



Noah Weisberger, PhD
noah.weisberger@pgim.com

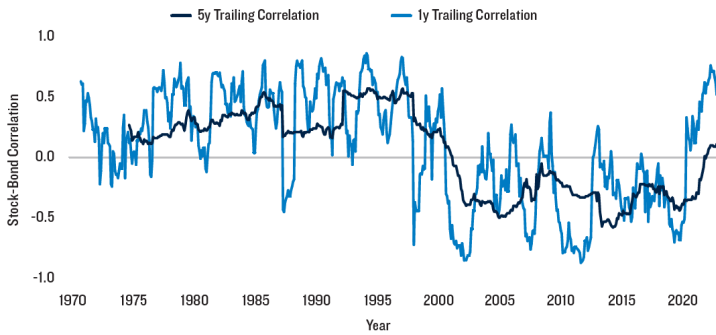


Xiang Xu, PhD
xiang.xu@pgim.com

POSITIVE STOCK-BOND CORRELATION

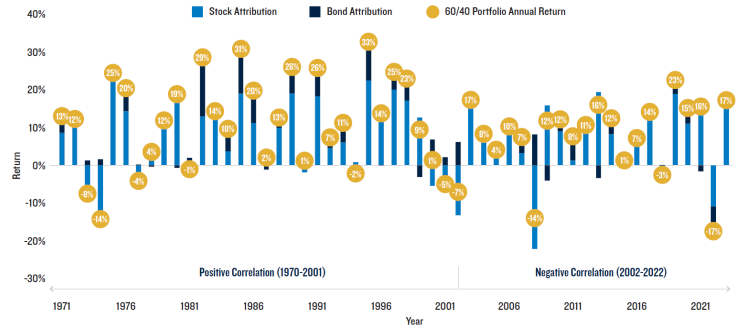
Prospects & Portfolio Construction Implications

US Stock-Bond Correlation (1970 – 2023)



Note: Trailing 5y & 1y rolling correlations of 1m %-change in S&P 500 Total Return Index and 1m %-change in US 10y Treasury Constant Maturity Total Return Index. Source: Haver Analytics, Standard & Poor's, U.S. Treasury and PGIM IAS. For illustrative purposes only.

60/40 Portfolio Annual Return, with Attribution to Stocks and Bonds (1973 – 2023)



Note: Annual %-change in end-of period S&P 500 Total Return Index, annual %-change in end-of-period US 10y Treasury Constant Maturity Total Return Index, annual %-change in costless, annually rebalanced 60/40 portfolio of stocks (S&P 500 Total Return Index) and bonds (US 10y Treasury Constant Maturity Total Return Index). Source: Haver Analytics, Standard & Poor's, U.S. Treasury and PGIM IAS. For illustrative purposes only.

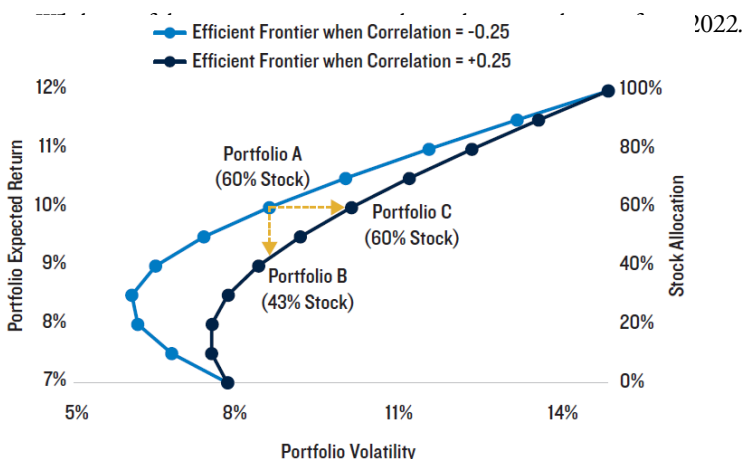
US stock and bond prices declined sharply in 2022 and then rebounded in tandem, pushing stock-bond correlation into positive territory for the first time in 20y. Correlation regimes tend to be driven by the prevailing macroeconomic landscape and can be long lived. Fiscal sustainability concerns, monetary policy uncertainty, elevated interest rate volatility, and the supply-driven nature of recent economic fluctuations have helped push correlation into positive territory and could support a prolonged period of positive stock-bond correlation, much like the 1970-2000 period.

A positive stock-bond correlation regime is a new investing environment for many market participants. The onset of this new regime coincided with a record bad year for the venerable 60/40 portfolio in 2022, which was down 17% owing to steep declines in both stocks and bonds. Some have mistakenly taken 2022's performance as indicative of what to expect when correlation is positive.

True, a change in correlation from negative to positive shifts the “efficient frontier” inward, making some risk-reward pairs unattainable and leading to a deterioration in risk-adjusted performance. Yet, both history and theory point to the enduring value of a balanced portfolio regardless of correlation regime, with little to suggest that periods of positive stock-bond correlation are particularly challenging for multi-asset investing.

Given the unfamiliar landscape, it is worth emphasizing that even when correlation is positive and bonds are not as strong a hedge for equity risk, the optimal allocation to bonds remains little changed, with bonds continuing to play a critical role in the construction of a balanced portfolio. Historically, portfolio returns are higher when correlation is positive than when negative. Moreover, the current narrowed stock-bond valuation gap is consistent with future risk-adjusted outperformance of bonds, underscoring their importance in a balanced portfolio.

Efficient Frontier as a Function of Assumed Stock-Bond Correlation



Note: Capital market assumptions are based on the 1970-2022 (annualized) mean and volatility of 1m %-changes in the S&P 500 Total Return Index (12% and 15%, respectively) and in the US 10y Treasury Constant Maturity Total Return Index (7% and 8%, respectively). Negative correlation is assumed to be -0.25 and positive correlation is assumed to be +0.25. Source: Haver Analytics, Standard & Poor's, U.S. Treasury and PGIM IAS. For illustrative purposes only.

60/40 Portfolio Performance by Correlation Regime (1970-2022)

Correlation Regime	Positive (1/1970-12/2001)	Negative (1/2002-12/2022)
Average Return	11.9%	7.0%
Avg. Excess Return	4.1%	5.4%
Volatility	10.8%	8.9%
Sharpe Ratio	0.4	0.6

Note: Annualized monthly performance of a costless monthly rebalanced 60/40 stock-bond portfolio; excess returns are calculated relative to the average monthly LIBOR rate; correlation regime is determined by the sign of trailing 5y correlation between stock and bond returns. Source: Haver Analytics, Standard & Poor's, U.S. Treasury and PGIM IAS. For illustrative purposes only.

For Professional Investors Only.

Past performance is no guarantee or reliable indicator of future results. All investments involve risk, including the possible loss of capital. These materials are for informational or educational purposes only. In providing these materials, PGIM is not acting as your fiduciary.

Alternative investments are speculative, typically highly illiquid and include a high degree of risk. Investors could lose all or a substantial amount of their investment. Alternative investments are suitable only for long-term investors willing to forego liquidity and put capital at risk for an indefinite period of time. Equities may decline in value due to both real and perceived general market, economic and industry conditions. Investing in the bond market is subject to risks, including market, interest rate, issuer, credit, inflation risk and liquidity risk. Commodities contain heightened risk, including market, political, regulatory and natural conditions and may not be suitable for all investors. The use of models to evaluate securities or securities markets based on certain assumptions concerning the interplay of market factors, may not adequately take into account certain factors and may result in a decline in the value of an investment, which could be substantial.

All charts contained herein were created as of the date of this presentation, unless otherwise noted. Performance results for certain charts and graphs may be limited by date ranges, as stated on the charts and graphs. Different time periods may produce different results. Charts and figures are provided for illustrative purposes and are not an indication of past or future performance of any PGIM product.

These materials represent the views, opinions and recommendations of the author(s) regarding the economic conditions, asset classes, securities, issuers or financial instruments referenced herein, and are subject to change without notice. Certain information contained herein has been obtained from sources that PGIM believes to be reliable; however, PGIM cannot guarantee the accuracy of such information, assure its completeness, or warrant such information will not be changed. The information contained herein is current as of the date of issuance (or such earlier date as referenced herein) and is subject to change without notice. PGIM has no obligation to update any or all of such information; nor do we make any express or implied warranties or representations as to the completeness or accuracy or accept responsibility for errors. Any forecasts, estimates and certain information contained herein are based upon proprietary research and should not be considered as investment advice or a recommendation of any particular security, strategy or investment product. These materials are not intended as an offer or solicitation with respect to the purchase or sale of any security or other financial instrument or any investment management services and should not be used as the basis for any investment decision. No liability whatsoever is accepted for any loss (whether direct, indirect, or consequential) that may arise from any use of the information contained in or derived from this report. PGIM and its affiliates may make investment decisions that are inconsistent with the recommendations or views expressed herein, including for proprietary accounts of PGIM or its affiliates. The opinions and recommendations herein do not take into account individual client circumstances, objectives, or needs and are not intended as recommendations of particular securities, financial instruments or strategies to particular clients or prospects. No determination has been made regarding the suitability of any securities, financial instruments or strategies for particular clients or prospects. For any securities or financial instruments mentioned herein, the recipient(s) of this report must make its own independent decisions.

The information contained herein is provided by PGIM, Inc., the principal asset management business of Prudential Financial, Inc. (PFI), and an investment adviser registered with the US Securities and Exchange Commission. In the United Kingdom and various European Economic Area jurisdictions, information is issued by PGIM Limited with registered office: Grand Buildings, 1-3 Strand, Trafalgar Square, London, WC2N 5HR. PGIM Limited is authorised and regulated by the Financial Conduct Authority of the United Kingdom (registration number 193418) and duly passported in various jurisdictions in the EEA. Prudential Financial, Inc. of the United States is not affiliated with Prudential plc, incorporated in the United Kingdom or with Prudential Assurance Company, a subsidiary of M&G plc, incorporated in the United Kingdom. These materials are issued by PGIM Limited to persons who are professional clients or eligible counterparties as defined in Directive 2014/65/EU (MiFID II), investing for their own account, for fund of funds, or discretionary clients. In certain countries in Asia, information is presented by PGIM (Singapore) Pte. Ltd., a Singapore investment manager registered with and licensed by the Monetary Authority of Singapore. In Japan, information is presented by PGIM Japan Co. Ltd., registered investment adviser with the Japanese Financial Services Agency. In South Korea, information is presented by PGIM, Inc., which is licensed to provide discretionary investment management services directly to South Korean investors. In Hong Kong, information is provided by PGIM (Hong Kong) Limited, a regulated entity with the Securities & Futures Commission in Hong Kong to professional investors as defined in Section 1 of Part 1 of Schedule 1 (paragraph (a) to (i) of the Securities and Futures Ordinance (Cap.571). In Australia, this information is presented by PGIM (Australia) Pty Ltd. ("PGIM Australia") for the general information of its "wholesale" customers (as defined in the Corporations Act 2001). PGIM Australia is a representative of PGIM Limited, which is exempt from the requirement to hold an Australian Financial Services License under the Australian Corporations Act 2001 in respect of financial services. PGIM Limited is exempt by virtue of its regulation by the Financial Conduct Authority (Reg: 193418) under the laws of the United Kingdom and the application of ASIC Class Order 03/1099. The laws of the United Kingdom differ from Australian laws. Pursuant to the international adviser registration exemption in National Instrument 31-103, PGIM, Inc. is informing you of that: (1) PGIM, Inc. is not registered in Canada and relies upon an exemption from the adviser registration requirement under National Instrument 31-103; (2) PGIM, Inc.'s jurisdiction of residence is New Jersey, U.S.A.; (3) there may be difficulty enforcing legal rights against PGIM, Inc. because it is resident outside of Canada and all or substantially all of its assets may be situated outside of Canada; and (4) the name and address of the agent for service of process of PGIM, Inc. in the applicable Provinces of Canada are as follows: in Québec: Borden Ladner Gervais LLP, 1000 de La Gauchetière Street West, Suite 900 Montréal, QC H3B 5H4; in British Columbia: Borden Ladner Gervais LLP, 1200 Waterfront Centre, 200 Burrard Street, Vancouver, BC V7X 1T2; in Ontario: Borden Ladner Gervais LLP, 22 Adelaide Street West, Suite 3400, Toronto, ON M5H 4E3; in Nova Scotia: Cox & Palmer, Q.C., 1100 Purdy's Wharf Tower One, 1959 Upper Water Street, P.O. Box 2380 - Stn Central RPO, Halifax, NS B3J 3E5; in Alberta: Borden Ladner Gervais LLP, 530 Third Avenue S.W., Calgary, AB T2P R3