Rethinking the Stock-Bond Correlation*

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The correlation between stocks and bonds has been a prominent topic of discussion over the past 5 years, particularly due to the resurgence of inflation risks. Many portfolio managers, who had long assumed that the stock-bond correlation was negative, were surprised when this relationship turned strongly positive in the aftermath of the COVID-19 crisis. This article examines the stock-bond correlation from both a theoretical and an empirical perspective.

Why study the correlation between stocks and bonds? This fundamental concept in finance is closely related to the core principles of asset management and significantly influences both strategic and tactical portfolio allocation decisions. However, understanding this correlation is complex and requires challenging certain commonly held assumptions.

To provide a clear framework for our discussion, we define the stock-bond correlation as the correlation between a country's stock market index returns and its 10-year government bond returns from the perspective of the local investor, measured in local currency. For example, when analyzing the stock-bond correlation in India, we would examine the relationship between the returns on the Nifty stock index and the returns on 10-year Indian government bonds, both denominated in Indian rupees.

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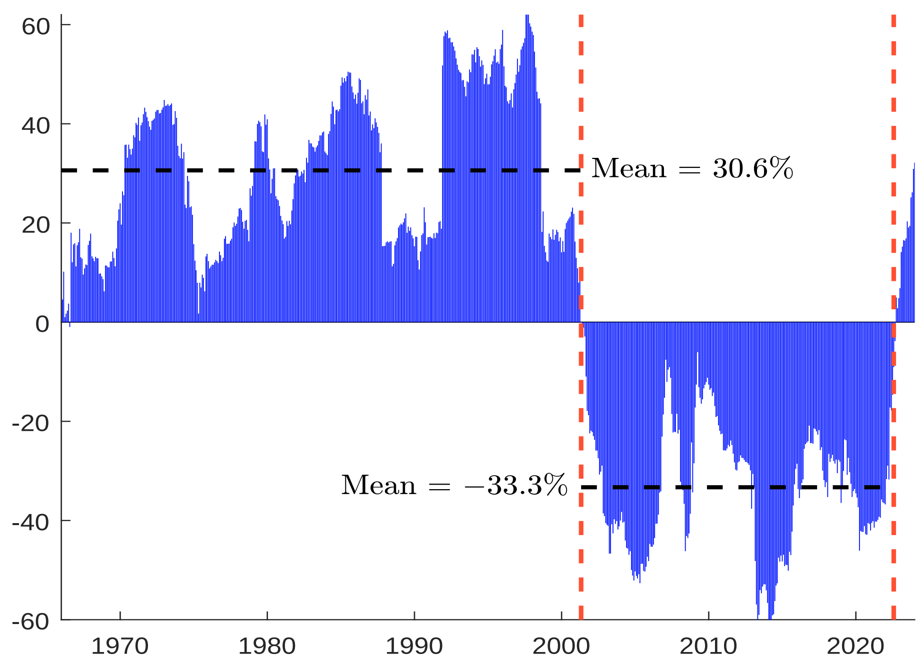
Long-term correlation between US stocks and bonds

Why is the stock-bond correlation a hot topic, especially in the last three years? Figure 1 shows the correlation between stocks and bonds in the United States from 1965 to the present[1]. Before the dot-com crisis of 2000, the correlation was positive, averaging about +30%. After the dot-com crisis, it turned negative, averaging about −30%. This observation deserves further discussion. While some portfolio managers expect and assume a consistently negative correlation between stocks and bonds, historical data tells a different story. Looking back to the early 20th century, the correlation between stocks and bonds has generally been positive, with only three exceptions: an extended period between 2000 and 2020, and two brief periods — one following the crash of 1929 and another following World War II. In fact, a positive correlation between stocks and bonds is the historical norm, not the negative correlation many assume today.

Figure 1: US stock-bond correlation (1965–2023)



Source: Portelli and Roncalli (2024).

Stock-bond correlation over the recent period

Table 1 shows the correlation between stocks and bonds five years ago in December 2019. We find that the correlation is strongly negative in several developed countries:

[1] The stock-bond correlation $\rho_{S,B}$ is calculated using a 4-year rolling window, comparing monthly returns of the S&P 500 Index with monthly returns of the 10-year US Treasury bond.

Table 1: Stock-Bond correlation (December 2019)

Country	$\rho_{S,B}$	Country	$\rho_{S,B}$	Country	$\rho_{S,B}$	Country	$\rho_{S,B}$
Argentina		Egypt	−13.2%	Japan	−66.7%	Romania	29.2%
Australia	−10.3%	Finland	5.0%	Korea	−33.8%	Russia	33.5%
Austria	−41.3%	France	−12.3%	Malaysia	22.6%	Singapore	−17.5%
Belgium	20.7%	Germany	−33.8%	Mexico	41.6%	South Africa	21.2%
Brazil	61.2%	Greece	76.8%	Netherlands	−7.5%	Spain	0.0%
Bulgaria	−9.0%	Hong Kong	18.2%	New Zealand	21.2%	Sweden	−26.0%
Canada	−23.1%	Hungary	10.9%	Norway	−36.2%	Switzerland	−25.3%
Chile	9.3%	India	−10.4%	Peru	50.1%	Taiwan	16.4%
China	11.0%	Indonesia	51.0%	Philippines	57.1%	Thailand	
Colombia	30.9%	Ireland	−13.2%	Poland	−1.3%	Turkey	55.6%
Czechia	−6.8%	Israel	−2.9%	Portugal	29.8%	UK	15.6%
Denmark	1.1%	Italy	28.6%	Qatar	21.4%	US	−36.3%

Source: Amundi Investment Institute (2025).

Table 2: Stock-Bond correlation (December 2024)

Country	$\rho_{S,B}$	Country	$\rho_{S,B}$	Country	$\rho_{S,B}$	Country	$\rho_{S,B}$
Argentina	29.0%	Egypt	−26.1%	Japan	20.9%	Romania	51.7%
Australia	47.8%	Finland	38.9%	Korea	49.0%	Russia	
Austria	27.8%	France	52.9%	Malaysia	27.1%	Singapore	29.8%
Belgium	35.4%	Germany	52.9%	Mexico	24.6%	South Africa	60.9%
Brazil	51.5%	Greece	23.4%	Netherlands	60.8%	Spain	25.4%
Bulgaria	26.0%	Hong Kong	39.8%	New Zealand	60.6%	Sweden	44.9%
Canada	50.4%	Hungary	41.6%	Norway	−15.2%	Switzerland	43.5%
Chile	17.3%	India	28.7%	Peru	28.9%	Taiwan	39.3%
China	−22.9%	Indonesia	26.4%	Philippines	33.5%	Thailand	12.6%
Colombia	6.9%	Ireland	38.4%	Poland	34.3%	Turkey	10.2%
Czechia	13.7%	Israel	52.5%	Portugal	24.1%	UK	44.4%
Denmark	35.5%	Italy	44.6%	Qatar	27.3%	US	62.3%

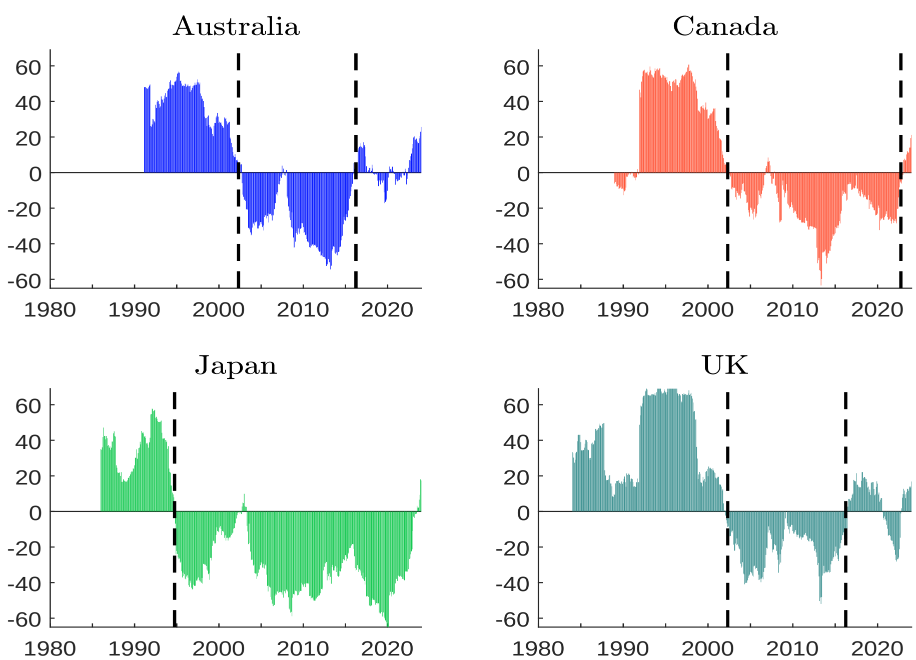
Source: Amundi Investment Institute (2024).

Austria, Canada, Germany, Japan, Norway, Sweden, Switzerland, and the United States. If we look at the more recent period, Table 2 is quite different. Only three countries have a negative correlation: China, Egypt, and Norway. Many countries, including developed countries such as Canada, France, Germany, Israel, the Netherlands, New Zealand, and the United States, have a correlation of more than 50%. How do we explain these huge differences in just five years?

Are stock-bond correlation cycles synchronized across countries?

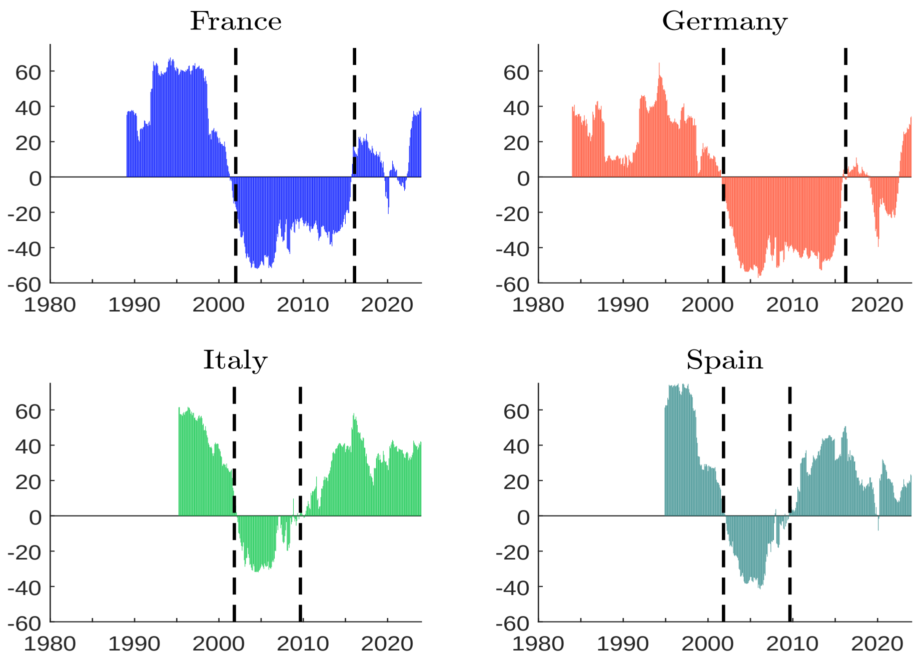
Most research articles focus on the stock-bond correlation in the United States. Studies that examine other countries are relatively rare. Portelli and Roncalli (2024) analyze correlation patterns in about 40 countries and compare them to US observations. They find that the stock-bond correlation cycle in the United States differs from that in other countries, with Canada being the only exception. In Japan, for example, the correlation shifted from positive to negative before the dot-com crisis in 2000, coinciding with the introduction of its low interest rate policy in 1994 (Figure 2). Similarly, while the US has recently experienced a reversal in the stock-bond correlation, Australia, France, Germany, and the UK experienced this shift before 2020. In Spain and Italy, the correlation has remained positive since the European sovereign debt crisis in 2010 (Figure 3).

Figure 2: Australia, Canada, Japan & UK



Source: Portelli and Roncalli (2024).

Figure 3: France, Germany, Italy & Spain



Source: Portelli and Roncalli (2024).

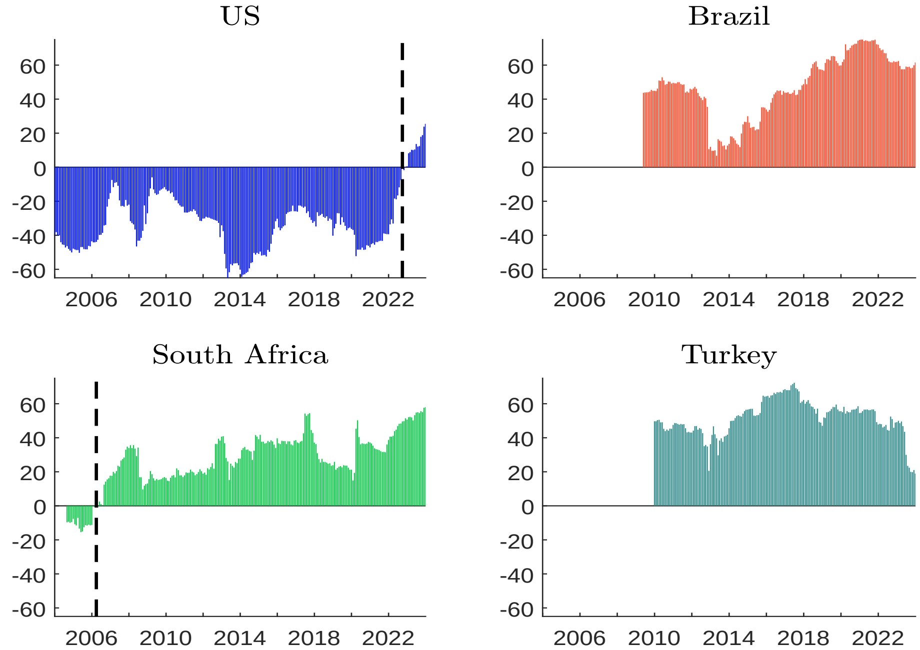
When looking at emerging markets, we typically expect to see a positive correlation between stocks and bonds, as credit risk affects both equity and debt markets. This pattern is evident in Brazil, South Africa and Turkey (Figure 4). Importantly, we reiterate that all calculations are in local currency, reflecting the perspective of domestic investors.

However, there is a second group of developing countries where the stock-bond correlation fluctuates between positive and negative values (Figure 5). This dichotomy can be attributed to the different impact of country and currency risk on stock prices. In some countries with robust local economies, the credit risk component has become less important. For example, local investors in China and India no longer perceive their government bond markets as particularly risky. Thus, domestic investors' confidence in their country's debt sustainability is becoming as a key determinant of the sign and magnitude of stock-bond correlations in emerging markets.

Relationship between stock-bond correlation and risk premium

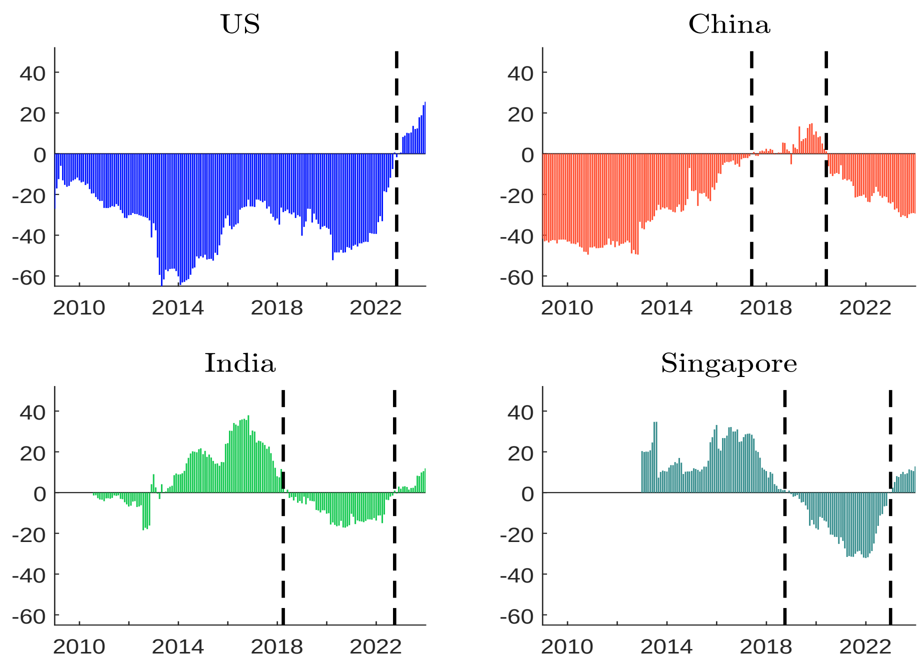
Stock-bond correlation is a valuable tool for portfolio managers because it is closely related to the theory of risk premia and the distinction between performance and hedging assets. The Sharpe model and, more broadly, the Black-Litterman model are particularly useful because they allow for the pricing of asset class risk premia.

Figure 4: Brazil, South Africa & Turkey



Source: Portelli and Roncalli (2024).

Figure 5: China, India & Singapore

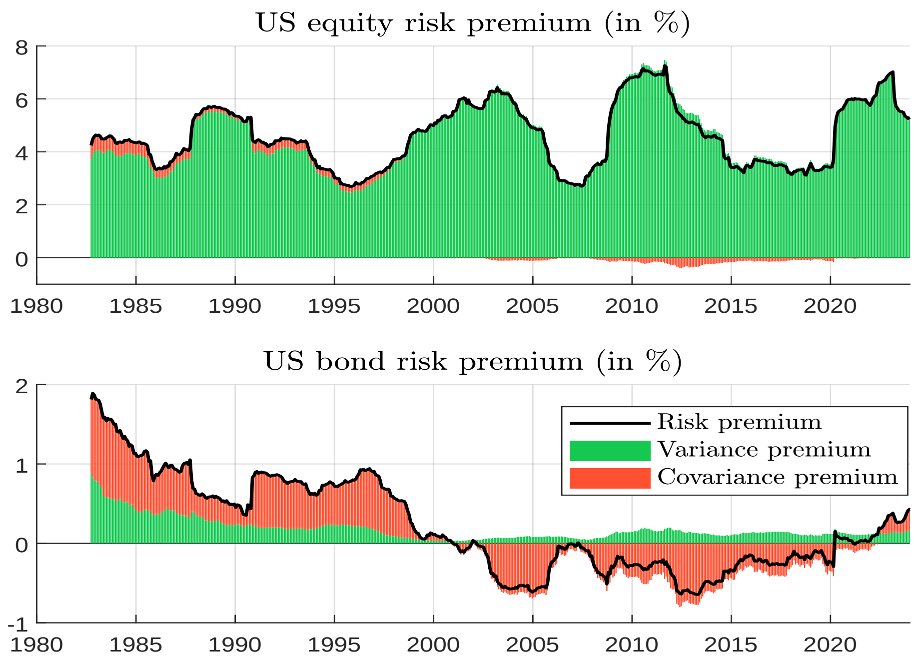


Source: Portelli and Roncalli (2024).

Under an equilibrium assumption, we can show that the risk premium of an asset is equal to the product of the Sharpe ratio of the market portfolio and the marginal risk of the asset relative to the market portfolio. This implies that the risk premium has two components: a variance risk premium and a covariance risk premium[2].

Within this framework, an asset can have a negative risk premium if its covariance risk premium is negative and exceeds its variance risk premium. This may be the case for bonds. Investors may accept a negative risk premium on bonds if they believe that bonds can effectively hedge their equity exposure. As a result, we can see that stocks are always performance assets because they always have a positive implied risk premium. In contrast, bonds can be either performance or hedging assets, depending on the stock-bond correlation and the level of bond risk.

Figure 6: US risk premia (1965–2023)



Source: Portelli and Roncalli (2024).

The black curve in Figure 6 shows the evolution of US risk premia calculated using the US market portfolio. As expected, the equity risk premium remains consistently positive, ranging from 2.5% to 8%, and follows a cyclical pattern that

[2]The risk premium of asset i is given by:

$$\tilde{\pi}_i = \mathrm{SR}\left(x \mid r\right) \frac{\partial \sigma\left(x\right)}{\partial x_i} = \underbrace{\frac{\mathrm{SR}\left(x \mid r\right)}{\sigma\left(x\right)} x_i \sigma_i^2}_{\text{Variance premium}} + \underbrace{\frac{\mathrm{SR}\left(x \mid r\right)}{\sigma\left(x\right)} \sum_{j \neq i} x_j \rho_{i,j} \sigma_i \sigma_j}_{\text{Covariance premium}}$$

where $x = (x_1, \ldots, x_n)$ is the market portfolio, $\mathrm{SR}\left(x \mid r\right)$ is the Sharpe ratio of portfolio x, $\sigma\left(x\right)$ is the portfolio's volatility, σ_j is the volatility of asset j, and $\rho_{i,j}$ is the correlation between the returns of assets i and j.

fluctuates with equity market risk. In contrast, the bond risk premium is negative from 2002 to 2020, varying between −50 and 0 basis points. In the same chart, we also plot the two components of the risk premium: the variance premium (green line) and the covariance premium (red curve). Notably, 95% of the equity risk premium is driven by the variance premium. Meanwhile, 67% of the bond risk premium is explained by the covariance premium, highlighting that the stock-bond correlation has a significant impact on the bond risk premium, but a much weaker impact on the equity risk premium.

Aggregate vs. individual stock-bond correlation

The stock-bond correlation is typically calculated as the correlation between a 10-year bond and a stock index. This is an aggregate stock-bond correlation because it looks at a portfolio of stocks rather than individual stocks. It is important to distinguish this aggregate correlation from the individual stock-bond correlation, which is measured at the level of individual stocks rather than an index. When analyzing a portfolio, we find that the aggregate stock-bond correlation is not simply the average of the individual stock-bond correlations. Instead, it is a weighted average, but the sum of the weights is greater than one[3]. Mathematical analysis shows that portfolio diversification creates a correlation leverage phenomenon that is exactly the same as the diversification ratio defined by Choueifaty and Coignard (2008). This result has important implications. Portfolio diversification simultaneously reduces volatility risk and increases correlation risk. Quantitatively, in a well-diversified portfolio, individual volatility risk typically decreases by a factor of three, while individual correlation risk increases by a factor of two. This risk transformation represents a fundamental trade-off in portfolio construction that investment managers must carefully consider.

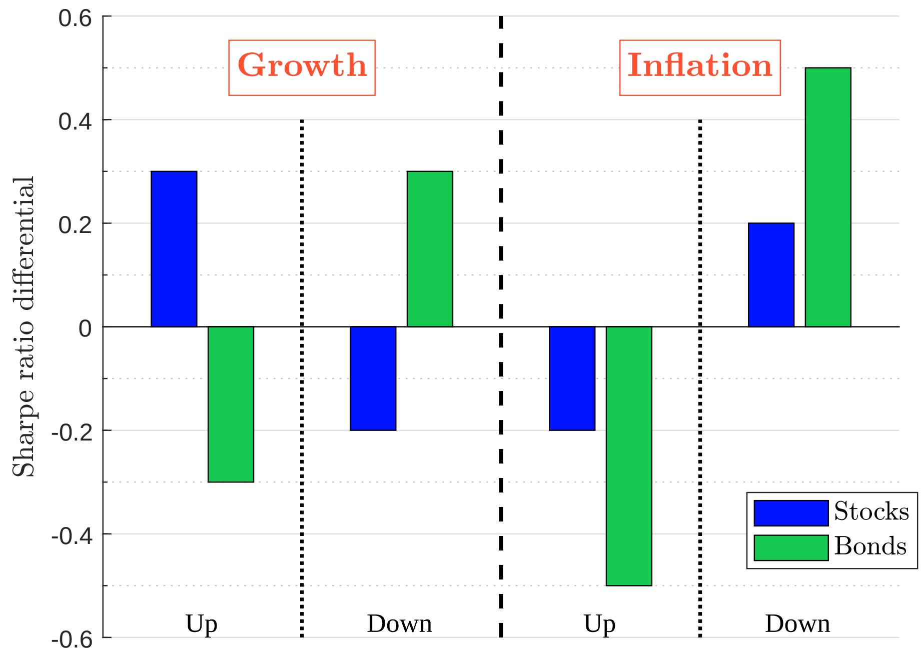
Remark 1 *The previous result implies that there are not one but several stock-bond correlations when we consider non-diversified portfolios. This is the case, for example, when we calculate stock-bond correlations using sectors or factors. Portelli and Roncalli (2024) showed that utilities and real estate generally have higher stock-bond correlations than the market-cap portfolio. This is also the case for low volatility and high dividend strategies. It is also interesting to note that the stock-bond correlation of value stocks is lower than the stock-bond correlation of growth stocks over the long term.*

[3] The stock-bond correlation between a stock index $(w_1, \ldots, w_n)$ and a bond can be expressed as $\rho_{S,B} = \sum_{i=1}^n w_i \gamma_i \rho_{i,B}$, where $\gamma_i = \dfrac{\sigma_i}{\sigma(w)}$ is the volatility ratio between the volatility of the stock and the volatility of the portfolio, and $\rho_{i,B}$ is the individual correlation between stock i and the bond. We can further show that $\rho_{S,B} = \mathcal{L}(\omega) \sum_{i=1}^n \omega_i \rho_{i,B}$, where $\mathcal{L}(\omega) = \sum_{i=1}^n w_i \gamma_i = \dfrac{\sum_{i=1}^n w_i \sigma_i}{\sigma(w)}$, $\omega_i = \dfrac{w_i(t)\gamma_i(t)}{\mathcal{L}(\omega)}$, and $\sum_{i=1}^n \omega_i = 1$. From this we deduce that $\mathcal{L}(\omega) = \mathrm{DR}(w) \geq 1$, where $\mathrm{DR}(w)$ is the Choueifaty-Coignard diversification ratio.

Macroeconomic models of the stock-bond correlation

According to Portelli and Roncalli (2024), there are three families of economic models of stock-bond correlation: inflation-centric, real-centric, and growth-inflation models. In inflation-centric models, the stock-bond correlation depends on the inflation risk. In this case, the stock-bond correlation is generally positive, except in some very specific situations. Real-centric models are macroeconomic models that explain some flight-to-quality patterns. In general, the correlation between stocks and bonds is zero, except during some exceptional periods of stress. In these models, it is investor behavior that creates the negative correlation between stocks and bonds, while inflation is of secondary importance. The growth-inflation model assumes that growth risk creates an economic environment that favors a negative correlation between stocks and bonds, while inflation risk creates an economic environment that favors a positive correlation between stocks and bonds.

Figure 7: Sharpe ratio differences by macroeconomic regime (US, January 1972-June 2022)



Source: Brixton *et al.* (2023, Exhibit 3, page 5).

In Figure 7, we have reproduced the analysis performed by Brixton *et al.* (2023), who calculated the Sharpe ratio of US stocks and bonds by dividing the period from January 1972 to June 2022 into rising and falling growth and inflation risk regimes. The chart shows the Sharpe ratio differentials of stocks and bonds relative to these macroeconomic regimes, compared to the entire period. We observe that stocks outperform in a rising growth regime, while bonds perform better in a declining growth regime. With respect to inflation, both stocks and bonds perform more favorably in a declining inflation risk regime. These patterns confirm that stocks and bonds are comonotonic (move in the same direction) with respect to inflation risk, while they are countermonotonic (move in opposite directions) with respect to growth risk.

We can now understand the conditions for a negative correlation between stocks and bonds. First, the market must be more concerned about growth risk than inflation risk. Second, government bonds must have a low yield so that the cost of hedging is low. Third, credit risk should not be a concern to encourage flight-to-quality episodes. Finally, we need an accommodative monetary policy.

Remark 2 *From 2005 to 2020, the 10-year US Treasury bond served as the universal hedging asset for developed market equity exposure. This explains the negative risk premium observed in Figure 6. In fact, many developed market government bonds have lost their status as reliable hedging assets for their respective equity markets. This is particularly true in European markets following the sovereign debt crisis triggered by the 2008 Global Financial Crisis. In this context, many European portfolio managers preferred to use the 10-year US Treasury bond to hedge some of their equity risk rather than rely on their own 10-year bond. For emerging markets, the situation is more complex due to the significant role of currency risk in these economies. Whether the 10-year US Treasury bond can continue to serve as a universal hedge for equity markets remains an open question. Ultimately, the answer will depend on investor confidence in the US government's ability to manage its debt.*

Stock-bond correlation and asset allocation

In many strategic asset allocation (SAA) exercises, risk premia are typically determined by strategists or economists, while risk measures (volatilities and correlations) are calculated by statisticians or quants. This separation is artificial and can lead to incoherence between risk premia and risk metrics. Consider a SAA exercise in year t. Below we give risk premia and risk measures:

	Year t	Year $t+1$
Equity risk premium	6%	6%
Bond risk premium	1%	3%
Equity volatility	15%	15%
Bond volatility	4%	4%
Stock-bond correlation	−30%	−30%

In year $t+1$, the strategist revises the bond risk premium by increasing it from 1% to 3%. However, the quant does not change the risk measures. We can then ask whether a stock-bond correlation of −30% is consistent with a 6% equity risk premium and a 3% bond risk premium. For many investors, it is not.

To illustrate this point, consider a classic SAA based on Markowitz optimization. The expected returns are 8% for stocks and 2.5% for bonds, the volatilities are 15%

for stocks and 6% for bonds, and the risk-free rate is set at 1%. Below we report the optimal allocation based on the tangent portfolio:

Stock-bond correlation	−40%	−20%	0%	20%	40%
Equity	34.2%	37.6%	42.7%	51.5%	69.8%
Bond	65.8%	62.4%	57.3%	48.5%	30.2%

When the stock-bond correlation is negative, the optimal portfolio has a higher allocation to bonds than to stocks. Conversely, when the stock-bond correlation is positive, the optimal portfolio has a higher allocation to stocks. This result is expected. When the stock-bond correlation is 100%, the investor's optimal choice is to allocate all capital to the asset with the highest expected return.

If the investors are long-term, buy-and-hold investors, this implies that they invest in bonds because they believe that bonds are performance assets, not hedging assets. They would not want a negative correlation between stocks and bonds in the long run, because that would mean that some of the positive performance generated by the equity allocation would be offset by the negative performance of the bond allocation. This observation highlights the difference in SAA between sovereign wealth funds and many European pension funds.

While the long-term role of bonds is relatively clear, their short-term status is more uncertain. In general, short-term investors and tactical managers prefer a negative correlation between stocks and bonds. This is particularly true for CTA hedge funds, which benefit from a negative correlation when taking short positions in equities. Jusselin *et al.* (2017) challenge the myth that CTA hedge funds can be massively short equities, explaining that they want to avoid excessive vega risk and the high gamma trading costs associated with such positions. For example, consider the 2008 Global Financial Crisis. During this period, volatility risk was extremely high. In such conditions, CTA hedge funds avoided vega risk and instead implemented short equity exposure through highly leveraged long bond positions — a strategy they actively pursued in 2008. Conversely, risk parity funds may prefer a zero or negative stock-bond correlation to hedge equity risk. In this context, bonds can serve as a temporary hedge. However, hedging or insurance strategies always come at a cost. For example, the risk premium of a systematic long put option strategy is typically negative.

Conclusion

We have to be very careful when we talk about stock-bond correlation. Stock-bond correlation in the long run is not the same as stock-bond correlation in the short run. Moreover, although correlation is generally associated with the concept of diversification, we see that it is more complex. It can be related to the concept of hedging, and it also has a big impact on the risk premium structure of stocks and bonds.

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