FIRST QUADRANT

Did Diversification Fail?
Part 2

October 2010

FQ Perspective

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or Did Diversification really fail in 2008?
or The Diversification shibboleth…
or Honey I Shrunk My Diversification (in 2008)
or Bad Breadth – Redux
or Diversification in Name Only?
or Fred Flintstone's Guide to Portfolio Construction

It's considered "conventional wisdom" that correlations go to 1 when markets fall. We've argued in the past that's because you had Diversification In Name Only (DINO[1]), and not "true" diversification. What we'd like to explore for a moment is why it looks like asset classes were uncorrelated until markets fell.

The main thesis is that most asset classes are actually "hybrid betas". High Yield Bonds are effectively a blend of Equities and Treasuries. Even Equities aren't a true "beta", but are themselves a hybrid beta composed of part "real economic growth asset" and part "risky asset". The "weights" though, are not risk weights but instead capital weights. So, when volatilities rise, the "Risk Weights" change (even if the "Capital Weights" did not). This is a key point about these "hybrid betas" (i.e. asset classes). The internal structure doesn't change in capital terms, but it can (and does) change in risk terms.

If the "risky asset" beta inside equities gets more volatile (because the world gets "riskier", for example), it will have a larger impact on Equity returns, simply because it's more volatile and not because the intrinsic structure of equities has changed!

That means two "asset classes" that looked uncorrelated historically become correlated because one of the underlying (dare we say, "Essential") betas inside increased in "Risk Weight" as its volatility rose. And so High Yield and Investment Grade Bonds both become nearly 100% Equities, and therefore become correlated with each other.

If you've read our recent perspective on Diversification and 2008[2], you can skip ahead. If not, a brief summary is in order to give you some background on this perspective, which is an empirical exploration of the points made in that previous perspective.

BACKGROUND

Quoting from the first page of the previous perspective[2]:

> "We need to recall the original meaning of beta. Beta is a measure of exposure an asset or portfolio carries to systematic risk. Systematic risk is the risk you get paid to take because it is that risk that remains after idiosyncratic risk has been dissolved through diversification. As a reminder, idiosyncratic risk is that risk that is peculiar to an individual asset or asset class. You don't get paid for taking idiosyncratic risk because you can diversify those risks away. Notice the word "away" in that sentence. It is not that we are placing these risks – these treasured eggs – in different baskets for safekeeping. On the contrary, we're trying to get rid of them because we won't be compensated for holding them. Diversification is not an act of "spreading" risk around, rather it is a process of "dissolving" diversifiable, idiosyncratic, and uncompensated risk.
>
> When stocks are combined with bonds, each dissolves some portion of the idiosyncratic risk of the other. Some are not accustomed to thinking of idiosyncratic risk existing at the asset class level, but

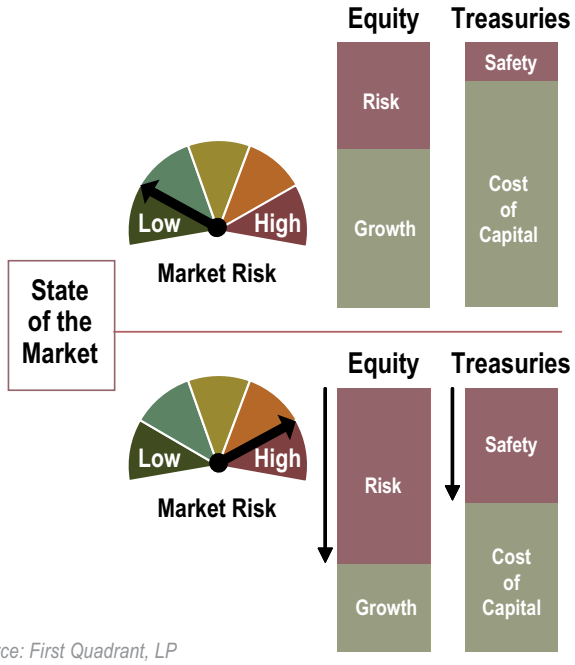
> that's due to the erroneous association of "beta" with asset class. There are, indeed, risks that are peculiar to, i.e., idiosyncratic, the asset classes themselves, and that risk can be dissolved when combined with counteracting idiosyncratic risk attached to other asset classes."

And adding in the last quote of that perspective:

> "In short, diversification is not intended to be a tool for risk avoidance. Rather, it is meant to be used as though it were an acid that dissolves away impurities, i.e., uncompensated risk, leaving behind a pure risk that is more desirable principally because we are rewarded for holding it. The remaining risk will be risky. Otherwise, we wouldn't be compensated for holding it."

The question we want to explore empirically can be described as, "what are the features and sources of the idiosyncratic risks of asset classes, and what are the features and source of the non-diversifiable (i.e. "beta", "compensated") risk left?"

Here's a picture of the basic idea:



Source: First Quadrant, LP

At a very high level, the asset class known as "Equities" is composed of two return (or risk) sources. One is based on the economic structure behind equities (as a return related to the growth of companies and economies), while the other is based on the market structure behind equities (as a risk related to investors liquidity needs and risk aversion, etc.). Equivalently, the asset class known as "Treasuries" is composed of two return (or risk) sources. One is based on the economic structure behind treasuries (as a cost of capital for both companies and economies), while the other is based on the market structure behind treasuries (as a "safe haven" asset with "no" default risk).

Note two key features (which are very important for the upcoming empirical analysis!): for the economic structure pieces of the two asset classes the returns are positively correlated[3], while for the market structure pieces of the two asset classes the returns are negatively correlated![4]

Also, while the "regime" indicator is "Market Risk", there are three related concepts all contained within that two word phrase: Market Risk, Investor Risk Aversion, Investor Risk Perception. In the end, since we can only observe market prices, all three components come into play, since changes to any (or all) of the three would/should affect the market price.[5]

EMPIRICAL ANALYSIS

Unfortunately, the "latent" components of the two asset classes aren't directly observable. So, we'll use some empirical "tricks" to try and back them out.

First, while we pointed out that the returns of the two sources inside the two asset classes have completely different correlations, note that correlations are entirely independent of volatility (if measured correctly). This is important because we are explicitly choosing to subdivide each asset class return into the two sources based on changes in "risk".

What we're going to do, therefore, is look at two forms of analysis.

The first will use as long a history of monthly data as possible for the two asset classes, and look at the rolling 36-month correlations between them. We'll assume that the most positive and most negative correlations represent the "all in" states of the two sources inside the asset classes, which will then determine the volatilities, etc., of the two sources.

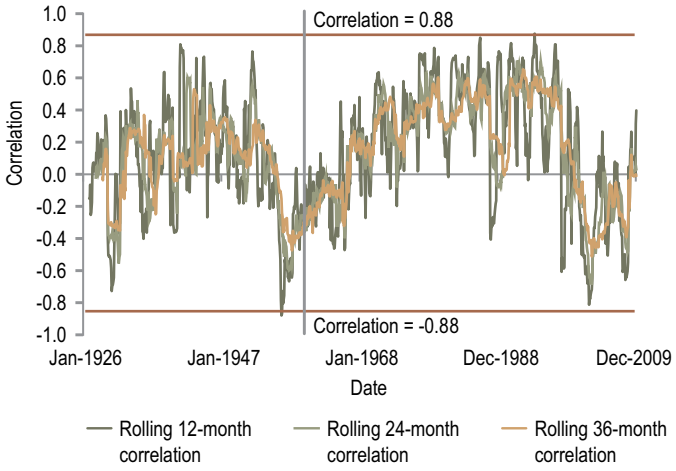
The second will use as long a history of daily data as possible for the two asset classes, and look at much shorter (260-day and 60-day) rolling analysis, as we assume (a priori) that evolutions in the risk environment occur over relatively short horizons (hence the 36-month analysis in the first form of analysis is likely to mis-specify the states).

We'll stay with US-only data for this paper for two main reasons. First, it has the longest data history. Second (and this is important), time zone issues are not present, since the two asset prices are struck at the same time.

This is, by the way, the same type of econometric study done in term-structure models, where corporate bonds (for example) are decomposed into some component of a true "risk free" asset, along with "inflation risk", "liquidity risk", "default risk", etc.

ROLLING 12-, 24-, 36-MONTH CORRELATIONS BETWEEN LT TREASURY AND S&P 500 RETURNS

January 1926 – December 2009



Sources: Ibbotson, Datastream, First Quadrant, LP

What we can see from the chart is that the maximum positive and negative correlations on a rolling basis between Stocks and Bonds can be summarized as follows:

	12 month	24 month	36 month
Max Neg	-0.88	-0.69	-0.51
Max Pos	0.88	0.71	0.65

Note that the correlations are largely symmetric (i.e. the maximum positive and negative correlations are of nearly the same magnitude on any of the horizons), which helps to support our theoretical prior (the two assets are composed of two underlying "betas" that have time varying weights/volatilities).

If we make one or two more heroic assumptions[6], we can try to decompose the assets into their component betas (and weights), and plot the weights. The easiest way to do this is to use the "risk" (i.e. variance) of the assets and divide up the states of the market into just two states ("Low Risk" and "High Risk"), then look at the relationship between the market states and the correlations.

For our "risk" measure, we'll look at two related measures. The first is the realized risk (volatility) of the market, which we'll proxy for by the trailing 63-day standard deviation of S&P500 returns. The second is the "expected" risk of the market, which we'll proxy for by the 63-day average level of VIX[7]. Note that in order to do this, we'll need to switch to daily data (monthly data isn't fine grained enough, unfortunately), which means we do lose a little bit of the history (the VIX index only goes back to the start of 1993), but fortunately it still includes a number of correlation "cycles" to study.

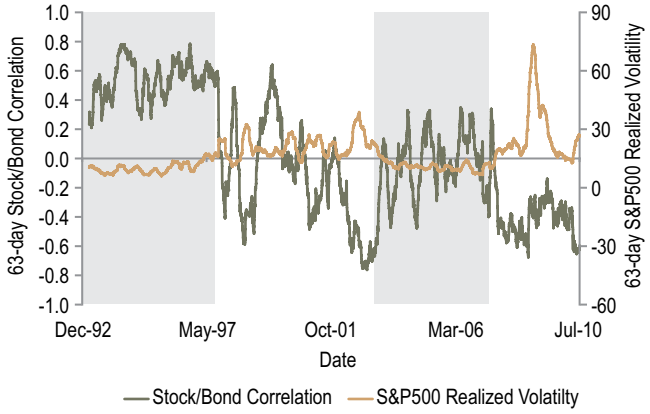
REALIZED RISK RESULTS

In the graph below, we've plotted the trailing 63-day correlation between the total returns of US Treasuries (10+ years to maturity) and the S&P500 overlaid with the trailing 63-day realized volatility of the S&P500.

Where the realized volatility of the S&P500 is below its mean we've shaded in grey. Where it's above its mean we've left in white.

COMPARISON OF TRAILING 63-DAY STOCK/BOND CORRELATION AND 63-DAY S&P REALIZED VOLATILITY

December 1992 – July 2010



Sources: Datastream, CBOE, First Quadrant, LP

What's visually apparent is a strong inverse relationship between the two series.[8] In other words, when S&P500 realized volatility is "High", the correlation between Stocks and Bonds in the US is generally negative. When the realized volatility is "Low", the correlation is generally positive.[9]

Two periods do stand out a bit in this analysis, which are the late 90's and the 2004-2007 periods.

For the late 90's, the two positive correlation peaks which occur in May-1998 and September-1999 (as well as a minor positive peak in Oct-2000) are particularly interesting. In three cases, while the level of realized volatility was "High", it had also just fallen sharply. The likely explanation is that

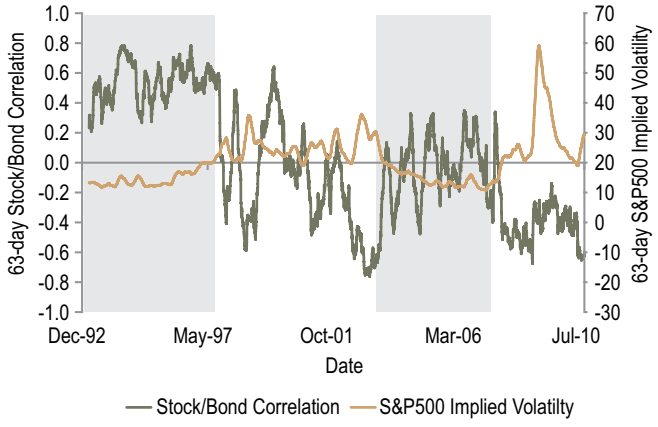
our "risk" proxy broke down because it wasn't Market Risk that changed, but Investor Risk (in other words, the fall from "High" to "Not Quite So High" felt like a fall to "Low", even though it never made it to "Low").

For the 2004-2007 period, the likely explanation is that while realized volatility was low, the extraordinary credit expansion that took place dislocated the bond market returns enough that the correlation broke down.[10]

"EXPECTED" RISK RESULTS

When we repeat the study with "Expected" Risk (i.e. implied volatility), we see a very similar (but not identical) result.

COMPARISON OF TRAILING 63-DAY STOCK/BOND CORRELATION AND S&P REALIZED VOLATILITY
December 1992 – July 2010



Sources: Datastream, CBOE, First Quadrant, LP

In other words, when "Expected" risk is low, the correlation between Stocks and Bonds in the US tends to be high, etc. We still have the same two periods of "unusual" performance, but even including them we still see a strong negative relationship between the two series.[11,12]

CONCLUSION

Correlations between asset classes (in particular, Stocks and Bonds) do vary, and do seem to rise just when it would be most useful for them to stay low. We've seen fairly strong empirical evidence supporting the hypothesis that much of the reason behind that effect is due to the "hybrid" nature of asset classes. By confusing "Asset Classes" with "Betas", we created this "problem". But the solution is actually quite easy to find, as it involves changing how we measure "Diversification".

In other words, by combining Equities and Treasuries with equal "risk" weights, we diversify away the "Risk" beta (since the "Risk" beta inside Equities is very negatively correlated with that in Treasuries) and keep the "Growth" beta (since the "Growth" beta inside Equities is very positively correlated with that in Treasuries). Those aren't the only betas we need to manage the risk of (the "Inflation" beta inside Equities and Treasuries isn't diversified away by putting them together, since it's positively correlated), but it's a big start!

By looking at "Asset Classes" and "Betas" in this way, we benefit from real Diversification—which does help—and not Diversification In Name Only…!

♦♦♦

Endnotes

[1] With apologies to Hanna-Barbera.
[2] Darnell, Max, "Did Diversification Fail?", FQ Perspective, October 2009.
[3] If bond yields rise (i.e. bond prices fall), that raises the cost of capital, hurting corporate (or economic) growth, causing stock prices to fall as well.
[4] If investor risk aversion rises, they sell stocks (the risky asset) and buy bonds (the safe asset), causing stock prices to fall and bond prices to rise.
[5] The situation is actually slightly more complicated, since the market price represents the market clearing price at that time, and so is essentially only a sample of the true market clearing price (i.e. market liquidity comes into play as well, since the market may not be "functioning" in a traditional/normal fashion when one (or more) of the three components change). Examples of this are the (in)famous 3Com/Palm IPO price, etc.
[6] (1) That the weights of the two "betas" within each asset class change at the exact same time and by the same magnitude, and (2) that the variance of the two "betas" within each asset class are constant through time.
[7] VIX is an index created by the CBOE that looks at near-dated options on the S&P500 to get a measure of the implied volatility of the S&P500 using "the whole surface". To quote the CBOE, "The CBOE Volatility Index® (VIX®) is a key measure of market expectations of near-term volatility conveyed by S&P 500 stock index option prices." (http://www.cboe.com/micro/vix/introduction.aspx)
[8] The correlation between the two series over the full period is -0.52.
[9] In particular, when the 63-day realized volatility is above its historic mean the 63-day correlation between Stocks and Bonds in the US averages -0.27, while when the 63-day realized volatility is below its historic mean the same correlation averages +0.21.
[10] While we started with the idea that Treasuries are composed of two "betas" ("growth" and "risk"), they are composed of more than just those two, as that period of a credit bubble makes clear.
[11] The correlation is very slightly stronger at -0.53 between the two series over the full period.
[12] When VIX is above its historic mean the 63-day correlation between Stocks and Bonds in the US averages -0.20, while when VIX is below its historic mean the same correlation averages +0.18.

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