INTERPRETING CORRELATION

Proceed with ~~Causation~~ Caution

GRAHAM INSIGHT SERIES

Correlation is one of the most widely used measures of diversification and can be a helpful statistical indicator for investors looking to construct a diversified portfolio. However, there are complexities in analyzing correlation and investors should use caution in interpreting it. Here, we highlight a few of these complexities. Ultimately, rather than passively combining assets with low correlation to achieve diversification, investors should use a range of measures to actively analyze diversification. Investors can seek strategies that demonstrate dynamic diversification and are structurally designed to perform differently in different market conditions.

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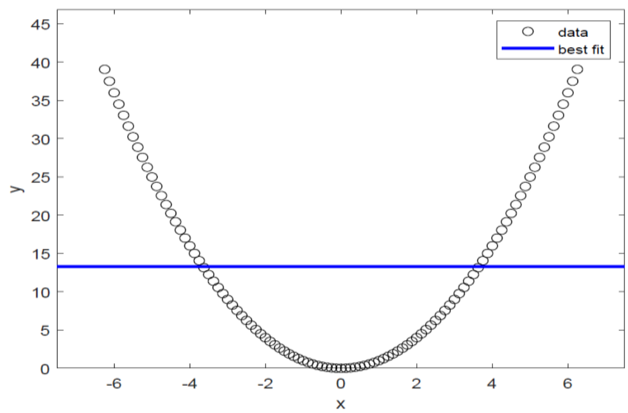
KEY TAKEAWAYS

- Correlation is a widely misunderstood and highly dynamic measure, and this can result in investors getting much less diversification than they had hoped for.
- Correlations may vary depending on market environments, sometimes leading to a lack of diversification when it is needed most, such as during market stress periods.
- A well-constructed portfolio seeks to incorporate diversification by design rather than by accident. Investors should look for strategies that provide dynamic diversification and are designed to perform differently across various market conditions.

NON-CORRELATION DOES NOT IMPLY INDEPENDENCE

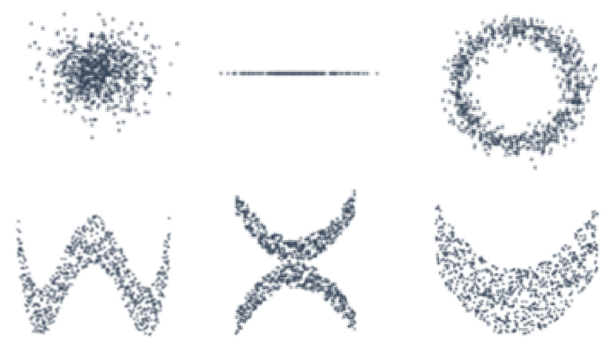
If two variables are independent, then their correlation will be 0. However, it doesn't go the other way. A correlation of 0 does not imply independence. In the example (right), while y is fully determined by x, the linear correlation between the two, measured by the slope of the best fit, is zero. As shown below, there are many paths that can lead to a given correlation, and even assets with zero correlation can have a clear relationship.

Correlation is (usually) linear[1]



Examples of non-correlated series

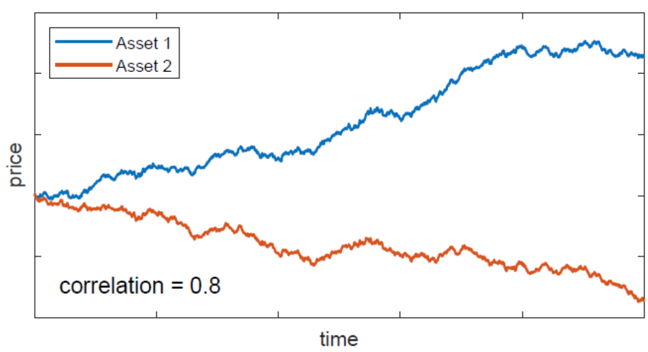
Correlation = 0 for each of the below examples[2]



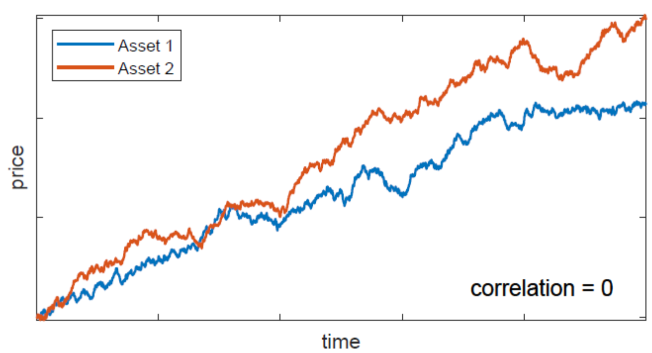
CORRELATION IGNORES THE MEAN

Two price series that are highly correlated may move in different directions due to different average returns and vice versa. This means that while the relative movements of the prices might be similar, their absolute levels can diverge significantly over time. For instance, if one asset consistently grows at a faster rate than the other, their price paths can separate despite a high correlation. This divergence underscores the importance of considering both correlation and average returns when analyzing and forecasting price movements. Therefore, solely relying on correlation without accounting for the mean can lead to misleading conclusions about the relationship between two price series.

Two highly correlated assets moving in different directions...[1]



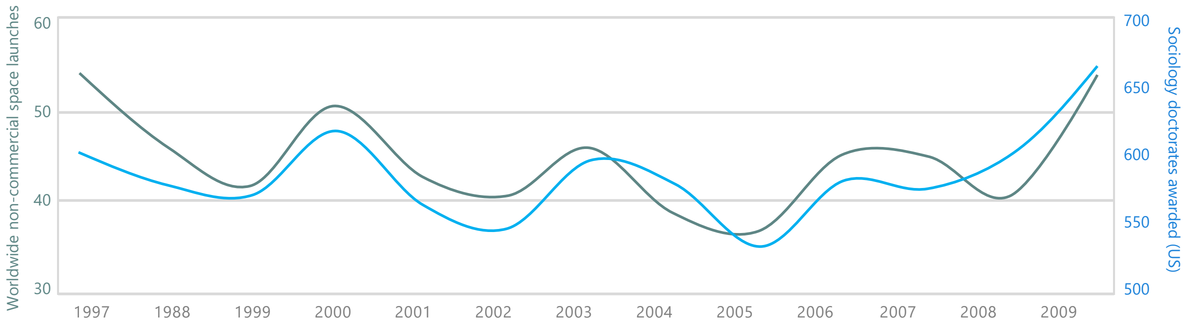
Two uncorrelated series moving in the same direction...[1]



CORRELATION ≠ CAUSATION

Causation means that one event causes another event to occur. **Correlation** means there is a relationship or pattern between the values of two variables. However, even if the historical correlation is +1, this does not mean that the asset prices will move the same way in the future. It only means that they have done so in the past.

Worldwide non-commercial space launches correlates with **Sociology doctorates awarded**[3]

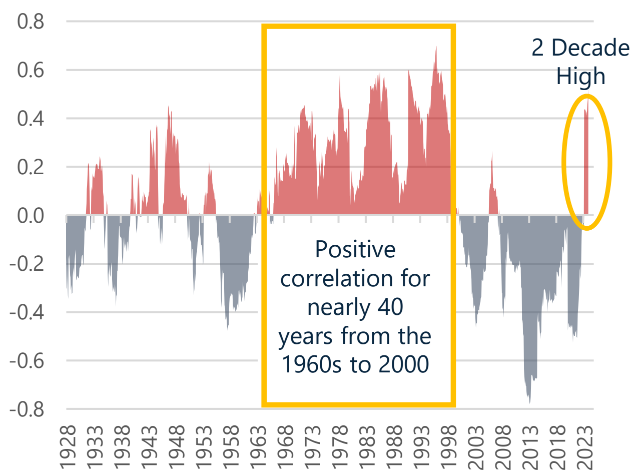


CORRELATIONS CHANGE OVER TIME

Correlations can change dynamically over time and fluctuate during short- or long-term periods. For example, while negative stock/bond correlation has been the bedrock of many asset allocation strategies since 2000, over a longer time frame there have been prolonged periods where stock/bond correlation was positive. In addition, in periods of high market volatility, shorter-term market correlations tend to move toward a positive coefficient.

Correlations change: sometimes slowly...

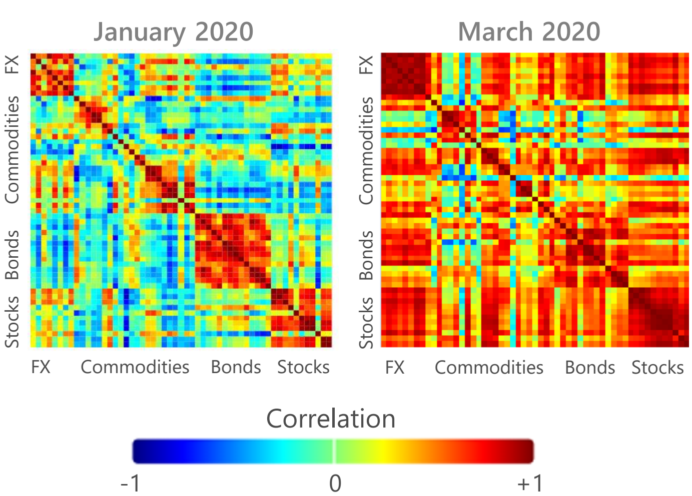
100 Year Stock-Bond Correlation
Last 100 Years Ended December 2023, 3yr Rolling Window



Correlation of S&P 500 to U.S. 10yr
Data Source: Robert Shiller Database

Sometimes abruptly...

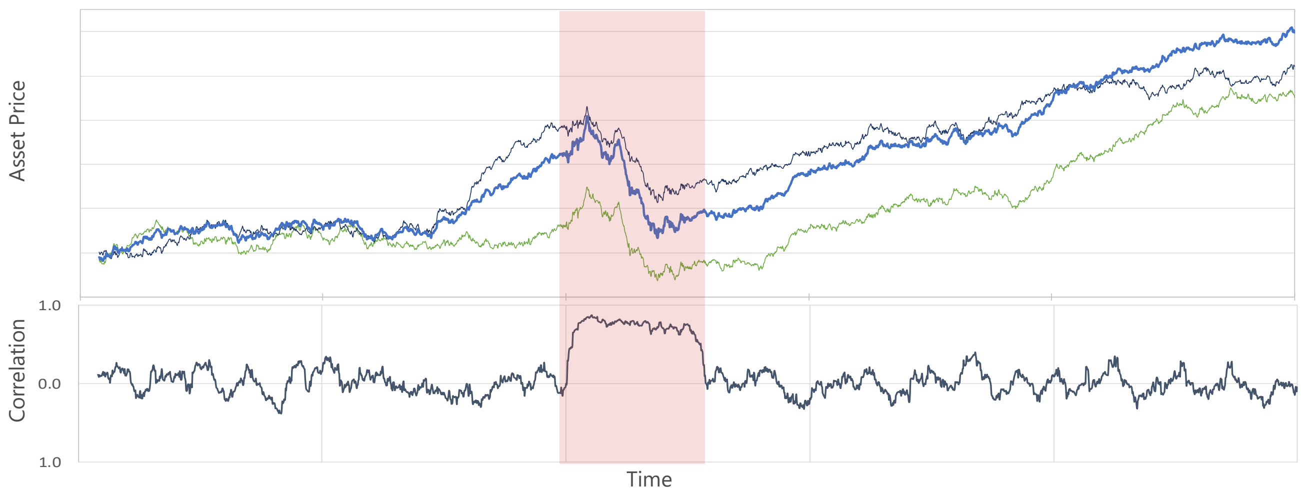
Contemporaneous Correlation



CORRELATIONS MAY BE CONDITIONAL ON THE MARKET ENVIRONMENT

Sometimes asset owners face the worst of all worlds – portfolio diversifiers that are only uncorrelated with their core portfolio in normal market conditions, but become correlated when most needed, when the core is under stress. Conditional correlation may reveal that strategies with high or low overall correlation may behave very differently in down markets (when diversification is needed most):

An Example of Conditional Correlation[1]



THE IMPORTANCE OF DYNAMIC DIVERSIFICATION

Rather than relying solely on historical correlations, investors should use a variety of metrics to analyze portfolio diversification. As market dynamics continually change, strategies that can dynamically manage portfolio diversification and risk when market correlations increase will continue to be important when constructing a portfolio resilient to changing market conditions. By adopting strategies that offer structural diversification to markets and can adapt to changing market conditions, investors can better navigate uncertain environments and achieve more stable long-term returns.

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IMPORTANT DISCLOSURE

REFERENCES

[1] C. Jones, N. Bethke, and E. Tricker. Contemplating Correlation Research Note, Graham Capital Management, May 2021.

[2] https://www.analyticsvidhya.com/

[3] tylervigen.com

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