



Why Diversification is Failing

By Robert Huebscher

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Diversification has long been considered an essential tool for those seeking to minimize their risk in a volatile market. But a recent study presented to the CFA Institute shows diversification doesn't accomplish its goals, working best in up markets when investors could use a little less of it and failing to protect them in down markets when it's needed most.

"Fear is more contagious than optimism," says Sebastien Page, of State Street Associates, who wrote "The Myth of Diversification" along with his colleague David Chua and Mark Kritzman of Windham Capital Management.

Page presented the results of their study in a CFA Institute webcast, which was taped on December 8, 2008. It showed that, when both the US and the world (excluding the US) markets were up by more than one standard deviation above their mean, the correlation between them is 35%. When both are down by more than one standard deviation below their mean, their correlation rises to 85%, precisely the opposite of what investors desire.

In short: diversification is failing because of correlation asymmetry.

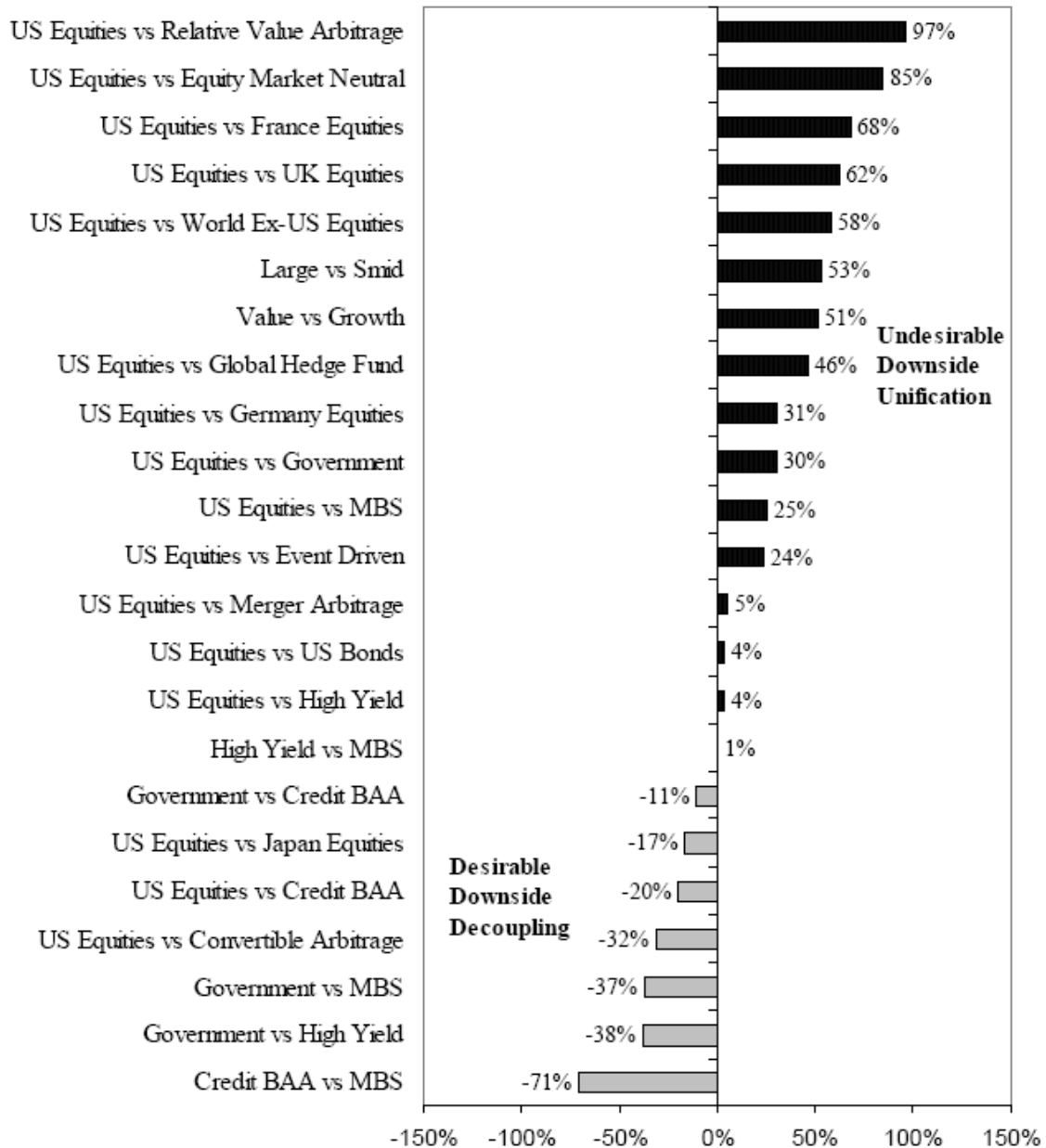
"It's like having your head in the oven and your feet in a tub of ice; your overall body temperature might be okay but the chances of survival are pretty slim," Page says.

It's not just the US and non-US markets that let investors down. Diversification by style (growth versus value), size (small versus large cap), and across major sectors of the fixed income markets all exhibit the same undesirable property – greater correlation in down markets than in up markets.

Page and his co-authors provide the following data to illustrate correlations across a number of pairs of asset classes:



Exhibit 1: Correlation Asymmetries



The values are the difference of the average excess downside correlations minus the average excess upside correlations. A positive score is undesirable, as it represents greater correlation on the downside than on the upside. The score for US equities versus world ex-US equities ranks among the worst, at +58%.



Page offers a number of observations. Market neutral funds have been promoted by the hedge fund industry for their lack of correlation to US markets. However, the lack of correlation among these funds occurs in up markets and not in down markets, giving market neutral funds one of the worst diversification scores against US equities. Even though the beta of market neutral funds is theoretically zero, when crises occur they exhibit significant market correlation.

The failure of style diversification is shown by the poor (+51%) score for value versus growth, and the failure of size diversification is evident in the +53% score for large versus small/mid-cap ("smid") stocks.

US equities and US bonds have a low correlation asymmetry, meaning that the average upside and downside correlations are similar.. This finding is not new and has been reported previously. Page said that fixed income asymmetries have weakened recently, at least partially because of a lack of liquidity in the bond markets. As credit markets have seized, fixed income markets have become increasingly correlated to equity markets.

Decoupling was achievable through mortgage-backed securities, although Page noted that this decoupling disappeared starting in 2007 along with the bursting of the housing bubble.

Even those sectors traditionally hailed as great diversifiers against US equities score poorly by these measures. Commodities, based on the S&P GSCI Commodity Total Return index scored +57.5% (using data from 1979-2009). Real estate was no better. Global REITs, based on FTSE EPRA/NAREIT Global Dollar index, scored +54.4%, and the FTSE EPRA/NAREIT US Dollar index scored +14.4% (using data from 1990-2009). These scores are computed against the Russell 3000 index for US equities.

Full-scale optimization

Page, Kritzman, and Chua say a new approach is called for to construct portfolios to provide true diversification benefits. Traditional optimization, using mean-variance algorithms, incorporates only the average correlation between asset classes, and does not incorporate asymmetries between up and down markets. Mean-variance artificially smoothes risk across up and down markets, and does not account for the shifting of risk dynamics over time.

To illustrate this, consider the asset allocations produced by mean variance techniques under three different sets of assumptions:



| Optimal Portfolios | US | World Ex-US | Cash |
|---------------------------|-----|-------------|------|
| Unconditional Correlation | 25% | 72% | 3% |
| Down-Down Correlation | 14% | 77% | 9% |
| Up-Up Correlation | 32% | 68% | 0% |

Markedly different optimal asset allocations result, depending on whether down-down or up-up correlations are used. Unconditional correlations smoothes results between these sets of assumptions.

Instead of mean-variance, the co-authors recommend “full-scale optimization” as the preferred approach.

Full-scale optimization finds the optimal portfolio by testing various combinations of asset classes against the historical data, which reflects asymmetrical correlations, as well other statistical properties, such as skewness, kurtosis, and other peculiarities.

Traditional mean-variance optimization uses a quadratic utility function, which means that it assumes investors have constant risk aversion – they are equally risk averse regardless of their wealth.

A more realistic approach is to assume that investors’ risk aversion increases once they reach a certain level of wealth. Such an approach is reflected in a “kinked” utility function, and full-scale optimization constructs the optimal portfolio under these circumstances.

Implications for advisors

The guiding message of this research is that advisors should focus more on hedging than diversifying, according to Page. But identifying, implementing, and measuring the effectiveness of proper hedges requires more research. Page said the concept of portfolio insurance offers some promise. Shorting the historically undesirable asset classes (like relative value arbitrage) might work, but shorting negates the returns along with the diversification properties, so a more sophisticated approach is necessary.



The key is finding assets that decouple, especially in down markets. And just because traditional assets have failed to decouple in the past does not mean they will behave this way in the future. Proper diversification requires an understanding of the fundamentals driving the returns of each asset class, analyzing whether these fundamentals are influenced by truly independent economic relationships, and insuring that this independence is exhibited primarily in down markets.

Does this research mean that advisors should scrap the concept of diversification altogether, and rely on a portfolio of plain-vanilla equities? Absolutely not. But it does send a stern warning to advisors paying substantial fees for portfolio construction and optimization tools that do not incorporate correlation asymmetries. If you are using such tools, an important question to ask is whether they optimize based on averages across all historical data, or over primarily down markets when diversification is most valuable.

Portfolios should be built to withstand turbulence, knowing that investors cannot predict when that turbulence will occur. Proper diversification is an important ingredient toward reaching this goal. Other research by Kritzman shows that once turbulence occurs, it tends to persist on a daily basis, and active managers can profit from this behavior. [See our earlier [article](#) on this topic.]

If the co-authors had constructed a portfolio two years ago, it would have been heavily laden with mortgage-backed securities, in retrospect one of the worst possible choices of asset classes. But Page advises against placing too much faith in the historical data. "Mathematics is there to help us make the best use of our judgments," he said. Many people warned about the dangers of the real-estate bubble, which were not reflected in the co-authors' data, and good judgment would have avoided the most exposed asset classes.

Page likened portfolios built with traditional mean-variance optimization to "driving a car with the air bag deployed, except when the car crashes." Full-scale optimization, based on empirical data reflecting the asymmetric nature of correlations, does the opposite. It deploys diversification when it is needed most (in market crashes) and gets it out of the way when it is not needed (in up markets).

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