The Swan Defined Risk Strategy & Risk Analysis Software Considerations

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"It's tough to make predictions, especially about the future." - Yogi Berra

Many people would like to know the future. However, without time machines or crystal balls, the next best option is probabilistic statistical models.

In the wake of the Global Financial Crisis of 2007-09, numerous statistical tools became available that attempt to quantify the risk to a portfolio under adverse scenarios. Broadly speaking, these types of tools attempt to estimate future risk following one of two methods. They are either:

1) Holdings-based, or

2) Returns-based

Each has their relative strengths and weaknesses. Neither is perfect.

Holdings-Based Analysis

With holdings based analysis (HBA) the risk model analyzes a "snapshot" of the portfolio's actual holdings. HBA will apply a statistical test to the individual holdings, usually via multi-variable regression. The statistical model attempts to determine how sensitive a security is to changes in a variety of market or economic factors.

Pros: The pros of HBA is that it takes a look "under the hood" at what is in a portfolio. It is a "bottom-up" rather than "top-down" way of analyzing a portfolio.

Cons: The problem with any holdings-based scenario/shock test is that it looks at a single, point-in-time portfolio. In a way, HBA is like taking a single frame out of a movie, and assuming the whole movie looks like that one shot.

HBA makes no provision for the fact that a portfolio manager might sell/trade/adjust their positions. A shock test applies the "worst case" upon current positions, extrapolated all the way out to the bottom, assuming the portfolio manager does nothing. Any good portfolio manager will re-evaluate their positions and risk and make modifications. Really the only ways portfolios don't change when hit by a crisis are:

1. The portfolio manager is asleep at the wheel and isn't actively managing the portfolio,
2. The securities are illiquid and the portfolio manager is unable to sell, or
3. The portfolio is passively managed, and by design must track the performance of an index

None of these apply to Swan and the Defined Risk Strategy.

Moreover, HBA is particularly difficult to apply to options. A HBA model typically attempts to estimate the impact of variables like inflation, earnings surprises, or energy prices on holdings. If the holding is a traditional stock or bond, HBA factor analysis can work well.

The prices of options, on the other hand, are driven by different factors. Options are derivatives, meaning their value is dependent upon or "derived from" other securities. What determines an option's price are factors like:

- The time remaining until the option expires
- The gap between the strike price of the option and the current price of the underlying security
- The volatility of the underlying security in the option contract

Pricing for options requires entirely different models than regressions.

Extrapolating out future returns from current positions is especially difficult when analyzing options. Unlike stocks, every option has an expiration date. It will simply cease to exist after a pre-determined amount of time, at which point it will be worth something or it will not. Beyond its expiration date the option does not exist. A holdings based system would need to make a number of heroic assumptions about the options a manager would buy in the future to replace the expiring ones. We believe this type of data can not be accurately forecast from a single, point-in-time snapshot of current holdings.

Returns-Based Analysis

With returns based analysis (RBA) the risk model is based off the actual, historic return history of a portfolio. RBA will compare the track record of a portfolio against a variety of market or economic factors in order to see how sensitive the overall portfolio is to those different scenarios. It is more of a "top-down" approach.

Pros: The pros of RBA is that the actual track record of a manager is used in the analysis. The track record will contain the impact of every decision the portfolio manager made-good and bad. A RBA is based off of what a portfolio manager has actually accomplished.

Cons: The problem with RBA has to do with the length of the track record. If a manager has only been in existence during "good times" in a market, it is difficult to use RBA to ascertain how they would do in bad times. This is especially worrisome in today's environment. The current bull market is the second-longest in U.S. history. It's been nine years since the Global Financial Crisis. Many investment products have not been "battle-tested" through a true bear market, thus limiting the value of RBA.

Conclusion

As stated in the outset, there is no crystal ball in finance. The best HBA or RBA can tell you is what might happen. Read the fine print on the output of any of these stress tests and there should be a lot of disclosure to this point.

Moreover, the results of a HBA and RBA sometimes contradict one another. The "worst case" for the same manager might be radically different based upon the assumptions made and the statistical model used. Furthermore, these tools can also include a very large "margin of error" from the forecasted return. The table below compares the various projections following a crisis similar to the 2007-09 Global Financial Crisis for various Swan products:

Input	Scenario	Return: (actual/forecast)
S&P 500 Index	Actual returns, Nov 07 – Feb 09	-51.0% (actual)
Swan DRS - Hidden Levers, holdings based	"Fed Stress test: Severely Adverse"	-45.0% (forecast)
Swan DRS - Riskalyze	"Financial Crisis"	-16.7% (forecast)
Swan DRS, Select Composite (net of fees)	**Actual returns, Nov 07 – Feb 09**	**-4.7% (actual)**

Source: Zephyr StyleADVISOR and Swan Global Investments

Conclusion (continued)

The DRS has been battle tested over 20 years and successfully navigated events like the LTCM blow-up, the dot-com crash, September 11th, the “Flash Crash” in May 2010, the Financial Crisis, the “taper tantrum”, and the China hard-landing panic in August 2015. While probability-based stress tests or forecast models can be useful in certain circumstances, we believe the ultimate “stress test” is reality.