

Working Paper

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RETHINKING THE HERD

Are increasing correlations between
markets unhinging the principle of
diversification?

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In his seminal paper "Portfolio Selection," Nobel Prize-winning economist Harry M. Markowitz demonstrated that an investor can reduce portfolio risk simply by holding imperfectly correlated instruments. He argued that diversification leads to the reduction of risk in a portfolio, but does not necessarily reduce returns.

Recently, as markets increasingly move in lockstep, it seems the attendant increase in correlations could unhinge this cornerstone of portfolio theory. How relevant are these concerns? We examined how stable the correlations between asset classes are, in particular how correlations behave during market downturns.

The study examines market behavior over the last 20 years based on the weekly returns of major indices. First, we analyzed how correlations behave over time, focusing on equity markets. More volatile than bonds, stocks are indeed the main contributor to the overall volatility of a portfolio. Figure 1 depicts the average correlation between the major equity markets for five different time periods within the last two decades.

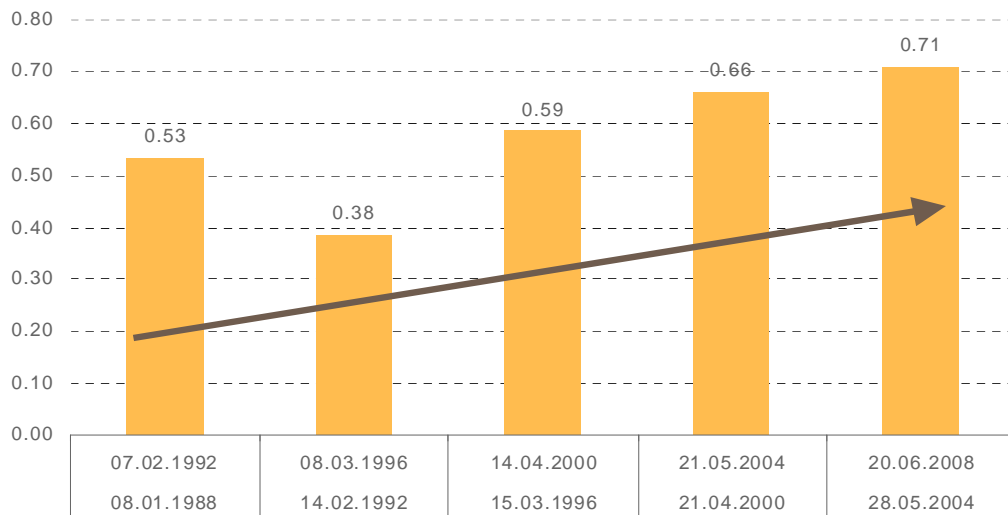


Figure 1: Average correlation on equity markets spanning the last two decades.

As can be seen from the figure, average correlation between equity markets has increased over the last two decades, thus reducing the overall diversification benefit. In addition, there is evidence that correlations increase during market downturns, underlining that dangerous herd behavior displayed during critical market periods. Hoping to verify whether or not this observation has a sound statistical basis, we divided the last 20 years into periods reflecting "normal markets" and periods of economic turmoil and sharp market downturns¹ as depicted in Figure 2.

¹ Sharp market downturns are considered to be scenarios in which the tri-weekly rolling returns fall by more than 10%.



Figure 2: DAX index over the period 1987-2008.

As significant correlation occurs within the various time periods, heat maps were used to depict the results. In a heat map, numbers are replaced by a spectrum of colors to give a visual representation of the correlation: warm colors (reds) equal high correlation, low correlations equal colder colors (blues). The heat map in Figure 3 compares “normal markets” (left) with “markets in turmoil” (right).

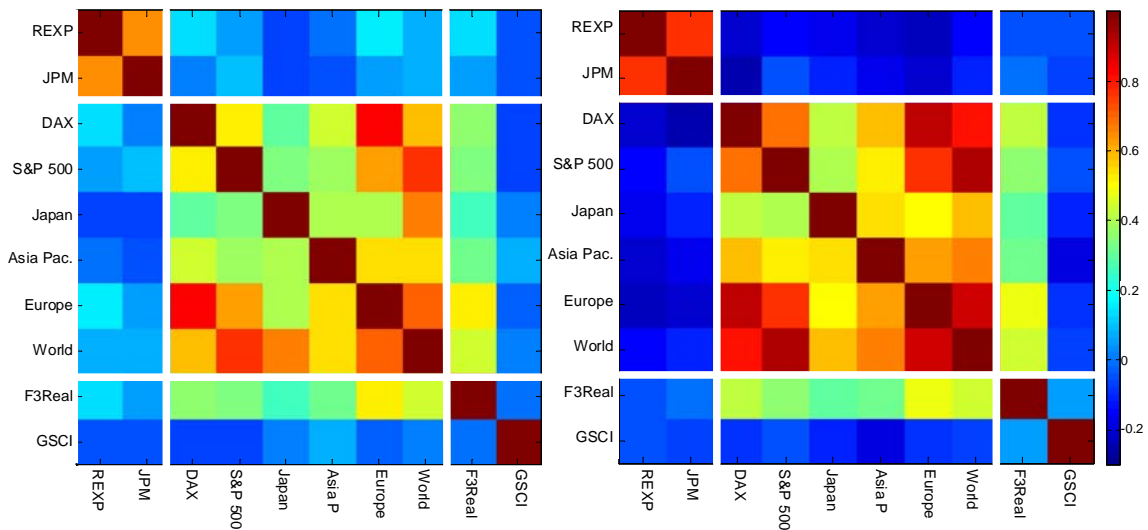


Figure 3: Correlation structure for normal (left) and falling equity markets (right).

REXP = German bond index
 JPM = JP Morgan Global Government Bond Index
 DAX = German stock index
 S&P500 = US stock index
 Japan = MSCI Japan stock index

Asia Pac. = MSCI Asia Pacific
 Europe = MSCI Europe
 World = MSCI World
 F3Real = FTSE Real Estate index
 GSCI = GSCI Commodities index

A significant increase in correlation can be observed in times of turmoil, particularly in regards to the equity market, (represented by the central, black-rimmed, rectangular area of both maps). The areas divided by the white lines in each graph are (left to right and top to bottom) bonds, equities and alternatives. For example, the DAX vs. MSCI World correlation moves from a moderate level during times of normal markets to high correlation during time of turmoil. The principal factor underlying this trend is globalization, which creates greater uniformity among financial markets. As a consequence, the boundaries separating asset classes (the rectangular areas of the maps) are becoming blurred – a trend reinforced by faster dissemination of market intelligence. It would seem natural to conclude that it is no longer sufficient to disperse the investments over different equity markets. Is broadening the asset base the answer?

A separate analysis based on monthly data indicates that several other asset classes – for example, real estate or alternatives, such as private equity, alternatives or property – display a tendency similar to that of equities. In part this is being driven by increasing access of investors to asset classes traditionally restricted to institutional investors and high-net-worth individuals. These days, almost anyone can invest in private equity and commodities. Investors must accept that correlations do not establish immutable regularities.

Correlations, and diversification, derivatively, are stochastic. That is to say, historical correlations represent relationships true during the measurement period, but those relationships tend to vary over time and across different market environments. It is not good enough anymore to set up a portfolio with a strategic asset allocation confidently based on correlations thought to hold true once and for all. The developments described here do not call into question the Markowitz principles underlying modern portfolio theory; they merely complicate its implementation. Still, there is no reason to panic, since the diversification benefit still persists – even though at a lower level. Indeed, opportunities exist even in times of turbulence. For example, note that the DAX and the JPM Global Government Bond Index become less correlated in the right-hand heat map. However, it is fair to say that in the world seems to be increasingly correlated, so portfolio diversification remains essential. In order to continue to capitalize on its risk-mitigating effect, investors must learn to adjust to the new market patterns and do justice to the stochastic nature of correlations in the portfolio construction process.

One possible solution may be to invest in new asset classes such as timber, farmland, art and other luxury collectibles. However, these asset classes should be approached cautiously. Like private equity and hedge funds of past decades, the new asset classes may be surrounded by formidable barriers to entry: often liquidity is limited, while valuation lacks transparency and is overly complicated. Some of these asset classes may be of interest mainly for players – such as university endowments – with very long-term investment horizons and little concern for immediate liquidity. Finally, dynamic asset allocation, which can control a portfolio's risk, is a promising tool for coming to grips with volatile correlations.

The evidence discussed above suggests that the investment game must now be played somewhat differently. Understanding and taking advantage of the stochastic nature of correlations and diversification, prudent monitoring of the market environment and emerging asset classes, and the use of dynamic asset allocation can help investors avoid the undesirable effects of increasing correlations and stay ahead of the curve.