The correlation myth

Patrick Burke d'Orey argues that factor analysis shows that correlations are not at all-time highs – and that even in 2008 there was wide dispersion in pair-wise factor correlations

Correlations **Commentary**

Over the past few years, sentiments such as 'correlations are at an all time high' and 'there are very few opportunities for diversification' have frequently appeared in the financial press.

In this context, 'correlations' usually means the median pair-wise correlation of all the assets in an index or reference benchmark. There are three problems immediately associated with using this broad all-enveloping term.

First, the usual benchmarks taken to calculate this median correlation are broad market indices such as the MSCI Europe index. These indices contain large and mid-cap stocks and are not representative of the full opportunity set available to equity investors. A better representation of the entire market could be the MSCI Europe IMI index, which comprises large, mid and small caps. As a proxy for a more complete representation of the European equity market, we will take the Barra Europe Equity Model (EUE3) estimation universe, based on the MSCI AC Europe IMI index, augmented with frontier-market stocks and a few others.

The second problem lies in defining how correlations are estimated. There are essentially two methods: looking at pairs of a time series of asset returns; or observing asset sensitivities to a series of factors and computing correlations between pairs of assets through these factor sensitivities and the factor variance/covariance matrix.

There are several problems with the first method. There can be spurious correlations, and there is no agreement on how to calculate correlations in the first place: How long should the time series be? Should we look at 90-day correlations, 180-day correlations? Should the historical observations be equally weighted or exponentially weighted? Thus, we will use the Barra factor model forecast correlations instead, as that offers deeper insight and provides a structured view of asset correlations by focusing on systematic relationships between assets.

Our third problem is that we cannot isolate correlations from the context of the volatility regime we are in. Higher correlations can mean that co-movement across assets is higher only if volatilities are constant. If volatilities increase, then the statement no longer holds.

So, let us address the two claims outlined above. Are correlations at an all time high? Figure 1 clearly suggests they are not. It shows the median correlations across the entire European equity universe. But what happens when we separate large, mid and small caps? What about developed, emerging and frontier markets?

Figure 2 shows that the effects that small caps and frontier markets have on the median correlation of our selected universe of stocks are very apparent. In particular, the divide between large/mid and small caps is quite conspicuous. The same can also be said of the split between developed/emerging and frontier markets, especially from mid-2011.

In practical terms, what can correlations do for us? Asset pair-wise correlations only tell one part of the story. It is important to understand what's driving these correlations. Changes in portfolio risk can be attributed to three key components: changes in weights (or constituents), changes in standalone volatilities and changes in correlations. More importantly, correlations with respect to a portfolio can be more informative than standalone asset pair-wise correlations.

In practical terms, asset correlations with respect to a portfolio are directly related to the respective contributions to a portfolio's risk and return; pair-wise correlations show how these assets might be behaving as isolated pairs. In addition, the cross-sectional dispersion of asset returns may be more relevant to understanding the extent of opportunities for active outperformance. In times of increasing volatility this dispersion increases. This means that during periods of higher volatilities, there may be greater opportunities for portfolio managers to differentiate themselves.

What about diversification? While adding more assets to a portfolio can diversify idiosyncratic or asset specific risk, market risk (or systematic risk) cannot be diversified and can only be hedged. Thus, since idiosyncratic returns are, by definition, uncorrelated, asset-level correlations (and for that matter volatilities) are quite unrelated to our ability to diversify.

We must turn then to factor correlations. These represent the non-diversifiable component of portfolio risk. In order to reduce market risk, we can implement an effective hedging strategy can be done by understanding factor-level correlations with respect to the overall portfolio.

So how have individual factors and their pair-wise correlations evolved, and is there any relevant information we can glean from this? Looking at figure 3, we can see the median correlation doesn't change that much.

But what about the extremes? Have there been large changes to the factor correlation dispersion? Did we see large increases in median pair-wise correlations in 2008, for example? The answer is no. Figure 4 suggests, in fact, that what we observed was a large increase in the dispersion of factor correlations. While some factors became very positively correlated, others became very negatively correlated.

Understanding which factors have become more positively and/or negatively correlated as well as a portfolio's exposure to those factors is how we can fully unravel what is happening to a portfolio, whether that portfolio's risk and return is following the strategy of choice, what action might need to be taken in order to hedge unwanted risks and how those actions can be implemented. We have shown how to use factor models in order to estimate these measures and to decompose the key drivers of changes in risk of a portfolio – and we have also shown that correlations are not at an all-time high, and that there still may be plenty of opportunities for diversification.

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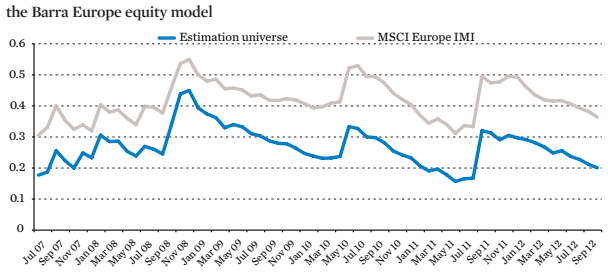
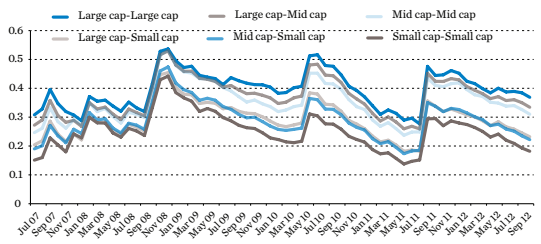
1. Median asset pair-wise forecast correlations

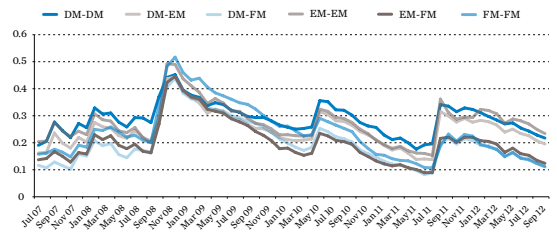
Across the model estimation universe and MSCI Europe IMI indices, through the lens of the Barra Europe equity model



2. Median asset pair-wise forecast correlation of the estimation universe

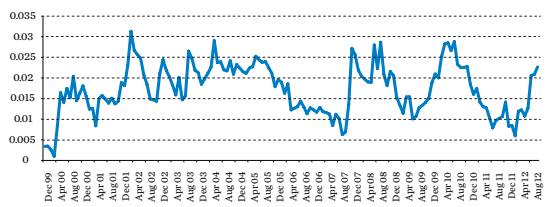
Through the lens of the Barra Europe Equity model. Breakdown by capitalisation and market segments





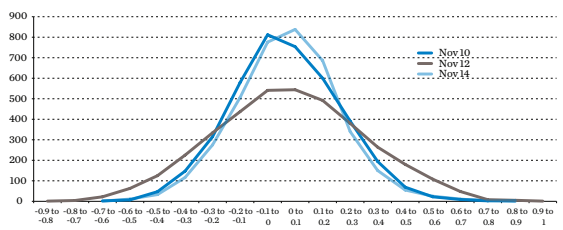
3. Median factor pair-wise return correlation

Barra Europe equity model



4. Factor pair-wise forecast correlations

Barra Europe equity model



Source for all: MSCI