Swedroe: Testing The Beta Premise

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One of the most important issues in finance concerns the relationship between risk and expected return. John Lintner, William Sharpe and Jack Treynor are generally given most of the credit for introducing the first formal asset pricing model, the capital asset pricing model (CAPM), which was developed in the early 1960s. The CAPM provided the first precise definition of risk and how it drives expected returns.

The CAPM looks at risk and return through a "one-factor" lens, meaning the risk and the return of a portfolio are determined only by its exposure to *market beta*. Market beta is the measure of the equity-type risk of a stock, mutual fund or portfolio relative to the risk of the overall market. The CAPM was the financial world's operating model for about 30 years.

However, like all models, it was by definition flawed or wrong, explaining only about two-thirds of the differences in returns of diversified portfolios. If such models were perfectly correct, they would be laws, like we have in physics.

More Than Beta

In their 1992 paper, "The Cross-Section of Expected Stock Returns," Eugene Fama and Kenneth French proposed that, along with the market factor of beta, exposure to the risk factors of size and value explain the cross section of expected stock returns. The Fama-French model greatly improved upon the explanatory

power of the CAPM, accounting for more than 90% of the differences in returns between diversified portfolios.

The three-factor model became the new powerhouse working model in finance. Later, the Carhart momentum factor was added, and we had a four-factor model. Today there's a factor model battle going on, with a few additional factors competing for inclusion. Among these other factors are investment, profitability and quality.

The bottom line is that beta is only one measure of risk, and there are many others currently being "thrown around," such as the higher moments of volatility (skewness, kurtosis and downside volatility).

Does Beta Make Sense As A Risk Measure?

With this in mind, Javier Estrada and Maria Vargas, authors of a November 2015 paper, "Black Swans, Beta, Risk, and Return," sought to answer the question of whether beta is a good measure (if not the only one) of risk.

Their hypothesis was that, while markets are more complex than indicated by the CAPM, it "seems highly unlikely that expected returns are unrelated to the risks of doing badly in bad times." Clearly, an asset that performs badly in bad times is a risky asset. Thus, investors should demand (expect) a risk premium as compensation.

To test their hypothesis, Estrada and Vargas explored whether high-beta portfolios of countries and industries fall more than low-beta portfolios when negative "black swans" hit the market. They defined a black swan as a month where the market rose or fell by at least 5%.

Five percent might seem like a low hurdle to define a black swan. However, you want to make sure you have enough data. If the authors had defined blacks swans as monthly returns in the world market of at least 10%, they would have had only 15 events (eight negative and seven positive) between January 1973 and December 2009 relevant for countries, and only six events (four negative and two positive) between January 1998 and December 2009 relevant for industries.

The authors also sought to answer the question of whether beta is a valuable tool for portfolio selection. In pursuit of an answer, Estrada and Vargas explored if a strategy that reacts to positive and negative black swans by investing in portfolios selected on the basis of beta would outperform a passive investment in a world market portfolio.

Study Details

Their study covered the period 1970 through 2009 and included 47 countries (23 developed and 24 emerging) and 57 industries. The benchmark passive index was the MSCI World (equity) Market Index. Due to the availability of data, between January 1970 and December 1987, Estrada and Vargas used a world market portfolio consisting only of developed markets. From January 1988 through December 2009, they used a world market portfolio consisting of developed as well as emerging markets.

The authors tested an investable strategy that reacts to negative black swans by investing in high-beta portfolios (based on country and industry indexes) and to positive black swans by investing in low-beta portfolios.

To perform their test, every time a negative black swan hit the market, Estrada and Vargas estimated betas for each country in their sample on the basis of the 60 months previous to, but not including, the black swan

month. They then ranked rank all countries by those betas and split them into four portfolios: one containing the high-beta countries, another containing the low-beta countries, and two in between.

Their investment strategy was, after negative black swans, to invest in a portfolio of high-beta countries, obtaining exposure to the countries expected to gain the most. After positive black swans, their strategy was to invest in a portfolio of low-beta countries, obtaining exposure to countries expected to fall the least. In between black swans, the strategy called for holding whatever portfolio was formed after the last black swan event. The return of each portfolio for the black swan month was an equally weighted average of the returns of the countries in each portfolio during that month. The same procedure was used for industry portfolios.

Results

Following is a summary of the authors' findings:

- In the case of countries, of the 99 black swans identified, 63 were positive (monthly returns higher than or equal to 5%) and 36 were negative (monthly returns lower than or equal to -5%.
- Positive and negative black swan events averaged 7.3% and -8.6%, respectively.
- Across all 36 negative black swans, high-beta portfolios and low-beta portfolios have average betas of 1.50 and 0.54, respectively.
- The beta-based strategy outperforms a passive investment in the world market by 4.3 percentage points a year (14.4% versus 10.1%), although it did also produce higher volatility (19.2% versus 15.2%). The risk-adjusted returns also showed a relative outperformance of 13%.
- Across all 36 events, the relationship between beta and return is strictly negative and monotonic. On average, the high-beta portfolios fell by 10.6% and the low-beta portfolios by 7.1%, relative to a decline of 8.6% for the world market. In other words, on average, high-beta portfolios fell 2 percentage points more than the market, and low-beta portfolios fell 1.5 percentage points less than the market. In the months in which negative black swans hit the market, high-beta portfolios of countries fell, on average, 3.5 percentage points more than low-beta portfolios.
- When the 63 positive black swans occurred, there was an average rise of 7.3% in the market. On average, across all 63 events, high-beta portfolios rose by 9.8% (2.5 percentage points more than the market) and low-beta portfolios by 5.4% (1.9 percentage points less than the market). There was a 4.4 percentage point spread between the high-beta and low-beta portfolios.

The results were similar when building portfolios based on industries instead of countries:

- Due to the shorter history available, only 38 of the 99 black swans are relevant, 21 of which were positive (averaging 7.2%) and 17 of which were negative (averaging -9.1%).
- On average, following the 17 negative black swan events, while the market portfolio fell 9.1%, high-beta portfolios fell by 11.4% and low-beta portfolios by 5.3%.
- On average, across the 21 positive black swan events, the market portfolio rose by 7.2%, the high-beta portfolios rose by 9.4% and the low-beta portfolios by 4.0%.
- The investable strategy delivered an annualized return of 5.8% a year and outperformed the 3.8% return delivered by the passive investment by 2.0 percentage points a year. Its relative outperformance on a risk-adjusted basis was by more than 30%.

Conclusions

The authors observed that, while their switching strategy would indeed generate higher transactions costs, given that it can be implemented with low-cost ETFs or mutual funds, the higher returns would swamp any reasonable assumption of transactions costs.

Summarizing, the authors note: "When negative black swans hit the market, high-beta portfolios fall the most; that is, their prices are those punished most severely. On the other hand, when positive black swans hit the market, low-beta portfolios rise the least; that is, their price run-ups are the least excessive."

Finally, Estrada and Vargas concluded: “Beta appears to properly capture the risk that concerns money managers and investors in general; that is, exposure to large and unexpected market declines.” Thus, they added: “We find beta to be a useful measure of risk in the sense of properly capturing exposure to the downside, and particularly to large and unexpected market declines.”

The bottom line is that, at least from the perspective of black swans, beta does appear to be a good measure of risk. In other words, beta isn’t entirely dead. It may also be a useful tool in forming portfolios. Remember that when rebalancing after a negative black swan, you’re likely purchasing the assets with higher betas and selling the ones with lower betas. And the reverse is true after positive black swans.

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