Factor/Style Investing

Betting Against Correlation

February 12, 2017

Our latest paper Betting Against Correlation tries to look deeper into what drives the low-risk effect. In short, we create a new priced factor that helps distinguish between competing, and confounding, stories explaining the efficacy of low-risk investing.

Recall that the low-risk effect is the tendency for low-risk assets to do better than they should versus high-risk assets. That's a loaded sentence as I haven't defined risk or how we should measure "better than they should." When it comes to the low-risk effect, risk has been measured in many ways including most prominently as market beta or some form of volatility.[1] "Better than they should" is usually, explicitly or implicitly, based on standard single- or multi-factor market equilibrium models where risk should be rewarded with more expected return. In general a broad set of researchers have found that, within a very wide range of asset classes and even across asset classes, low-risk assets, measured in different ways and against a reasonably wide set of potential models of market equilibrium, do too well versus high risk assets.[2]

There are many potential explanations for the low-risk effect. Two of the most prominent are leverage aversion and a preference for lotteries.[3]

In standard market equilibrium theory all investors should pick the best portfolio in terms of expected return per unit of risk and then apply leverage (or, in fact, deleverage if desired) to taste. Leverage is often assumed to be "frictionless" in these theoretical models, meaning investors can freely lever up and down and the risk of levered portfolios is simply proportional to unlevered ones (i.e., more levered portfolios don't entail some other type of exogenous risk). In reality, leverage can be less attractive, not as easy to implement, and more dangerous. It requires someone to lend you money and not change, or be allowed to change, their mind at inopportune times, or else the costs of such possible changes must be borne at potentially trying times. Even simpler, its basic everyday cost is likely above the risk free rate implied in theoretical models and asymmetric for levering versus delevering. Investors also might simply fear leverage beyond what's warranted by these rational reasons. All of these reasons might lead investors to be more averse to leverage than assumed by common frictionless models. As a result, aggressive, but leverage-averse, investors who seek higher expected returns might not simply apply leverage to the "best" portfolio but instead concentrate in the subset of assets with high expected returns and high risk. Hence, leverage aversion creates excess demand for high-risk assets while low-risk assets are unloved. Excess demand and unloved are statements about price. It means that low-risk assets are underpriced and high-risk assets overpriced, and correspondingly low-risk assets have higher expected returns and high-risk assets lower expected returns than if leverage was more readily and easily employed.

Lottery preferences are even simpler. It's a behavioral story. It says that investors are wooed by assets that can exhibit large upside. Essentially, and in contrast to most theory, such investor behavior leads to high risk being desirable, not punished, at least at the margin. As before, "desirable" means "excess demand" which means "higher price" which means "lower expected return."

A large and growing literature attempts to differentiate between these two stories. The debate, while sometimes couched in other forms, really comes down to beta vs. volatility. To understand why, note that leverage aversion is explicitly a story about beta, not simply volatility which can be diversified away, as undiversifiable beta is the theoretical measure of risk when you think about leverage and risk-versus-return in a portfolio context. Lottery demand, on the other hand, is inherently about some kind of volatility because the behavioral theory underlying it explicitly assumes that investors are not thinking in terms of their overall portfolio. Much of the literature attempts to distinguish which of these measures, beta versus some type of volatility, is truly more important. If beta is more important in producing the low-risk effect — with "more important" generally meaning delivering a bigger low-risk effect and subsuming other measures — it bolsters the leverage aversion explanation. If volatility or similar measures are more important, it bolsters the lottery preference story. That all sounds great but there's a problem. The problem is that beta and most measures of volatility are highly correlated, so distinguishing their relative importance is a difficult exercise. Too many stocks simply move around a lot so they have both high beta and high volatility, and vice versa. Much of the literature tries to untangle this knotty problem by brute force (i.e., regressing correlated factors on each other and hoping for the best). We take a different path.

Instead of looking across the different measures of risk we look deeper within one, beta. We dissect beta into its component parts. A stock's beta can be broken down into correlation with the market portfolio times the stock's own volatility, divided by overall market volatility. When comparing stocks, we can ignore the market volatility as it's the same for all assets. So stocks differ in their beta because of differences in their own volatilities or differences in their correlations with the market. Correlation is very different from volatility so this helps us separate the competing theories.

Typical studies take their measure of risk, for example beta, and show that low-risk assets perform "better than they should" by using the risk measure to construct a profitable portfolio by going long low-risk assets and short high-risk assets. Frazzini and Pedersen (2014) use beta as their risk measure and call such a long-short portfolio the "betting against beta" factor or BAB. We push this a step further. We build long-short portfolios for beta's component parts forming a "betting against volatility" (BAV) and "betting against correlation" (BAC) factor representing the two distinct parts of beta or the BAB factor.

We find both BAV and BAC are rewarded. Low-volatility stocks perform "better than they should" and so do low-correlation stocks. The results for BAV are unsurprising as other research has focused on volatility, and both theories, leverage aversion and lottery preferences, imply the power of BAV. The results for BAC are, however, new and important. Quite simply, BAC is strong. This is consistent with the leverage aversion story which implies that changes in correlation induce changes in beta and should be priced. On the other hand, the lottery preference story is silent on the effect of correlations (has anyone ever desired a very boring lottery because it was correlated to the market?).

These findings are a strong indication that leverage aversion is indeed an important part of the low-risk effect though by no means does it rule out other contributing explanations. In fact, we go on to examine common measures of lottery demand[4] that also confound two very different aspects of risk (in this case, volatility vs. the shape of the distribution). Like for beta, we attempt to fix this confounded factor and indeed find a separate role for lottery preferences.[5]

Instead of looking across different risk measures our paper looks within them producing better, cleaner factors. We believe this yields more precise tests of the major theories and yields novel results.

---

[1] Volatility is typically measured as total volatility, idiosyncratic volatility (volatility after hedging out some factor model exposures), or the maximum returns over a certain time (where the latter confounds volatility and skewness – something we attempt to fix in our paper).

[2] We focus on individual stocks around the world, but the low-risk effect has also been found in bond markets, credit markets, stock indices, within and across industries, across asset classes, and in option markets and ETFs.

[3] There are, of course, other competing explanations. I focus here on the two most well-known.

[4] I refer here to short-term measures that look at "best recent days" that tend to mix volatility and some type of upside or positive skewness.

[5] I only detail the BAC/BAV breakdown part of our paper here. To get the other parts, and in fact all the detail behind BAC/BAV, you still need to read the paper!

This document is not intended to, and does not relate specifically to any investment strategy or product that AQR offers. It is being provided merely to provide a framework to assist in the implementation of an investor's own analysis and an investor's own view on the topic discussed herein.

This document has been provided to you solely for information purposes and does not constitute an offer or solicitation of an offer or any advice or recommendation to purchase any securities or other financial instruments and may not be construed as such. The factual information set forth herein has been obtained or derived from sources believed by the author and AQR Capital Management, LLC ("AQR") to be reliable but it is not necessarily all-inclusive and is not guaranteed as to its accuracy and is not to be regarded as a representation or warranty, express or implied, as to the information's accuracy or completeness, nor should the attached information serve as the basis of any investment decision. This document is not to be reproduced or redistributed to any other person. The information set forth herein has been provided to you as secondary information and should not be the primary source for any investment or allocation decision. Past performance is not a guarantee of future performance. Diversification does not eliminate the risk of experiencing investment losses.

This material is not research and should not be treated as research. This paper does not represent valuation judgments with respect to any financial instrument, issuer, security or sector that may be described or referenced herein and does not represent a formal or official view of AQR. The views expressed reflect the current views as of the date hereof and neither the author nor AQR undertakes to advise you of any changes in the views expressed herein.

The information contained herein is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Charts and graphs provided

herein are for illustrative purposes only. The information in this presentation has been developed internally and/or obtained from sources believed to be reliable; however, neither AQR nor the author guarantees the accuracy, adequacy or completeness of such information. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to be relied on in making an investment or other decision. There can be no assurance that an investment strategy will be successful. Historic market trends are not reliable indicators of actual future market behavior or future performance of any particular investment which may differ materially, and should not be relied upon as such. Diversification does not eliminate the risk of experiencing investment losses.

The information in this paper may contain projections or other forward-looking statements regarding future events, targets, forecasts or expectations regarding the strategies described herein, and is only current as of the date indicated. There is no assurance that such events or targets will be achieved, and may be significantly different from that shown here. The information in this document, including statements concerning financial market trends, is based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons.