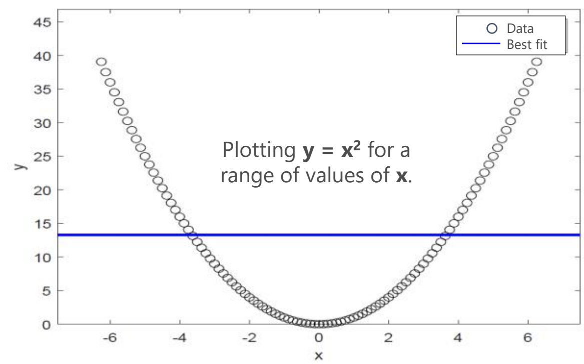
Interpreting Correlation: Proceed with ~~Causation~~ Caution

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 and seek strategies that are structurally designed to perform differently in different market conditions.

NON-CORRELATION DOES NOT IMPLY INDEPENDENCE

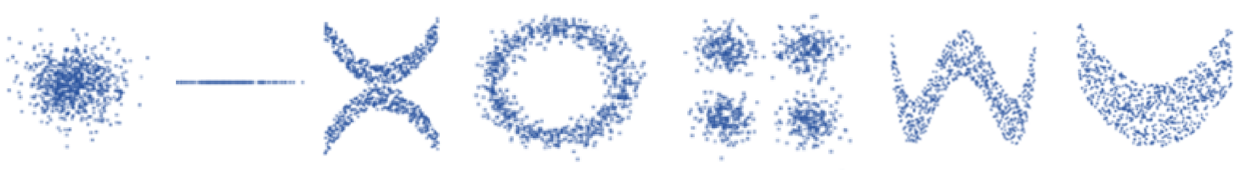
If two variables are independent, then their correlation will be 0. However, it doesn't go the other way. A correlation of 0 does not imply independence. In the example (right), while y is fully determined by x, the linear correlation between the two, measured by the slope of the best fit, is zero. As 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

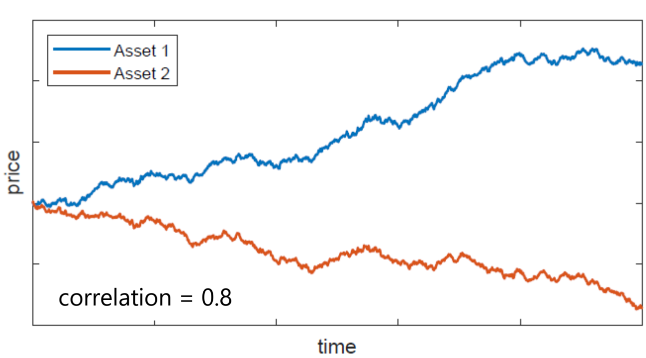
Correlation = 0 for each of the below examples[2]



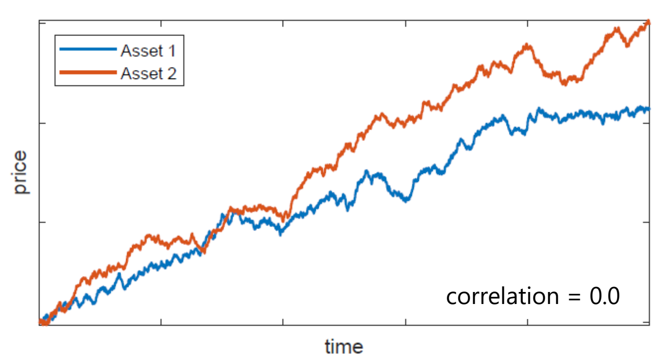
CORRELATION IGNORES THE MEAN

Two price series that are highly correlated may move in different directions due to different average returns and vice versa.

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



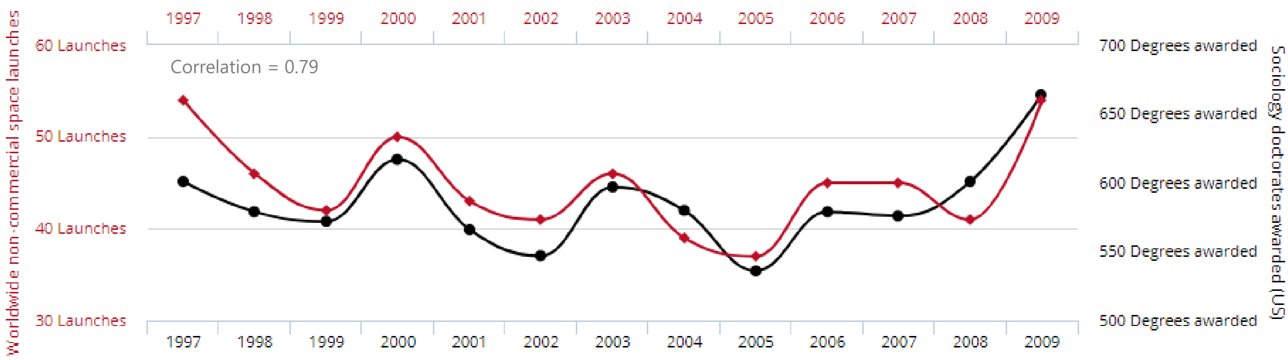
Two uncorrelated series moving in the same direction...[1]



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.

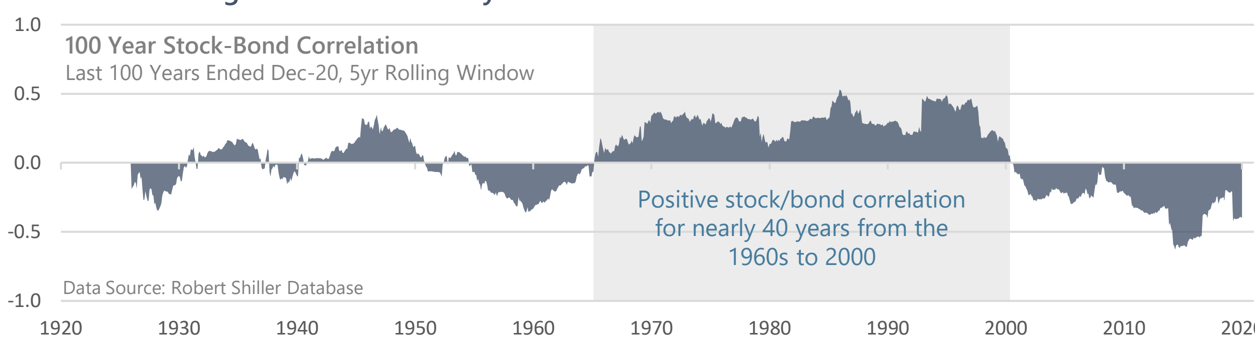
Worldwide non-commercial space launches correlates with **Sociology doctorates awarded**[3]



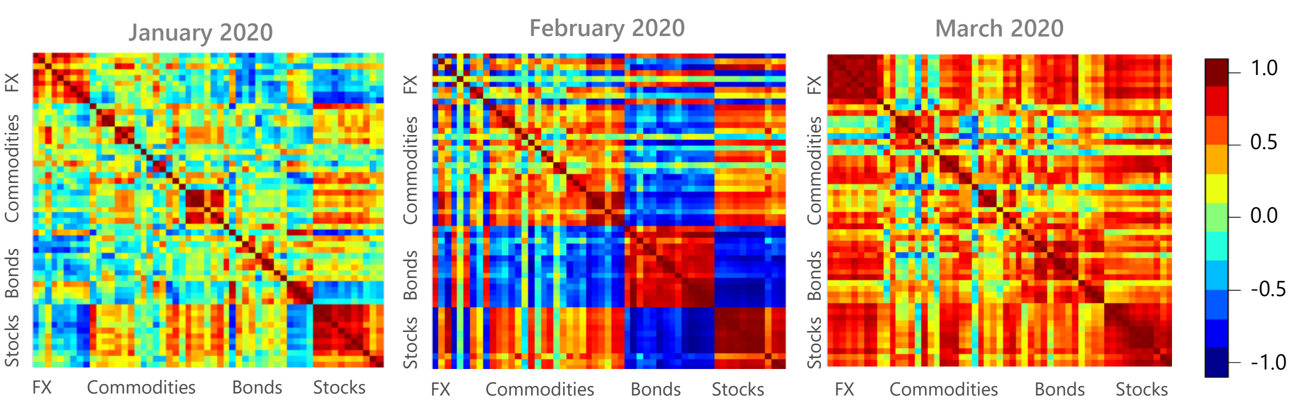
CORRELATIONS CHANGE OVER TIME

Correlations can change dynamically over time and can fluctuate during short-term 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....



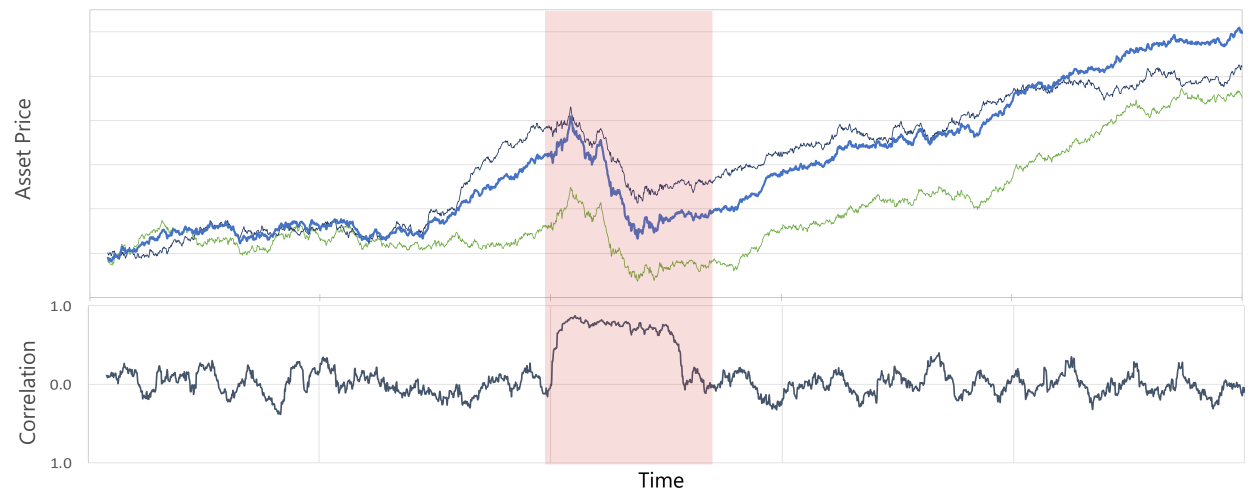
Sometimes abruptly...



CORRELATIONS MAY BE CONDITIONAL ON THE MARKET ENVIRONEMNT

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 BOTTOM LINE

- Correlation is a widely misunderstood and highly dynamic measure, and this can result in investors getting much less diversification than they had hoped for.
- Rather than passively combining assets with low correlation to achieve diversification, investors should use a range of measures to actively analyze diversification and seek strategies that are structurally designed to perform differently in different market conditions.
- A well-constructed portfolio seeks to incorporate diversification by design rather than by accident.

RELATED CONTENT

Contemplating Correlation

Correlation is Dynamic

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In Search of Negative Beta

Portfolio Diversification: Accomplishing More with Less

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1-203-899-3456

info@grahamcapital.com

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] https://www.tylervigen.com/spurious-correlations

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