but the correlations between the two variables is not constant. Two variables might have been uncorrelated at the time of measurement and therefore risk minimizing but over time become highly correlated in effect raising risk. I once, when asked, cautioned Canada's bank regulator that correlation is the least understood variable in finance. I said that in 2007 just prior to the collateralized debt obligation (CDO) blow-up which was a model built on a flawed correlation assumption.

3) Data Sampling Out of Date as Illustrated by the 60/40 Portfolio

No Nobel prize has been awarded for the design of the 60/40 portfolio. In a further article I describe in painstaking, tedious detail this was an evolution as opposed to a breakthrough. The point I raise in this exercise is that the apparent and obvious success of the 60/40 portfolio is not the genius of the model but the effect of the times we live in. To assume its continued success is to assume the continued state of the markets. That requires you to believe that interest rates will not rise from the lows set after the Great Financial Crisis. A dangerous assumption on which to rely.

The book Don Quixote is considered by literary historians as one of the most important books of all time. Quixote became an archetype. I am no Don Quixote. I know the windmills aren't giants. But I also know the giants and their models aren't infallible. The models aren't wrong but they can be misapplied.

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