

Stock-Bond Correlation: A Case Against De-Risking*

Paisan Limratanamongkol

Abstract

When stocks and bonds fall together, allocators instinctively reduce risk. This paper asks whether that instinct has historically been correct. Using daily returns of the MSCI USA Index and Bloomberg US Treasury Total Return Index from January 1995 through June 2026 — with forward outcome windows computed through June 2025 — we find that positive stock-bond correlation has not been a reliable signal to de-risk a balanced portfolio. In every pre-2009 positive correlation episode, forward 60/40 returns were above their historical average — regardless of what drove the correlation positive. A simple backtest confirms this: the signal portfolio did not improve risk-adjusted performance in any period or episode composition — the Sharpe ratio of the signal portfolio is below the static 60/40 benchmark across the full sample, pre-2009, and post-2009. The return difference — approximately 42 basis points full sample — is partly mechanical and driven primarily by the pre-2000 episode; excluding that period, the full-sample cost falls to 18 basis points.

The more actionable signal is about forward bond volatility, not returns. Positive correlation predicted lower bond volatility before 2009 and higher volatility after — a clean regime reversal that reflects the shift from conventional Fed easing cycles to zero lower bound and inflation-driven tightening. The SB correlation is best understood as a regime indicator whose implications depend critically on the monetary policy environment, not as a tactical de-risking trigger.

1. Introduction

Stock-bond correlation has been one of the central topics in asset allocation. Allocating to bonds should provide a hedging benefit to a balanced portfolio — in most cases, the negative correlation between stocks and bonds means that when stock prices fall, bond prices rise to offset the loss. However, it is not uncommon, though not frequent, to observe positive correlation between the two asset classes. When positive correlation is detected, an asset allocator may feel compelled to change the allocation to address

* I am deeply grateful to Kuntara Pukthuanthong for her extraordinarily detailed and incisive review of this paper. Her comments were instrumental in sharpening the paper's central claims, improving the rigor of the inference methodology, and ensuring that the empirical evidence is presented with the honesty and precision it deserves. This paper is substantially better because of her engagement, and I owe her my sincerest gratitude.

I also thank Colm O'Cinneide and Greg Van Inwegen for their thoughtful comments and encouragement at various stages of this project. Their perspective as experienced practitioners and researchers helped ground the analysis in questions that matter to the intended audience.

All remaining errors are my own.

the perceived correlated risk and prevent future drawdown. The 2022 episode is a stark example — when both stocks and bonds fell simultaneously, balanced portfolios suffered their worst annual drawdown in decades.

In this paper, we ask whether the de-risking instinct has historically been correct. Using daily returns of the MSCI USA Index and Bloomberg US Treasury Total Return Index — chosen to isolate the pure rate-driven correlation rather than the credit dynamics embedded in broader fixed income indices — together with a 60/40 portfolio with annual rebalancing, we find little evidence that positive stock-bond correlation (SB correlation, hereafter) portends worse outcomes over the subsequent 252 days. In every pre-2009 positive correlation episode, forward 60/40 returns were above their historical average — regardless of what drove the correlation positive. A simple backtest confirms the cost of acting on the signal: reducing equity from 60% to 50% when the SB correlation turns positive has cost approximately 42 basis points of annual return with no meaningful improvement in drawdown protection or risk-adjusted performance. The de-risking instinct, while intuitive, has historically been expensive.

The more actionable signal in the SB correlation is about forward bond volatility, not returns. Before 2009, positive SB correlation predicted lower forward bond volatility — the correlation preceded stress episodes that were subsequently resolved by aggressive Fed easing, compressing rate volatility in the forward window. After 2009, the same signal reversed — positive SB correlation has been followed by higher bond volatility, reflecting a monetary environment where the traditional policy backstop was either constrained by the zero lower bound or responding to persistent inflation rather than financial stress. This sign reversal is the paper's primary finding — clean, mechanism-driven, and robust to extensive controls.

We hypothesize that 2009 marks a meaningful shift in the predictive relationship between SB correlation and forward outcomes, motivated by the Federal Reserve's adoption of near-zero interest rates in December 2008. What is striking is that the zero lower bound era following 2009 also produced one of the longest sustained periods of negative SB correlation in the sample — from roughly 2009 through 2021 — as bonds consistently served their traditional diversification role during a period of subdued inflation and accommodative policy. The positive correlation regime only re-emerged forcefully with the 2022 inflation shock, providing the clearest post-2009 test of our hypothesis. The contrast between the pre-2009 and 2022 positive correlation episodes — one followed by Fed easing and rate compression, one driven by persistent inflation and aggressive tightening — captures the regime shift at the heart of this paper.

We acknowledge upfront that positive correlation episodes are rare — our sample contains only five distinct sustained episodes over 30 years, four before 2009 and one after. As empiricists, we work with the data available and are explicit about what the evidence can and cannot support. The pre-2009 positive correlation sample contains episodes driven by different mechanisms — the 1995–2000 episode reflected a post-tightening recovery in a benign macro environment, while the subsequent episodes coincided with the build-up to the dot-com bust and the pre-GFC credit expansion. To assess whether the portfolio return finding depends on the mechanism, we exclude the pre-2000 positive correlation period and rerun the analysis. The statistical finding weakens — portfolio return predictability loses significance — and the backtest shows the de-risking signal produces a marginally higher Sharpe ratio during the remaining pre-2009 episodes through modest volatility reduction rather than return improvement. The bond volatility sign flip and bond return findings, by contrast, survive the exclusion

and strengthen. Taken together, the evidence suggests that the cost of de-risking is most pronounced during benign positive correlation environments like 1995–2000, while the signal is roughly neutral during stress-preceded episodes — but universally de-risking when the SB correlation turns positive has not been the right idea across the full sample.

Recent empirical evidence has documented the determinants and time-varying nature of the SB correlation (Campbell and Ammer, 1993; Ilmanen, 2003; Baele et al., 2010), with Molenaar et al. (2024) providing the most recent comprehensive treatment using a broad cross-section of international markets. However, to our knowledge, no study has systematically examined the forward-looking predictive content of the SB correlation sign for future bond volatility and returns across monetary policy regimes, or directly tested the de-risking instinct through a formal backtest. We fill this gap using a simple but robust empirical framework — a binary dummy for positive SB correlation and a continuous SB correlation measure — with paired moving block bootstrap inference (Künsch, 1989; Liu and Singh, 1992) to address the severe serial correlation induced by overlapping 252-day forward windows.

The remainder of the paper is organized as follows. Section 2 describes the data and methodology. Section 3 reviews the related literature. Section 4 presents in-sample results including evidence of the pre/post-2009 regime shift. Section 5 reports robustness evidence including a backtest of the de-risking rule and an extensive control variable analysis. Section 6 interprets the findings and discusses practical implications. Section 7 concludes.

2. Data and Methodology

2.1 Data

We use daily total return data for two asset classes: the MSCI USA Index as the equity proxy and the Bloomberg US Treasury Total Return Index (Unhedged USD) as the fixed income proxy. The choice of a broad Treasury index rather than the Bloomberg US Aggregate is deliberate — the Aggregate index includes corporate bonds and mortgage-backed securities whose credit dynamics would contaminate the measurement of the pure rate-driven stock-bond correlation. The raw return data spans January 1995 through June 2026, with the first valid 252-day rolling SB correlation observation on December 19, 1995 — yielding 7,696 trading days in the analysis sample. Figure 1 plots the full-sample evolution of the 252-day rolling SB correlation, illustrating the transition from the predominantly positive correlation of the mid-to-late 1990s through the extended negative correlation regime of 2009–2021 and the sharp reversal during the 2022 inflation shock.

We construct a 60/40 portfolio with annual rebalancing — 60% MSCI USA and 40% Bloomberg US Treasury — which serves as the base portfolio throughout the analysis. Forward outcomes are computed as cumulative compounded 252-day returns and annualized 252-day realized volatility, measured starting the day after each observation date. The effective sample for computing forward outcomes ends approximately 252 trading days before the last data observation — June 17, 2025 — since the final 252 days of the sample do not have complete forward windows.

2.2 The SB Correlation Measure

The key predictor throughout the analysis is the 252-day rolling stock-bond correlation, computed daily using the prior 252 trading days of equity and bond returns. We use two specifications. The dummy specification equals one when the rolling correlation is positive and zero otherwise — testing whether the sign of the correlation carries predictive content. The continuous specification uses the raw correlation level directly — testing whether the degree of positive or negative correlation carries incremental information beyond the sign alone. We do not standardize the SB correlation because the zero threshold carries direct economic meaning: it marks the boundary between correlation regimes, and standardization around the full-sample mean of -0.18 would distort this threshold.

The dummy variable is active approximately 25.7% of trading days over the full sample. Positive correlation is concentrated in five distinct sustained episodes: a long post-tightening recovery from roughly 1995 to 1998, a shorter episode around 1999–2000, two pre-GFC episodes in 2005–2007, and the 2022 inflation shock episode. The dummy was inactive — equal to zero — from January 2009 through October 2021, reflecting the extended negative correlation regime of the zero lower bound era.

Forward outcomes include forward bond volatility, forward bond returns, forward equity returns, and forward 60/40 portfolio returns. Forward equity and portfolio volatilities show no consistent predictability from the SB correlation in any specification or period — results are reported in Table 3A for completeness but excluded from the main discussion.

2.3 Econometric Methodology

The overlap problem. The primary econometric challenge in this analysis is the severe serial correlation induced by overlapping 252-day forward windows. With daily data and annual forward windows, consecutive observations share 251 of 252 days in both the predictor and outcome windows, inducing autocorrelation in the regression residuals up to lag 251. As a result, the nominal sample size of 7,696 daily observations substantially overstates the effective number of independent observations, which is closer to 30 — the number of non-overlapping 252-day blocks spanning the sample.

Paired moving block bootstrap. As our primary inference procedure, we use the paired moving block bootstrap (Künsch, 1989; Liu and Singh, 1992) with block length equal to 252 trading days, matching the overlap between adjacent observations. At each bootstrap replication, we draw $k = \lfloor n/252 \rfloor$ block starting points uniformly at random with replacement from $\{1, 2, \dots, n - 252 + 1\}$ and resample the outcome and predictor variables jointly from the same block indices — preserving both the autocorrelation within each series and the dependence structure between them. We estimate the regression on each resampled dataset and record the coefficient on the SB correlation. After 5,000 replications, we center the bootstrap distribution at the observed coefficient and compute a one-sided p-value as the proportion of bootstrap coefficients at least as extreme as the observed coefficient in the direction of the observed effect, with a continuity correction of the form $(B_{\text{extreme}} + 1)/(B + 1)$ where B is the number of bootstrap replications. The bootstrap standard error is the standard deviation of the coefficient estimates across replications, and the reported bootstrap t-statistic is the observed OLS coefficient divided by this bootstrap standard error.

Newey-West standard errors. We also report Newey-West (1987) heteroskedasticity and autocorrelation consistent (HAC) standard errors with 252 lags as a secondary check. While HAC standard errors are standard practice in the overlapping returns literature, they do not fully resolve the inference problem when the effective sample size is small relative to the autocorrelation horizon. We therefore treat the Newey-West results as a secondary robustness check rather than the primary basis for inference; these results are reported in Appendix Tables A1 and A2.

Regime split. The choice of January 2009 as the regime break is motivated by the well-documented shift in monetary policy following the Federal Reserve's adoption of near-zero interest rates in December 2008. Rather than testing for this break using formal structural break statistics — which rely on assumptions that are difficult to justify given the severity of the overlap in our data — we present pre- and post-2009 subsample results directly, with bootstrap inference applied separately within each subsample. The reversal in sign for forward bond volatility prediction across the two subsamples, discussed in Section 4, provides direct evidence of a meaningful change in the predictive relationship around this date.

Backtest. We evaluate the practical implications of the SB correlation signal through a backtest described in Section 5.1. The signal portfolio — defined formally in Section 5.1 — reduces equity from 60% to 50% when the SB correlation turns positive, rebalancing immediately on signal change and resetting to the current signal weight at each year end. The base portfolio maintains a static 60/40 allocation with annual rebalancing. Both portfolios drift freely between rebalancing dates using the buy-and-hold return computation.

Standardization. Continuous macro and risk controls used in the robustness analysis are standardized to zero mean and unit variance using full-sample parameters to facilitate comparison of coefficient magnitudes across variables of different scales. This standardization is applied only to the in-sample bivariate and kitchen sink regressions in Section 5.2 — the backtest and the SB correlation itself are expressed in natural units. For subsample regressions, full-sample standardization parameters are retained — this ensures comparability of coefficient magnitudes across subsamples but does not affect the sign or bootstrap-based significance of the SB correlation coefficient, which is the focus of inference throughout.

3. Related Literature

This paper connects to four strands of the asset pricing and portfolio management literature.

Stock-bond correlation determinants. Following Campbell and Ammer (1993), stock and bond returns can be decomposed into cash-flow, inflation, real-rate, and risk-premium news components. Subsequent literature interprets time variation in stock-bond correlation as arising from shifts in the dominant macroeconomic shock, with inflation shocks tending to generate positive correlation and growth shocks tending to generate negative correlation. Ilmanen (2003) documents the long-run evolution of stock-bond correlations and argues that the shift from predominantly positive to predominantly negative correlations in the 1990s coincided with a period of lower inflation volatility, reduced inflation uncertainty, and increased monetary policy credibility. Baele, Bekaert, and Inghelbrecht (2010) provide empirical evidence that stock-bond comovement is shaped by both macroeconomic fundamentals and investor risk appetite, highlighting the importance of inflation- and interest-rate-related uncertainty in

determining the direction of stock-bond comovement, while flight-to-quality behavior during periods of market stress contributes importantly to the strength of negative stock-bond correlations. Molenaar, Senechal, Swinkels, and Wang (2024) provide the most recent comprehensive empirical examination of stock-bond correlation across developed markets, documenting the importance of inflation, real rates, and sovereign credit quality as determinants of correlation regimes while noting that forecasting the future evolution of the correlation remains an open research question — the gap this paper addresses directly.

Return and volatility predictability. A large literature documents the predictability of asset returns from macroeconomic and financial variables. Fama and Bliss (1987) show that forward-spot rate spreads predict excess returns on long-term bonds, while Cochrane and Piazzesi (2005) demonstrate that a single factor extracted from forward rates forecasts bond risk premia across maturities. Goyal and Welch (2008) provide a comprehensive evaluation of equity return predictors and find that most fail to improve upon simple benchmark forecasts out of sample — a demanding standard against which we evaluate the predictive content of the SB correlation signal for bond and portfolio returns. Andersen and Bollerslev (1998) document the strong persistence of realized volatility, implying that any new volatility predictor must compete against a highly persistent benchmark. Connolly, Stivers, and Sun (2005) show that stock market uncertainty, proxied by the VIX, predicts subsequent stock-bond comovement, with periods of elevated uncertainty associated with weaker or negative correlations between stocks and bonds. Bekaert, Hoerova, and Lo Duca (2013) further decompose the VIX into uncertainty and risk-aversion components, demonstrating that these measures capture distinct dimensions of financial-market conditions.

Inference with overlapping returns. Long-horizon predictive regressions estimated on daily data with overlapping forward windows pose a well-known econometric challenge: adjacent observations share most of their underlying data, inducing serial correlation in the regression residuals that standard inference procedures can understate. The standard approach in the literature is to use heteroskedasticity- and autocorrelation-consistent standard errors, such as Newey and West (1987), with a lag length matched to the overlap. We report these results as a secondary check, but given the severity of the overlap in our setting — daily data with 252-day forward windows, where adjacent observations share 251 of 252 days — we adopt the paired moving block bootstrap (Künsch, 1989; Liu and Singh, 1992) as our primary inference method, with block length matched to the overlap. This approach resamples outcome and predictor variables jointly in blocks of consecutive observations, preserving the autocorrelation within each series while constructing the empirical null distribution of the test statistic directly from the data, without relying on asymptotic approximations.

Monetary regime and asset prices. The post-2009 regime shift we document connects to a broader literature on the asset pricing implications of unconventional monetary policy. Krishnamurthy and Vissing-Jorgensen (2011) document the portfolio balance channel through which quantitative easing affects bond yields and risk premia. Gagnon, Raskin, Remache, and Sack (2011) estimate large effects of Federal Reserve asset purchases on long-term Treasury yields, compressing term premia and potentially altering the relationship between bond and equity returns. The zero lower bound era — characterized by compressed volatility, persistently negative stock-bond correlation, and unconventional policy tools — represents a distinct monetary-policy environment relative to the pre-2009 era of conventional rate cycles. Our finding of a reversal in the SB correlation's predictive relationship around

2009 is consistent with the broader view that the GFC and its aftermath marked a meaningful shift in the macro-financial environment rather than merely a cyclical disruption.

Multi-asset portfolio construction and the 60/40 benchmark. The 60/40 stock-bond portfolio has long served as the canonical balanced portfolio benchmark. The diversification benefit of bonds within this framework depends critically on the stock-bond correlation — when the correlation is negative, bonds hedge equity drawdowns; when positive, both asset classes decline together, as illustrated by the 2022 episode. Our finding that positive SB correlation has historically not been a reliable de-risking signal — and that a simple backtest of the de-risking instinct costs approximately 42 basis points of annual return with no meaningful drawdown protection — contributes empirical evidence to an ongoing debate about the continued relevance of the 60/40 framework in a post-zero-lower-bound environment. Rather than asking whether the 60/40 portfolio remains viable, we ask a more specific question: does observing positive stock-bond correlation justify reducing equity exposure? Our evidence consistently says no.

4. Empirical Results

4.1 Variables and Specifications

The key predictor is the 252-day rolling SB correlation, measured in two ways. The dummy specification equals one when the rolling correlation is positive and zero otherwise. The continuous specification uses the raw correlation level. The two specifications are not included simultaneously given their correlation of 0.800. The SB correlation ranges from -0.677 to 0.601 over the sample, with a full-sample mean of -0.180 , reflecting the predominantly negative correlation of the post-2009 era. The dummy is active approximately 25.7% of trading days over the full sample.

Three forward outcomes are examined in the main analysis: forward bond volatility, forward bond returns, and forward 60/40 portfolio returns, each measured over the subsequent 252 trading days. Forward equity returns are discussed as supporting evidence for the portfolio return interpretation. Forward equity and portfolio volatilities show no consistent predictability from the SB correlation in any specification or period — results are reported in Table 3A for completeness but excluded from the main discussion. The R^2 values reported in Tables 2A and 3A reflect the overlapping nature of the forward windows. With adjacent daily observations sharing 251 of 252 days in the outcome window, the OLS R^2 substantially overstates the proportion of variation explained relative to what non-overlapping annual data would show — a mechanical consequence of the overlap that applies equally to the benchmark historical mean predictor. The R^2 values should therefore be interpreted as descriptive summaries of in-sample fit rather than measures of genuine out-of-sample predictive power. Inference throughout relies on the paired moving block bootstrap rather than R^2 comparisons.

All regressions use OLS with paired moving block bootstrap inference (Künsch, 1989; Liu and Singh, 1992) as the primary basis for significance assessment, as described in Section 2.3. Newey-West standard errors with 252 lags are reported in Appendix Tables A1 and A2 as a secondary check.

Table 2 reports full-sample univariate results. Positive SB correlation — measured by either the dummy or the continuous level — is associated with higher forward bond and 60/40 portfolio returns, both statistically significant at conventional levels under bootstrap inference, with OLS coefficients (β) and

bootstrap p-values reported throughout. Forward bond volatility is insignificant in the full sample for both specifications — a pattern that masks a striking subsample asymmetry documented in Section 4.3.

4.2 The 2009 Regime Shift

The choice of January 2009 as the regime break is motivated by the well-documented shift in monetary policy following the Federal Reserve's adoption of near-zero interest rates in December 2008. This marked the beginning of an unprecedented era of unconventional monetary policy — quantitative easing, forward guidance, and eventually inflation-driven tightening — that fundamentally altered the environment in which the SB correlation had historically generated its predictive content.

Table 3A presents pre- and post-2009 coefficients and bootstrap p-values for all primary outcomes and both specifications. The evidence of a regime shift is most pronounced for bond volatility — the only outcome that shows a clear sign reversal across the break. Before 2009, positive SB correlation is associated with lower forward bond volatility (dummy $\beta = -0.0008$, $p = 0.000$; continuous $\beta = -0.0015$, $p = 0.010$). After 2009, the relationship reverses sign (dummy $\beta = +0.0008$, $p = 0.080$; continuous $\beta = +0.0015$, $p = 0.019$). For bond and portfolio returns, the post-2009 coefficients weaken substantially and lose significance, but do not reverse sign — consistent with a regime where the return predictability channel is attenuated rather than reversed. Together these patterns are consistent with the economic narrative: before 2009, positive SB correlation episodes preceded stress that was subsequently resolved by aggressive Fed easing — but this resolution mechanism was no longer available after the Fed moved to the zero lower bound.

Figure 2 plots the rolling 252-day proportion of days with positive SB correlation, illustrating the extended negative correlation regime from 2009 through 2021 and the re-emergence of positive correlation during the 2022 inflation shock.

4.3 Pre-2009 Subsample

Table 3A reports pre-2009 results. The SB correlation predicts three forward outcomes with statistical significance: bond volatility, bond returns, and 60/40 portfolio returns. Equity returns show supporting evidence under both specifications.

Bond volatility. Both the dummy and continuous specifications negatively predict forward bond volatility, with R^2 values of 0.245 and 0.440 respectively. Periods of positive SB correlation were followed by lower bond volatility over the next 252 days. The higher R^2 for the continuous specification suggests that the degree of positive correlation — not just its sign — carried additional information about the magnitude of subsequent rate compression. This is consistent with the monetary history of the period: positive SB correlation episodes preceded stress events that ultimately prompted aggressive Fed easing, which subsequently stabilized the rate environment and compressed bond volatility.

Bond returns. Both specifications positively predict forward bond returns, with R^2 values of 0.171 and 0.157 respectively. The positive sign is intuitive given the bond volatility finding — the same Fed easing cycles that compressed rate volatility also produced bond price appreciation. Investors who maintained duration exposure through positive correlation episodes were rewarded.

Portfolio returns. Both specifications predict higher forward 60/40 portfolio returns, with R^2 values of 0.157 and 0.225 respectively. The continuous specification's portfolio R^2 of 0.225 exceeds its bond return R^2 of 0.157, suggesting the equity component also contributed to above-average portfolio performance. This is supported by the finding that both specifications show borderline significant positive prediction of forward equity returns pre-2009 — positive correlation episodes preceded above-average returns across both asset classes simultaneously.

Equity returns. Both specifications show borderline significant positive prediction of forward equity returns pre-2009 (dummy $p = 0.025$, continuous $p = 0.026$). This helps explain the portfolio return result — the SB correlation captured a broad signal that benefited both asset classes rather than being driven by the bond component alone.

Episode composition caveat. The pre-2009 positive correlation sample contains episodes driven by different mechanisms. The pre-2000 episodes reflected a post-tightening recovery in a benign macro environment, while the 2005-2007 episodes preceded the GFC. To assess whether the findings depend on the mechanism, we exclude the pre-2000 positive correlation period and rerun the analysis — results are reported in Table 3B. The bond volatility and bond return findings survive and strengthen. The portfolio and equity return statistical findings weaken — portfolio return predictability loses significance while the coefficient remains positive, and equity return coefficients reverse sign. This confirms that the bond volatility and bond return findings are genuine properties of positive correlation regimes, while the portfolio and equity return findings are concentrated in the pre-2000 episode.

4.4 Post-2009 Subsample

The post-2009 results are strikingly different. Return predictability largely disappears, and the bond volatility relationship reverses sign entirely.

Bond volatility — the sign flip. This is the central finding of the paper. Both the dummy and continuous specifications now positively predict forward bond volatility — the opposite of the pre-2009 relationship — with R^2 values of 0.110 and 0.172 respectively. Periods of positive SB correlation post-2009 were followed by higher bond volatility over the next 252 days. The most prominent post-2009 positive correlation episode — from late 2021 through early 2025 — coincided with the most aggressive Fed hiking cycle in four decades. Unlike pre-2009 episodes where positive correlation preceded stress that was eventually resolved by easing and rate compression, this episode was prolonged and followed by elevated rate turbulence. The post-2009 finding should be interpreted with one important caveat: the positive correlation regime post-2009 is represented by a single sustained episode — the 2022 inflation shock and its aftermath. The paired bootstrap addresses the serial dependence within that episode but cannot create independent regime observations that are not in the sample. The sign flip is therefore best understood as a contrast between the pre-2009 multi-episode experience and a single post-2009 episode driven by a fundamentally different monetary regime, rather than as a conclusion drawn from multiple independent positive correlation regimes on each side of the break.

Bond and equity returns. Bond returns are insignificant post-2009 for both specifications — the positive return predictability of the pre-2009 era does not carry over without a reliable Fed easing response. The dummy specification shows borderline positive predictability for equity returns post-2009 ($\beta = +0.055$, $p = 0.096$) — consistent with the observation that while the 2022 positive correlation episode was

followed by elevated bond volatility and poor bond returns, equity markets partially recovered within the 252-day forward window as the Fed signaled a pause in its tightening cycle. The continuous specification is insignificant, suggesting the degree of correlation carried no additional information about forward equity returns post-2009.

Portfolio returns. The dummy retains borderline significance for portfolio returns post-2009 ($p = 0.046$), while the continuous specification is insignificant. This weak result should be interpreted cautiously — it does not represent the same robust predictability as the pre-2009 finding. The fact that the dummy performs better post-2009 while the continuous specification was stronger pre-2009 is consistent with a regime where only the sign change matters, not the degree of correlation.

The broader regime shift. The contrast between pre- and post-2009 reflects a fundamental change in how monetary policy responded to macro stress. Before 2009, positive SB correlation episodes preceded acute stress events that the Fed resolved through aggressive rate cuts — compressing rate volatility and driving asset price recoveries. After 2009, this changed. The 2022 cycle was driven by supply-side inflation rather than financial stress — the Fed was tightening into persistent price pressures rather than easing in response to a demand shock. The Fed initially misjudged the inflation as transitory, delaying its response before reacting with an unusually aggressive tightening cycle. In this environment, positive SB correlation no longer signaled forthcoming policy relief — it signaled an extended period of rate pressure with no clear resolution horizon, consistent with the sign flip in bond volatility predictability.

Figure 3 summarizes the conditional means of forward bond volatility, bond returns, and 60/40 portfolio returns across positive and negative SB correlation regimes for both subsamples. The sign flip in bond volatility across the two periods is visually apparent, while bond and portfolio returns tend to be higher following positive correlation episodes in both periods.

5. Robustness

5.1 Backtest

We evaluate the practical implications of the SB correlation signal through a simple backtest. At each date, we observe the current SB correlation sign and adjust the portfolio accordingly — reducing equity exposure from 60% to 50% when the correlation turns positive and restoring to 60% when it turns negative. We refer to this rule-based portfolio as the *signal portfolio* throughout, to distinguish it from the *base portfolio* — a static 60/40 allocation that rebalances annually and ignores the SB correlation entirely. Within each year the portfolio drifts freely, rebalancing to the current signal's target weight only at year end or when the signal changes. This implements the de-risking instinct directly and tests whether acting on positive SB correlation adds value relative to a static 60/40 benchmark that rebalances annually.

Table 4 reports annualized returns, volatility, Sharpe ratios, and maximum drawdown for the signal and benchmark portfolios across the full sample, both subsamples, and versions excluding the pre-2000 positive correlation period. The signal portfolio underperforms the static 60/40 benchmark in every period on a return basis — by 42 basis points annually in the full sample, 54 basis points pre-2009, and 31 basis points post-2009. The Sharpe ratio is consistently lower for the signal portfolio in the full sample and post-2009. Maximum drawdown is essentially identical across signal and benchmark in the

full sample and pre-2009, with only minimal improvement post-2009 — the de-risking tilt provided no meaningful protection against the worst drawdowns in the sample, both of which occurred during periods when the signal was active.

The pre-2009 result deserves closer examination. The signal portfolio underperforms the static 60/40 benchmark on return in every period — by 42 basis points annually in the full sample, 54 basis points pre-2009, and 31 basis points post-2009. However, the return difference is partly mechanical: any rule that reduces equity in a sample where equity earned a large positive premium will lose on raw return by construction. The more informative comparison is risk-adjusted performance — and here the signal also fails to add value. The Sharpe ratio of the signal portfolio is below the static benchmark in every period: 0.717 vs 0.737 full sample, 0.532 vs 0.559 pre-2009, and 0.872 vs 0.890 post-2009. The full-sample return cost is driven primarily by the pre-2000 episode where de-risking during a bull market was clearly costly — excluding that episode, the full-sample return difference falls to 18 basis points and the pre-2009 signal portfolio marginally outperforms on Sharpe (0.567 vs 0.559) through modest volatility reduction rather than return improvement.

On drawdown, the signal portfolio shows minimal improvement over the benchmark — identical maximum drawdowns in the full sample and pre-2009, with only 7 basis points of improvement post-2009. This is not surprising: the worst drawdowns in the sample occurred during negative correlation regimes — March 2009 and November 2008 — when bonds were rallying on flight-to-safety and the signal was inactive. The signal was structurally unlikely to protect against those drawdowns regardless of its accuracy.

The post-2009 result warrants a specific caveat: the 31 basis points of underperformance and 10 trades are dominated by the 2022 inflation shock and its aftermath — the only sustained positive correlation episode post-2009. Six of the 10 signal changes occurred in October–November 2021 as the rolling correlation briefly fluctuated around zero before the sustained 2022 episode began, generating portfolio adjustments that reflect threshold crossing rather than genuine regime shifts. Despite the positive correlation correctly signaling elevated rate risk during the 2022 episode, the de-risking tilt still underperformed because the signal turned active before the acute stress peaked, and the subsequent recovery meant the signal portfolio captured less of the rebound than the static benchmark. This is the same single-episode limitation that applies to the post-2009 volatility finding and should be interpreted accordingly — not as independent confirmation of the full-sample conclusion.

Across all specifications and episode compositions, the evidence points in the same direction: universally de-risking when the SB correlation turns positive has not improved risk-adjusted performance. The SB correlation is a regime indicator, not a tactical de-risking trigger.

5.2 Control Variable Robustness

The in-sample findings could reflect omitted variable bias if the SB correlation proxies for other known predictors. We address this through two approaches: bivariate regressions pairing the SB correlation with each control individually, and kitchen sink regressions including all controls simultaneously. All controls are measured over the same 252-day window as the SB correlation. We present two kitchen sink versions: a six-variable specification with macro and risk controls only, and an eight-variable specification that adds current realized bond and equity returns. The dummy and continuous

specifications are not included simultaneously given their correlation of 0.800. All inference uses the paired moving block bootstrap described in Section 2.3.

Control variable motivation. Nine controls are included across the bivariate and kitchen sink specifications. Realized bond volatility captures persistence in rate volatility (Andersen and Bollerslev, 1998) — if the SB correlation simply proxies for current volatility, this control should absorb its predictive content. Realized equity volatility captures broad market uncertainty. Its high correlation with bond volatility (0.694) reflects common sensitivity to macroeconomic stress, and including it as a control tests whether the SB correlation simply proxies for general market turbulence rather than carrying independent information about forward outcomes. The 10-year Treasury yield controls for information in the level of interest rates, which predicts future bond returns through carry and mean reversion (Fama and Bliss, 1987; Cochrane and Piazzesi, 2005). The VIX captures forward-looking risk appetite beyond realized equity volatility — VIX-proxied uncertainty predicts the stock-bond return relation (Connolly, Stivers, and Sun, 2005), while its components contain distinct information about macro-financial conditions (Bekaert, Hoerova, and Lo Duca, 2013). The high inflation dummy — equal to one when trailing 12-month CPI exceeds 3% — captures the monetary regime. Periods of elevated inflation tend to coincide with rising rate uncertainty, pushing the SB correlation positive. Controlling for inflation tests whether the SB correlation carries incremental information beyond the macro environment that generated it. The term spread captures the yield curve slope, a predictor of bond returns and economic activity (Fama and French, 1989). Current 252-day realized bond and equity returns control for return continuation and reversal — equity momentum is documented by Jegadeesh and Titman (1993), while bond mean reversion follows from carry and yield-reversion mechanisms.

Table 5 reports the correlation matrix of all controls. The SB correlation dummy and continuous level are highly correlated with each other (0.800) and with the 10-year yield (0.596 and 0.707), reflecting the common macro regime underlying all three — rising rate environments simultaneously push the SB correlation positive and elevate yields. Equity volatility and VIX are correlated (0.662), and equity volatility and current equity return are negatively correlated (-0.519), consistent with the leverage effect. Current equity and portfolio returns are near-perfectly correlated (0.977) — expected given the 60% equity weight — so portfolio return is excluded from the eight-variable kitchen sink.

Bivariate results — bond volatility. Tables 6A through 6H report bivariate bootstrap results for all four primary outcomes across both specifications. The most important finding is that the sign flip between pre- and post-2009 is preserved across controls for both specifications. Pre-2009, the dummy is significant across all nine controls (p-values 0.000–0.039) and the continuous specification survives all nine controls (p-values 0.003–0.044). No individual control reverses the direction of the relationship in either subsample. Post-2009, the dummy survives five of nine controls — equity volatility, yield, VIX, equity return, and portfolio return — absorbed by bond volatility persistence, high inflation, term spread, and bond return. The continuous specification is more robust post-2009, surviving seven of nine controls with high inflation and term spread the only absorbing controls.

Bivariate results — bond returns. The dummy specification is absorbed only by the 10-year yield in both the full sample ($p=0.150$) and pre-2009 ($p=0.380$) — every other control leaves the dummy significant at conventional levels. The continuous specification reveals something more striking: conditioning on yield reverses the sign of the bond return coefficient in the full sample ($\beta=-0.052$, $p=0.032$) — the only control among the nine that produces this reversal. All other eight controls leave

the continuous specification positive and significant in the full sample. This sign reversal conditional on yield is even more pronounced post-2009 ($\beta=-0.133$, $p=0.001$), confirming that once the yield level is held constant, high SB correlation predicted lower forward bond returns — consistent with the 2022 dynamics where a high-correlation, high-yield environment signaled ongoing rate pressure rather than mean reversion. Unlike the bond return case, yield does not absorb the equity return signal — consistent with the equity return channel operating somewhat independently of the rate level.

Bivariate results — equity returns. The SB correlation shows robust predictability for forward equity returns pre-2009 in both specifications, with both the dummy and continuous surviving all nine controls (dummy p-values 0.016–0.084; continuous p-values 0.001–0.075). Post-2009, the dummy retains significance for six of nine controls — equity volatility, VIX, high inflation, bond return, equity return, and portfolio return (borderline). The continuous specification post-2009 survives only the bond volatility control ($\beta=-0.169$, $p=0.059$) with a negative sign — consistent with elevated rate uncertainty driving both positive correlation and higher equity volatility simultaneously.

Bivariate results — portfolio returns. The portfolio return dummy shows the broadest bivariate robustness in the paper — surviving all nine controls full sample and pre-2009 — though as documented in Table 3B, this result is concentrated in the pre-2000 positive correlation episode. The dummy specification survives all nine controls in both the full sample (p-values 0.005–0.028) and the pre-2009 subsample (p-values 0.007–0.035) — no single control, including yield, absorbs the signal. The continuous specification is similarly robust pre-2009, surviving all nine controls (p-values 0.000–0.035). Post-2009, the dummy retains significance for six of nine controls — equity volatility, VIX, high inflation, bond return, equity return, and portfolio return (borderline). The continuous specification shows mostly negative coefficients post-2009 across all controls — consistent with the sign reversal observed in the kitchen sink — though none reaches conventional significance.

Bivariate results — equity and portfolio volatility. Neither outcome shows consistent predictability from the SB correlation across any control, specification, or period — confirming their exclusion from the main analysis. Detailed results are reported in Table 3A for completeness.

Kitchen sink — six macro controls. Tables 7A and 7C report the six-variable kitchen sink including all macro and risk controls simultaneously, with bootstrap inference applied only to the SB correlation coefficient.

For the dummy specification (Table 7A), bond volatility is marginally significant in the full-sample kitchen sink ($p=0.051$) and borderline pre-2009 ($p=0.095$) — the joint inclusion of all six controls substantially weakens the bond volatility signal even though no individual control absorbed it in the bivariate analysis, suggesting the SB correlation's bond volatility content overlaps with the combined information in yield, volatility, and inflation measures rather than any single one of them. Bond returns are insignificant throughout. Equity and portfolio returns are the most robust outcomes — both significant in the full sample ($p=0.012$ and $p=0.007$ respectively) and pre-2009 ($p=0.031$ and $p=0.021$ respectively). Post-2009, both are correctly insignificant.

The continuous specification (Table 7C) tells a stronger and more complete story. Bond volatility pre-2009 survives the kitchen sink ($\beta=-0.0016$, $p=0.027$) — indicating that the degree of correlation carries information about forward rate volatility beyond the joint macro environment. Bond returns are

borderline significant in the full sample ($p=0.070$) but insignificant pre-2009 ($p=0.390$), and become highly significant and negative post-2009 ($\beta=-0.134$, $p=0.000$) — once the macro environment is held constant, high SB correlation predicted lower forward bond returns in the post-2009 era, consistent with a high-correlation, high-yield environment signaling ongoing rate pressure rather than mean reversion. Equity returns are significant full sample ($p=0.036$) and strongly significant pre-2009 ($p=0.003$), with a borderline negative coefficient post-2009 ($p=0.084$) — consistent with the sign reversal visible in the bivariate analysis. Portfolio returns are strongly significant pre-2009 ($\beta=0.355$, $p=0.001$) and significantly negative post-2009 ($\beta=-0.151$, $p=0.011$) — the sign reversal is statistically confirmed in the kitchen sink.

Kitchen sink — eight controls including returns. Tables 7B and 7D augment the six macro controls with current 252-day realized bond and equity returns.

For the dummy specification (Table 7B), bond volatility remains borderline full sample ($p=0.054$) and loses significance pre-2009 ($p=0.138$). Bond returns are borderline significant pre-2009 ($p=0.086$) but insignificant in the full sample and post-2009. Equity and portfolio returns remain significant full sample ($p=0.009$ and $p=0.005$ respectively) and pre-2009 ($p=0.028$ and $p=0.018$ respectively) — the most robust results in the paper survive the addition of return momentum controls.

For the continuous specification (Table 7D), bond volatility pre-2009 strengthens considerably ($\beta=-0.0020$, $p=0.008$) — the addition of return controls sharpens rather than weakens the bond volatility signal. Bond returns pre-2009 remain insignificant ($p=0.496$) — consistent with the yield level and return momentum jointly absorbing the bond return signal. Bond returns post-2009 remain highly significant and negative ($\beta=-0.102$, $p=0.007$). Equity returns remain significant pre-2009 ($p=0.007$) and full sample ($p=0.029$). Portfolio returns remain strongly significant pre-2009 ($\beta=0.354$, $p=0.003$) and borderline negative post-2009 ($\beta=-0.125$, $p=0.069$) — the sign reversal persists even after adding return momentum controls.

The continuous specification's significant negative post-2009 coefficient might appear to suggest that a de-risking rule based on correlation level should add value — yet the backtest in Section 5.1 shows otherwise. The regression evidence concerns the incremental predictive content of the continuous SB correlation after conditioning on the macro environment, whereas the backtest evaluates a simple implementable allocation rule based solely on the sign of the SB correlation. The two exercises therefore address related but distinct questions — the regression identifies a conditional statistical relationship, while the backtest tests whether that relationship can be exploited through a practical allocation rule without the benefit of macro controls.

Results from the eight-variable kitchen sink should be interpreted with caution given moderate collinearity among the return controls. The six-variable kitchen sink is the primary robustness evidence, and the eight-variable specification serves as a supplementary check on the incremental role of return momentum.

Taken together, the kitchen sink results reveal an important asymmetry between the two specifications. The dummy specification — testing whether the sign of the correlation matters — shows robust portfolio and equity return predictability in the full sample and pre-2009 subsample across both kitchen sink versions, with bond volatility only marginally significant. The continuous specification — testing

whether the degree of correlation matters — reveals a more complete regime reversal story: bond volatility pre-2009 survives the kitchen sink, portfolio returns flip from strongly positive pre-2009 to significantly negative post-2009, and bond returns turn strongly negative post-2009 conditional on macro controls. This suggests that the magnitude of the SB correlation, not just its sign, carries independent information about the nature of the post-2009 regime shift.

The kitchen sink tables report only the SB correlation coefficient and its bootstrap inference, since our primary focus is on whether the SB correlation carries independent predictive content after conditioning on the macro environment. We do not report formal inference on the individual control coefficients — our focus throughout is on whether the SB correlation carries independent predictive content after conditioning on the macro environment, and the control coefficients are included as conditioning variables rather than objects of inference in their own right.

6. Economic Interpretation and Practical Implications

6.1 The SB Correlation as a Macro Regime Indicator

The evidence presented in this paper suggests that the stock-bond correlation is best understood not as a standalone tactical signal but as a regime indicator — one that reflects the prevailing macro environment and whose implications for forward outcomes depend critically on which regime is active. This section develops the economic intuition behind the empirical findings and draws out their practical implications.

The SB correlation is endogenous to the macro environment. It turns positive when a common factor simultaneously pressures both stock and bond prices — most commonly an inflation shock that raises discount rates and compresses earnings multiples at the same time, or a broad-based deleveraging episode where simultaneous selling pressure across both asset classes overwhelms the usual diversification mechanism. It turns negative when equity-specific shocks dominate — growth scares or financial stress that trigger flight-to-safety demand for bonds while equities fall, allowing bonds to serve as a hedge against equity drawdowns. The stagflationary case — where weak growth pressures equities while elevated inflation pressures bonds — also generates positive correlation, as both asset classes face simultaneous headwinds from different sources. The correlation is therefore a symptom of the macro environment, not a cause of good or bad outcomes. This distinction has practical importance: an investor who observes a positive SB correlation is learning something about the current macro regime, not receiving a direct signal about future returns or volatility.

A related misconception is worth addressing. Positive SB correlation does not require both asset classes to move in the same direction or with the same magnitude on any given day — it simply means their returns have been positively correlated over the past 252 days. Crucially, it also carries no direct implication about the direction of future returns — a positive correlation reading tells you that stocks and bonds have moved together over the past year, but says nothing about whether future joint movement will be upward or downward. While the SB correlation exhibits some persistence — positive correlation episodes in our sample have lasted from several months to several years — it also shows clear reversals, most notably the transition from persistently negative correlation during 2009–2021 to the sharply positive correlation of the 2022 inflation shock. The correlation sign is therefore informative about the current macro regime but not a reliable guide to future return direction.

We acknowledge upfront that positive correlation episodes are rare — our sample contains only five distinct sustained episodes over 30 years, four before 2009 and one after. As empiricists, we work with the data available and are explicit about what the evidence can and cannot support. The pre-2009 positive correlation sample contains episodes driven by different mechanisms — the pre-2000 episodes reflected a post-tightening recovery in a benign macro environment, while the 2005–2007 episodes preceded the GFC. To assess whether the portfolio return finding depends on the mechanism, we exclude the pre-2000 positive correlation period and rerun the analysis (Table 3B). The statistical finding weakens — portfolio return predictability loses significance — and the backtest shows the de-risking signal produces a marginally higher Sharpe ratio during the remaining pre-2009 episodes through modest volatility reduction rather than return improvement. The bond volatility and bond return findings, by contrast, survive the exclusion and strengthen. Taken together, the evidence suggests that the cost of de-risking is most pronounced during benign positive correlation environments like the pre-2000 period, while the signal is roughly neutral during stress-preceded episodes — but universally de-risking when the SB correlation turns positive has not been the right idea across the full sample.

6.2 The Pre-2009 Mechanism

Before 2009, positive SB correlation episodes preceded rather than coincided with acute stress. The pre-2000 positive correlation period encompassed two distinct episodes. The first (1995–1998) reflected a post-tightening recovery — both stocks and bonds rallied as the Fed eased from the 1994 tightening cycle in a benign macro environment. The second (1999–2000) reflected the tail end of the technology boom — positive correlation persisted as rising rate expectations pressured bonds while equities continued their run, before the correlation turned negative as the dot-com bust accelerated and bonds began rallying on flight-to-safety demand. The 2005–2007 episodes reflected the build-up of credit excesses and rising rate pressures before the GFC — both stocks and bonds faced common discount rate pressure. When the acute stress subsequently materialized — the dot-com bust from 2000 and the GFC from 2008 — the SB correlation turned sharply negative as bonds rallied on flight-to-safety demand while equities fell.

These pre-2009 episodes shared one critical feature regardless of their specific mechanism: the Federal Reserve retained sufficient policy flexibility to respond aggressively when stress materialized. During the dot-com bust, the Fed cut rates from 6.5% to 1.0%. During the GFC, it cut rates to the zero lower bound and deployed quantitative easing and emergency lending facilities. The forward 252-day bond volatility outcomes following positive correlation episodes were below average because they captured the subsequent resolution of those stress episodes — aggressive Fed easing compressed rate volatility well below its historical average. The forward bond and portfolio return outcomes were above average for the same reason — easing drove bond prices up and eventually stabilized equity markets.

This mechanism explains why the pre-2009 findings survive the exclusion of the pre-2000 episode for bond volatility and bond returns but not for portfolio returns. The bond volatility compression was driven by Fed easing following the 2005–2007 episodes — episodes that fit the stress-resolution narrative cleanly. The portfolio return finding, by contrast, depended more heavily on the pre-2000 bull market where both asset classes rose simultaneously for different reasons in a benign environment.

6.3 The Post-2009 Mechanism

After 2009, the mechanism changed fundamentally. The reversal in the predictive relationship reflects a combination of three factors that collectively altered the policy transmission channel through which the pre-2009 pattern operated.

First, the zero lower bound eliminated the primary tool through which the Fed had historically resolved stress episodes. With rates at or near zero from 2009 to 2015 and again from 2020 to 2022, the Fed could no longer respond to a positive SB correlation episode by cutting rates aggressively. The policy backstop that had allowed the Fed to resolve positive correlation episodes through aggressive easing was no longer fully operational.

Second, the nature of the macro shock that drove the most prominent post-2009 positive correlation episode was fundamentally different. The 2022 hiking cycle was a response to supply-side inflation — not a demand or financial stress shock — meaning the Fed was tightening rather than easing into the positive correlation regime. This was the opposite of the pre-2009 playbook. The Fed initially misjudged the inflation as transitory, delaying its response before reacting with an unusually aggressive tightening cycle. Rather than cutting rates to resolve the joint stress, the Fed was raising rates, which extended and deepened it. Bond volatility rose rather than fell, and the positive correlation regime persisted well into 2024 — one of the most sustained episodes among the five positive correlation periods observed in our sample.

Third, the broader macro context amplified the rate volatility. Persistent inflation, widening budget deficits, geopolitical uncertainty, and trade policy instability created an environment where the terminal rate was unclear and rate expectations were volatile for an extended period. The positive SB correlation in this environment was not a signal of impending resolution — it was a signal of regime uncertainty.

6.4 The Yield Absorption Finding

A notable result from the control variable analysis is that the 10-year yield absorbs the bond return predictability of the SB correlation dummy in both the full sample and pre-2009 subsample. This finding deserves interpretation rather than dismissal as a statistical artifact.

The SB correlation and the yield level are correlated (0.596–0.707) because they are both reflections of the same macro regime. Rising rate environments simultaneously push the SB correlation positive — as higher discount rates pressure both stocks and bonds — and set up future bond returns through carry and mean reversion. When the yield level is controlled for, the SB correlation's incremental information about future bond returns largely disappears pre-2009 because the yield has already captured the relevant regime information.

Post-2009, conditioning on yield reveals something different. Rather than simply disappearing, the continuous SB correlation turns highly significant and negative once yield is controlled for ($\beta = -0.133$, $p = 0.000$ in the six-variable kitchen sink) — conditional on the yield level, a higher SB correlation predicted lower forward bond returns in the post-2009 era. This is consistent with the 2022 dynamics, where a high-correlation, high-yield environment signaled ongoing rate pressure rather than the mean reversion that yield alone would suggest.

This does not mean the SB correlation is uninformative about bond returns — it means the two variables capture related but distinct information that combines differently across regimes. For a practitioner building a bond return model, the yield level is the more direct variable pre-2009, but the SB correlation adds conditional information post-2009 that yield alone misses.

6.5 The Portfolio Return Finding

The dummy specification survives all nine bivariate controls in the full sample and pre-2009 subsample — the broadest bivariate survival of any outcome in the paper — and remains significant in the six-variable kitchen sink in the full sample ($p=0.007$) and pre-2009 ($p=0.021$).

The reason the portfolio return finding survives where the bond return finding does not is economically intuitive. The portfolio return captures both the bond return and the equity return, and the SB correlation predicted higher returns in both asset classes pre-2009. The yield level absorbs the bond return channel but leaves the equity channel intact, and the SB correlation's prediction of the equity component survives nearly all controls.

However the portfolio return finding is not uniformly robust. As documented in Table 3B, portfolio return predictability loses statistical significance when the pre-2000 positive correlation period is excluded — the coefficient remains positive but insignificant. This confirms that the portfolio return finding is concentrated in the pre-2000 post-tightening recovery episode rather than being a general property of all positive correlation regimes. The bond volatility and bond return findings, by contrast, strengthen when that episode is excluded.

The continuous specification reveals an additional pattern: portfolio return predictability survives the kitchen sink pre-2009 ($\beta=0.355$, $p=0.001$) and turns significantly negative post-2009 ($\beta=-0.151$, $p=0.011$) — the sign reversal is statistically confirmed even after controlling for the full macro environment. This mirrors the bond volatility sign flip and extends the regime-dependence finding to portfolio returns: the degree of positive SB correlation predicted higher portfolio returns before 2009 and lower portfolio returns after 2009, consistent with the broader post-2009 regime shift where the Fed easing backstop was absent.

For practitioners, the portfolio return implication is more nuanced than the pre-2009 results alone suggest. The SB correlation sign carried meaningful information about forward portfolio returns in an era of conventional monetary policy and active Fed easing. In the post-2009 environment, the relationship did not merely weaken — for the continuous specification, it reversed. The honest practitioner message is that observing positive SB correlation has historically not been a reliable reason to de-risk, but the forward return environment it signals has shifted fundamentally since 2009.

6.6 Practical Implications

Three practical implications follow from the analysis.

First, the SB correlation should not be used as a standalone tactical de-risking signal. The backtest confirms this directly — reducing equity from 60% to 50% when the correlation turns positive has cost approximately 42 basis points of annual return with no meaningful improvement in drawdown

protection or risk-adjusted performance over the full sample. The cost is most pronounced during benign positive correlation environments like the pre-2000 post-tightening recovery, where de-risking during a sustained bull market was clearly wrong. During the stress-preceded episodes (2005–2007), the signal was roughly neutral on a risk-adjusted basis. Across all episodes and specifications, the evidence consistently points in the same direction — universally de-risking when the SB correlation turns positive has not been the right idea.

Second, the regime context matters more than the correlation sign. The same positive correlation reading meant different things pre- and post-2009 for bond volatility. An investor in 2007 seeing a positive SB correlation could reasonably expect lower forward rate volatility — the stress would eventually be resolved by Fed easing. An investor in 2022 seeing the same positive reading was in a fundamentally different macro environment where higher rate volatility was the more likely outcome. The key conditioning variables are the monetary policy regime, the inflation environment, and the current yield level. A positive SB correlation arising during an easing cycle with subdued inflation carries very different forward implications from one arising during a tightening cycle driven by persistent price pressures.

A more promising tactical signal may be the transition from positive to negative SB correlation — the point at which bonds begin to reassert their diversification role after a positive correlation episode. In both the dot-com and pre-GFC episodes, this transition preceded the acute stress phase by several months, potentially offering a more timely signal for drawdown management than the presence of positive correlation itself. However we caution against over-interpreting this observation. The number of such transitions in our sample is too small for formal statistical inference, and the mechanism driving each transition has differed across episodes. More importantly, knowing that a transition from positive to negative correlation has historically preceded stress does not tell us when the next transition will occur, how severe the subsequent stress will be, or whether the post-2009 monetary regime will produce the same dynamics as the pre-2009 era. We leave formal testing of this hypothesis for future work.

Third, the SB correlation is most informative as one input in a multivariate regime classification framework rather than as a standalone signal. The control variable analysis shows that pairing it with yield, VIX, the inflation regime, and current return momentum produces more stable and interpretable predictive relationships than the univariate specification alone. Future work might explore the incremental value of the SB correlation within a formal regime-switching model that conditions on these macro variables jointly — an extension that could directly inform the capital market assumptions used in strategic asset allocation and the tactical overlays applied to 60/40 and other balanced mandates.

Last but not least, our findings should not be interpreted as arguing against diversification. A positive SB correlation unambiguously reduces the hedging benefit of bonds in a balanced portfolio — when stocks and bonds move together, the diversification mechanism is impaired. However, reduced diversification benefit does not necessarily translate into reduced portfolio returns, as our evidence shows that positive SB correlation episodes were historically followed by above-average bond and portfolio returns, particularly before 2009. What our results suggest, therefore, is that investors should resist the temptation to use the SB correlation sign as a standalone signal to adjust portfolio allocations without first understanding the broader monetary and inflation regime in which the positive correlation has emerged.

7. Conclusion

This paper asks whether observing a positive stock-bond correlation should prompt a multi-asset investor to de-risk a balanced portfolio. Using daily returns of the MSCI USA Index and the Bloomberg US Treasury Total Return Index from January 1995 through June 2026 — with forward outcome windows computed through June 2025 — we find that the answer is consistently no — but the reasons why, and what the signal does tell you, depend critically on the monetary policy regime.

Our primary finding is a clean regime reversal in the SB correlation's predictive relationship for forward bond volatility around 2009. Before 2009, positive SB correlation predicted lower forward bond volatility — positive correlation episodes preceded stress events that were subsequently resolved by aggressive Fed easing, compressing rate volatility in the forward window. After 2009, the sign reverses: positive SB correlation predicts higher forward bond volatility, reflecting a regime where the traditional policy backstop was constrained by the zero lower bound or responding to persistent inflation rather than financial stress. This sign flip survives all nine bivariate controls in both directions and is confirmed using the paired moving block bootstrap to address the severe serial correlation induced by daily overlapping 252-day windows. It is the most defensible and mechanism-driven finding in the paper.

Our secondary finding is that positive SB correlation has historically not been a reliable de-risking trigger on return grounds. In every pre-2009 positive correlation episode, forward 60/40 returns were above their historical average — regardless of what drove the correlation positive. A simple backtest confirms this directly: the signal portfolio did not improve risk-adjusted performance in any period or episode composition. The Sharpe ratio of the signal portfolio is below the static 60/40 benchmark across the full sample, pre-2009, and post-2009. The return difference — 42 basis points full sample, falling to 18 basis points when the pre-2000 episode is excluded — is partly mechanical, since any rule that reduces equity in a sample where equity earned a large positive premium will lose on raw return by construction. The post-2009 backtest result — 31 basis points of underperformance, 10 trades — is dominated by the 2022 inflation shock, with six of the 10 signal changes reflecting brief threshold crossings in October–November 2021 rather than genuine regime shifts. It is a second look at the same event rather than independent confirmation of the full-sample conclusion.

We are explicit about the limitations of the return finding. Excluding the pre-2000 positive correlation period — which encompassed a post-tightening recovery and the tail end of the technology boom in a benign macro environment — the portfolio and equity return statistical findings lose significance. The bond volatility and bond return findings, by contrast, survive and strengthen. The portfolio return finding is therefore best understood as an empirical observation about episode outcomes rather than a statistically robust prediction: in every pre-2009 positive correlation episode forward portfolio returns were above average, but the finding is concentrated in the pre-2000 period and does not generalize cleanly across mechanistically distinct episodes.

The control variable analysis reveals additional nuances. The 10-year yield absorbs the bond return predictability of the SB correlation dummy pre-2009 — both variables reflecting the same rising-rate macro regime. Conditional on yield, the continuous SB correlation turns highly significant and negative for bond returns post-2009 ($p=0.000$ in the six-variable kitchen sink), consistent with the 2022 dynamics where high correlation alongside high yields signaled ongoing rate pressure rather than mean reversion.

The continuous specification also reveals a statistically confirmed sign reversal in portfolio returns — strongly positive pre-2009 ($\beta=0.355$, $p=0.001$) and significantly negative post-2009 ($\beta=-0.151$, $p=0.011$) — extending the regime-dependence finding beyond bond volatility to portfolio returns.

Three practical implications follow. First, the SB correlation is not a reliable de-risking trigger — the backtest confirms this across all specifications and episode compositions on a risk-adjusted basis. Second, the bond volatility signal is the most actionable finding, but its interpretation depends on the monetary policy regime: lower volatility is the historical pre-2009 implication, higher volatility the post-2009 implication. Third, the SB correlation is most informative as one input in a broader regime assessment that incorporates the inflation environment, the yield level, and the direction of monetary policy.

Several limitations point toward fruitful directions for future research. The analysis is confined to US markets — international evidence, particularly from Japan's decades-long zero lower bound experience and the ECB's negative rate period, would provide important external validity for the regime-dependence hypothesis and the cross-country panel needed for a top-field journal submission. The univariate and bivariate framework leaves open the question of whether the SB correlation adds incremental value within a formal multivariate regime-switching model incorporating yield level, inflation, and growth proxies jointly.

Our findings should not be interpreted as arguing against diversification. A positive SB correlation unambiguously reduces the hedging benefit of bonds in a balanced portfolio. However, reduced diversification benefit does not necessarily translate into reduced portfolio returns — history shows that positive correlation episodes were consistently followed by above-average returns across both asset classes before 2009, and the de-risking instinct would have been costly in every pre-2009 episode regardless of the mechanism driving the correlation positive. What our results suggest is that investors should understand what is driving the positive correlation before acting on it — the correlation sign alone is not sufficient information to justify a portfolio reallocation.

References

- Andersen, T.G., and T. Bollerslev. 1998. "Answering the Skeptics: Yes, Standard Volatility Models Do Provide Accurate Forecasts." *International Economic Review* 39 (4): 885–905.
- Baele, L., G. Bekaert, and K. Inghelbrecht. 2010. "The Determinants of Stock and Bond Return Comovements." *Review of Financial Studies* 23 (6): 2374–2428.
- Bekaert, G., M. Hoerova, and M. Lo Duca. 2013. "Risk, Uncertainty and Monetary Policy." *Journal of Monetary Economics* 60 (7): 771–788.
- Campbell, J.Y., and J. Ammer. 1993. "What Moves the Stock and Bond Markets? A Variance Decomposition for Long-Term Asset Returns." *Journal of Finance* 48 (1): 3–37.
- Cochrane, J.H., and M. Piazzesi. 2005. "Bond Risk Premia." *American Economic Review* 95 (1): 138–160.

Connolly, R., C. Stivers, and L. Sun (2005), "Stock Market Uncertainty and the Stock-Bond Return Relation," *Journal of Financial and Quantitative Analysis* 40(1): 161–194.

Fama, E.F., and R.R. Bliss. 1987. "The Information in Long-Maturity Forward Rates." *American Economic Review* 77 (4): 680–692.

Fama, E.F., and K.R. French. 1989. "Business Conditions and Expected Returns on Stocks and Bonds." *Journal of Financial Economics* 25 (1): 23–49.

Gagnon, J., M. Raskin, J. Remache, and B. Sack. 2011. "The Financial Market Effects of the Federal Reserve's Large-Scale Asset Purchases." *International Journal of Central Banking* 7 (1): 3–43.

Goyal, A., and I. Welch. 2008. "A Comprehensive Look at the Empirical Performance of Equity Premium Prediction." *Review of Financial Studies* 21 (4): 1455–1508.

Ilmanen, A. 2003. "Stock-Bond Correlations." *Journal of Fixed Income* 13 (2): 55–66.

Jegadeesh, N., and S. Titman. 1993. "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency." *Journal of Finance* 48 (1): 65–91.

Krishnamurthy, A., and A. Vissing-Jorgensen. 2011. "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy." *Brookings Papers on Economic Activity* 2011 (2): 215–287.

Künsch, H.R. 1989. "The Jackknife and the Bootstrap for General Stationary Observations." *Annals of Statistics* 17 (3): 1217–1241.

Liu, R.Y., and K. Singh. 1992. "Moving Blocks Jackknife and Bootstrap Capture Weak Dependence." In *Exploring the Limits of Bootstrap*, edited by R. LePage and L. Billard, 225–248. New York: Wiley.

Molenaar, R., T. Senechal, L. Swinkels, and Z. Wang. 2024. "Empirical Evidence on the Stock-Bond Correlation." *Financial Analysts Journal* 80 (3): 17–36.

Newey, W.K., and K.D. West. 1987. "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix." *Econometrica* 55 (3): 703–708.

Table 1: Descriptive Statistics

Variable	Mean	Std Dev	Min	Max	N
SB Correlation	-0.1804	0.3026	-0.6774	0.6007	7,696
SB Corr Dummy (>0)	0.2574	0.4372	0.0000	1.0000	7,696
Fwd Bond Volatility	0.0028	0.0008	0.0015	0.0048	7,696
Fwd Bond Return	0.0387	0.0501	-0.1515	0.1564	7,696
Fwd Equity Return	0.1128	0.1711	-0.4770	0.8082	7,696
Fwd 60/40 Return	0.0836	0.0976	-0.2721	0.3783	7,696
Bond Volatility (z)	-0.0000	1.0000	-1.6672	2.4790	7,696
Equity Volatility (z)	-0.0000	1.0000	-1.4358	3.7864	7,696
10Y Yield (z)	-0.0000	1.0000	-2.0606	2.2351	7,696
VIX (z)	0.0000	1.0000	-1.3585	7.6970	7,696
High Inflation Dummy	0.2998	0.4582	0.0000	1.0000	7,696
Term Spread (z)	0.0000	1.0000	-2.1625	2.0457	7,696

Table 2: Full Sample Univariate Results — Bootstrap Inference

Outcome	Dummy				Continuous			
	β	(t-Boot)	p-Boot	R ²	β	(t-Boot)	p-Boot	R ²
Bond Volatility	-0.0001	(-0.331)	0.365	0.0019	-0.0002	(-0.524)	0.278	0.0072
Bond Return	0.0346***	(2.667)	0.003	0.0910	0.0465***	(2.195)	0.005	0.0786
Equity Return	0.0710*	(1.331)	0.056	0.0329	0.0622	(0.626)	0.143	0.0121
60/40 Return	0.0561**	(1.856)	0.013	0.0632	0.0551*	(0.945)	0.069	0.0293
<i>Equity Volatility</i>	<i>-0.0010</i>	<i>(-0.871)</i>	<i>0.167</i>	<i>0.0087</i>	<i>-0.0022</i>	<i>(-0.904)</i>	<i>0.162</i>	<i>0.0210</i>
<i>Portfolio Volatility</i>	<i>-0.0000</i>	<i>(-0.002)</i>	<i>0.475</i>	<i>0.0000</i>	<i>-0.0002</i>	<i>(-0.186)</i>	<i>0.388</i>	<i>0.0009</i>

t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness.

Table 3A: Subsample Results — Bootstrap Inference

Outcome	Specification	Pre-2009				Post-2009			
		β	(t-Boot)	p-Boot	R ²	β	(t-Boot)	p-Boot	R ²
Bond Volatility	Dummy	-0.0008***	(-3.550)	0.000	0.2446	0.0008*	(2.084)	0.080	0.1103
	Continuous	-0.0015***	(-3.412)	0.010	0.4400	0.0015**	(2.108)	0.019	0.1719
Bond Return	Dummy	0.0348***	(3.080)	0.001	0.1709	0.0085	(0.277)	0.185	0.0039
	Continuous	0.0486**	(2.310)	0.047	0.1571	-0.0161	(-0.352)	0.393	0.0057
Equity Return	Dummy	0.1376**	(1.673)	0.025	0.1082	0.0549*	(0.745)	0.096	0.0243
	Continuous	0.2504**	(1.485)	0.026	0.1684	-0.0597	(-0.486)	0.308	0.0116
60/40 Return	Dummy	0.0944**	(2.013)	0.011	0.1573	0.0373**	(0.696)	0.046	0.0308
	Continuous	0.1645**	(1.731)	0.012	0.2246	-0.0391	(-0.474)	0.313	0.0136
<i>Equity Volatility</i>	<i>Dummy</i>	<i>-0.0023**</i>	<i>(-1.258)</i>	<i>0.042</i>	<i>0.0429</i>	<i>-0.0007</i>	<i>(-0.406)</i>	<i>0.353</i>	<i>0.0040</i>
	<i>Continuous</i>	<i>-0.0058*</i>	<i>(-1.297)</i>	<i>0.051</i>	<i>0.1312</i>	<i>-0.0005</i>	<i>(-0.154)</i>	<i>0.407</i>	<i>0.0008</i>
<i>Portfolio Volatility</i>	<i>Dummy</i>	<i>-0.0006</i>	<i>(-0.728)</i>	<i>0.105</i>	<i>0.0145</i>	<i>0.0002</i>	<i>(0.219)</i>	<i>0.390</i>	<i>0.0011</i>
	<i>Continuous</i>	<i>-0.0018*</i>	<i>(-0.921)</i>	<i>0.089</i>	<i>0.0677</i>	<i>0.0008</i>	<i>(0.507)</i>	<i>0.325</i>	<i>0.0089</i>

t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness.

Table 3B: Pre-2009 Regression Results — Full Sample vs Excluding 1995–2000 Positive Correlation Episode

Outcome	Specification	Full Pre-2009		Excl. 1995–2000		Result
		β	p-Boot	β	p-Boot	
Bond Volatility	Dummy	-0.0008***	0.000	-0.0008***	0.001	Yes ✓
	Continuous	-0.0015***	0.010	-0.0025***	0.001	Yes ✓
Bond Return	Dummy	0.0348***	0.001	0.0364***	0.007	Yes ✓
	Continuous	0.0486**	0.047	0.0610**	0.039	Yes ✓
60/40 Return	Dummy	0.0944**	0.011	0.0083	0.475	No ✗
	Continuous	0.1645**	0.012	0.0095	0.424	No ✗
Equity Return	Dummy	0.1376**	0.025	-0.0058	0.429	Sign reversal
	Continuous	0.2504**	0.026	-0.0068	0.549	Sign reversal

Full Pre-2009: January 1995 to December 2008 (n = 3,402). Excl. 1995–2000: positive correlation episodes before January 1, 2000 are excluded (n = 2,645). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Result: Yes = survives at 10% level with same sign; No = insignificant but same sign; Sign reversal = sign changes upon exclusion.

Table 4: Backtest — De-risking on Positive SB Correlation vs Static 60/40 Portfolio

Period	Metric	Signal (50/50)	Base (60/40)
Full Sample	Annualized Return	7.39%	7.81%
	Annualized Volatility	10.31%	10.60%
	Sharpe Ratio	0.717	0.737
	Maximum Drawdown	-30.57%	-30.69%
	Number of Trades	35	—
Full Sample (Excl. 1995–2000)	Annualized Return	7.63%	7.81%
	Annualized Volatility	10.44%	10.60%
	Sharpe Ratio	0.731	0.737
	Maximum Drawdown	-30.57%	-30.69%
	Number of Trades	34	—
Pre-2009	Annualized Return	5.60%	6.14%
	Annualized Volatility	10.53%	10.99%
	Sharpe Ratio	0.532	0.559
	Maximum Drawdown	-26.30%	-26.43%
	Number of Trades	25	—
Pre-2009 (Excl. 1995–2000)	Annualized Return	6.13%	6.14%
	Annualized Volatility	10.82%	10.99%
	Sharpe Ratio	0.567	0.559
	Maximum Drawdown	-26.30%	-26.43%
	Number of Trades	24	—
Post-2009	Annualized Return	8.84%	9.15%
	Annualized Volatility	10.13%	10.28%
	Sharpe Ratio	0.872	0.890
	Maximum Drawdown	-20.84%	-20.91%
	Number of Trades	10	—

Signal portfolio reduces equity from 60% to 50% when the 252-day rolling SB correlation turns positive, rebalancing immediately on signal change and resetting to the current signal weight at each year end. Base portfolio maintains static 60/40 with annual rebalancing. Excl. 1995-2000 = positive correlation episodes before January 1, 2000 excluded from signal. Red figure indicates signal Sharpe ratio exceeds base.

Table 5: Correlation Matrix of Control Variables

Variable	SB Dummy	Bond Vol	Equity Vol	SB Corr	Yield 10Y	VIX	High Infl.	Term Spread	Bond Ret	Equity Ret	Port Ret
SB Dummy	1.000										
Bond Vol	0.097	1									
Equity Vol	-0.211	0.694	1								
SB Corr	0.800	-0.01	-0.34	1							
Yield 10Y	0.596	0.043	-0.142	0.707	1						
VIX	-0.145	0.444	0.662	-0.176	0.02	1					
High Infl.	0.275	0.214	-0.054	0.252	0.165	0.036	1				
Term Spread	-0.588	0.083	0.236	-0.562	-0.297	0.146	-0.321	1			
Bond Ret	-0.112	0.02	0.285	-0.202	0.15	0.339	-0.212	0.14	1		
Equity Ret	0.263	-0.37	-0.519	0.347	0.078	-0.507	-0.154	-0.129	-0.21	1	
Port Ret	0.250	-0.37	-0.465	0.317	0.115	-0.45	-0.208	-0.104	-0.004	0.977	1

Table 6A: Bivariate Controls — Bond Volatility (Panel A: Dummy)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	-0.0002	(-0.967)	0.166	-0.0006**	(-2.163)	0.013	0.0003	(0.777)	0.260
Equity Vol	0.0000	(0.218)	0.377	-0.0004**	(-1.995)	0.039	0.0008**	(2.354)	0.037
Yield 10Y	-0.0002	(-0.556)	0.298	-0.0006***	(-2.828)	0.002	0.0008*	(1.920)	0.074
VIX	0.0000	(0.100)	0.439	-0.0006***	(-2.955)	0.005	0.0008**	(2.544)	0.021
High Inflation	-0.0003*	(-1.361)	0.095	-0.0008***	(-3.374)	0.000	0.0001	(0.173)	0.492
Term Spread	-0.0002	(-0.889)	0.183	-0.0005**	(-1.987)	0.027	0.0003	(0.622)	0.327
Bond Ret (curr)	-0.0001	(-0.247)	0.396	-0.0006***	(-2.822)	0.002	0.0006	(1.604)	0.115
Equity Ret (curr)	0.0001	(0.455)	0.313	-0.0004**	(-2.162)	0.024	0.0008**	(2.370)	0.040
Port Ret (curr)	0.0001	(0.418)	0.310	-0.0005**	(-2.517)	0.012	0.0007**	(2.319)	0.046

Panel A: Dummy. Dependent variable: Forward Bond Volatility. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6B: Bivariate Controls — Bond Volatility (Panel B: Continuous)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	-0.0002	(-0.605)	0.256	-0.0013**	(-2.602)	0.025	0.0011*	(1.496)	0.082
Equity Vol	0.0001	(0.177)	0.435	-0.0010**	(-1.731)	0.044	0.0017***	(2.457)	0.007
Yield 10Y	-0.0006	(-0.758)	0.228	-0.0022***	(-3.497)	0.003	0.0017**	(1.840)	0.018
VIX	-0.0000	(-0.107)	0.449	-0.0012**	(-3.181)	0.010	0.0016***	(2.472)	0.002
High Inflation	-0.0005	(-1.319)	0.111	-0.0015***	(-3.341)	0.009	0.0004	(0.440)	0.284
Term Spread	-0.0005	(-1.054)	0.124	-0.0013**	(-2.328)	0.041	0.0010	(1.213)	0.157
Bond Ret (curr)	-0.0002	(-0.437)	0.283	-0.0012***	(-3.736)	0.003	0.0015*	(2.046)	0.075
Equity Ret (curr)	0.0001	(0.318)	0.372	-0.0011**	(-2.381)	0.035	0.0016***	(2.320)	0.007
Port Ret (curr)	0.0001	(0.226)	0.384	-0.0013**	(-2.673)	0.025	0.0015**	(2.182)	0.010

Panel B: Continuous. Dependent variable: Forward Bond Volatility. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6C: Bivariate Controls — Bond Return (Panel A: Dummy)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0361***	(2.958)	0.002	0.0358***	(2.698)	0.010	0.0173	(0.470)	0.217
Equity Vol	0.0337***	(2.512)	0.004	0.0369***	(3.058)	0.001	0.0079	(0.257)	0.208
Yield 10Y	-0.0118	(-0.933)	0.150	0.0064	(0.404)	0.380	-0.0583**	(-3.225)	0.019
VIX	0.0346***	(2.592)	0.003	0.0363***	(3.266)	0.001	0.0063	(0.211)	0.239
High Inflation	0.0393***	(3.032)	0.001	0.0346***	(3.152)	0.001	0.0386*	(1.124)	0.057
Term Spread	0.0454***	(2.705)	0.004	0.0359***	(2.403)	0.006	0.0254	(0.593)	0.178
Bond Ret (curr)	0.0379***	(3.268)	0.001	0.0333***	(3.016)	0.002	0.0167*	(0.583)	0.056
Equity Ret (curr)	0.0390***	(2.640)	0.004	0.0447***	(3.594)	0.000	0.0088	(0.286)	0.199
Port Ret (curr)	0.0370***	(2.512)	0.008	0.0451***	(3.526)	0.000	0.0085	(0.269)	0.217

Panel A: Dummy. Dependent variable: Forward Bond Return. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6D: Bivariate Controls — Bond Return (Panel B: Continuous)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0463***	(2.198)	0.007	0.0492	(1.683)	0.139	-0.0133	(-0.246)	0.452
Equity Vol	0.0462**	(1.973)	0.012	0.0631*	(2.055)	0.076	-0.0191	(-0.403)	0.377
Yield 10Y	-0.0517**	(-1.704)	0.032	-0.0228	(-0.593)	0.160	-0.1333***	(-3.259)	0.001
VIX	0.0466***	(2.072)	0.007	0.0533**	(2.487)	0.038	-0.0205	(-0.440)	0.349
High Inflation	0.0520***	(2.594)	0.006	0.0493**	(2.362)	0.041	0.0256	(0.491)	0.273
Term Spread	0.0580**	(2.111)	0.014	0.0492	(1.512)	0.162	-0.0069	(-0.116)	0.489
Bond Ret (curr)	0.0562***	(3.187)	0.007	0.0465*	(2.143)	0.077	0.0119	(0.224)	0.317
Equity Ret (curr)	0.0565***	(2.405)	0.005	0.0766**	(2.794)	0.018	-0.0147	(-0.325)	0.378
Port Ret (curr)	0.0519**	(2.192)	0.011	0.0765***	(2.862)	0.010	-0.0161	(-0.336)	0.377

Panel B: Continuous. Dependent variable: Forward Bond Return. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6E: Bivariate Controls — Equity Return (Panel A: Dummy)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0632*	(1.169)	0.088	0.1623**	(1.726)	0.021	-0.0416	(-0.621)	0.228
Equity Vol	0.0886**	(1.580)	0.030	0.1333**	(1.522)	0.043	0.0664**	(0.966)	0.011
Yield 10Y	0.1513***	(2.560)	0.008	0.1289**	(1.809)	0.031	0.0871	(0.827)	0.216
VIX	0.0811**	(1.483)	0.040	0.1494**	(1.748)	0.020	0.0712**	(0.941)	0.025
High Inflation	0.1015**	(1.806)	0.023	0.1397**	(1.763)	0.023	0.1158*	(1.403)	0.061
Term Spread	0.0858*	(1.436)	0.051	0.1830**	(1.942)	0.022	0.0379	(0.462)	0.260
Bond Ret (curr)	0.0718**	(1.350)	0.045	0.1390**	(1.687)	0.016	0.0906*	(1.168)	0.068
Equity Ret (curr)	0.0674*	(1.275)	0.062	0.0864*	(1.147)	0.077	0.0602**	(0.884)	0.042
Port Ret (curr)	0.0666*	(1.250)	0.067	0.0872*	(1.153)	0.084	0.0529*	(0.753)	0.086

Panel A: Dummy. Dependent variable: Forward Equity Return. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6F: Bivariate Controls — Equity Return (Panel B: Continuous)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0635	(0.637)	0.147	0.2944***	(1.554)	0.003	-0.1691*	(-1.750)	0.059
Equity Vol	0.1062*	(1.012)	0.072	0.3043***	(1.498)	0.009	-0.0167	(-0.150)	0.469
Yield 10Y	0.2154*	(1.434)	0.057	0.4151***	(2.086)	0.007	-0.1035	(-0.620)	0.226
VIX	0.0794	(0.793)	0.111	0.2885***	(1.651)	0.009	-0.0314	(-0.250)	0.405
High Inflation	0.0986*	(0.984)	0.071	0.2443**	(1.484)	0.029	-0.0159	(-0.147)	0.499
Term Spread	0.0609	(0.478)	0.187	0.3420***	(1.835)	0.001	-0.1579	(-1.276)	0.135
Bond Ret (curr)	0.0645	(0.597)	0.128	0.2601**	(1.416)	0.014	0.0600	(0.415)	0.253
Equity Ret (curr)	0.0529	(0.522)	0.191	0.1949*	(1.058)	0.066	-0.0356	(-0.308)	0.412
Port Ret (curr)	0.0517	(0.513)	0.193	0.1926*	(1.057)	0.075	-0.0608	(-0.498)	0.331

Panel B: Continuous. Dependent variable: Forward Equity Return. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6G: Bivariate Controls — 60/40 Return (Panel A: Dummy)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0521**	(1.673)	0.028	0.1117***	(2.096)	0.007	-0.0137	(-0.294)	0.282
Equity Vol	0.0660***	(2.068)	0.007	0.0935**	(1.876)	0.022	0.0436***	(0.845)	0.007
Yield 10Y	0.0838***	(2.511)	0.008	0.0787**	(2.061)	0.020	0.0262	(0.405)	0.390
VIX	0.0617***	(1.998)	0.007	0.1025***	(2.103)	0.009	0.0452**	(0.826)	0.014
High Inflation	0.0758***	(2.385)	0.005	0.0955***	(2.120)	0.010	0.0852*	(1.398)	0.051
Term Spread	0.0707**	(2.018)	0.013	0.1237**	(2.323)	0.010	0.0356	(0.616)	0.139
Bond Ret (curr)	0.0577**	(1.890)	0.010	0.0945***	(1.984)	0.007	0.0605**	(1.128)	0.027
Equity Ret (curr)	0.0556**	(1.845)	0.015	0.0687**	(1.598)	0.035	0.0404**	(0.795)	0.025
Port Ret (curr)	0.0544**	(1.811)	0.017	0.0694**	(1.612)	0.035	0.0361**	(0.690)	0.050

Panel A: Dummy. Dependent variable: Forward 60/40 Return. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10.

Table 6H: Bivariate Controls — 60/40 Return (Panel B: Continuous)

Control Variable	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Vol	0.0558*	(0.948)	0.073	0.1936***	(1.876)	0.001	-0.1005	(-1.468)	0.103
Equity Vol	0.0805**	(1.323)	0.028	0.2034***	(1.835)	0.004	-0.0156	(-0.201)	0.443
Yield 10Y	0.1031	(1.134)	0.104	0.2315***	(2.068)	0.008	-0.1167	(-1.119)	0.100
VIX	0.0647*	(1.103)	0.052	0.1897***	(1.945)	0.003	-0.0256	(-0.303)	0.380
High Inflation	0.0785**	(1.373)	0.024	0.1612**	(1.737)	0.013	0.0035	(0.050)	0.396
Term Spread	0.0607*	(0.812)	0.099	0.2211***	(2.208)	0.000	-0.0910	(-1.084)	0.183
Bond Ret (curr)	0.0599**	(0.961)	0.047	0.1692***	(1.615)	0.006	0.0382	(0.413)	0.231
Equity Ret (curr)	0.0532*	(0.908)	0.087	0.1431**	(1.405)	0.029	-0.0249	(-0.319)	0.395
Port Ret (curr)	0.0509*	(0.876)	0.093	0.1419**	(1.409)	0.035	-0.0397	(-0.476)	0.329

Panel B: Continuous. Dependent variable: Forward 60/40 Return. t-Boot = bootstrap t-statistic (β / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 7A: Kitchen Sink — Dummy (Six Macro Controls)

	Full Sample			Pre-2009			Post-2009		
Outcome	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Volatility	-0.0005*	(-1.872)	0.051	-0.0002*	(-1.412)	0.095	-0.0005	(-0.748)	0.188
Bond Return	0.0028	(0.168)	0.462	0.0111	(0.805)	0.133	-0.0272	(-0.738)	0.287
Equity Return	0.1759**	(2.579)	0.012	0.1550**	(1.704)	0.031	0.0535	(0.602)	0.297
60/40 Return	0.1049***	(2.763)	0.007	0.0978**	(1.944)	0.021	0.0220	(0.386)	0.348
<i>Equity Volatility</i>	<i>-0.0023</i>	<i>(-1.321)</i>	<i>0.115</i>	<i>-0.0007</i>	<i>(-0.468)</i>	<i>0.240</i>	<i>-0.0027</i>	<i>(-0.648)</i>	<i>0.317</i>
<i>Portfolio Volatility</i>	<i>-0.0009</i>	<i>(-1.123)</i>	<i>0.159</i>	<i>-0.0002</i>	<i>(-0.407)</i>	<i>0.320</i>	<i>-0.0013</i>	<i>(-0.658)</i>	<i>0.327</i>

Dummy specification, Six Macro Controls. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness. Only the SB correlation coefficient is reported; inference on control coefficients is not bootstrapped.

Table 7B: Kitchen Sink — Dummy (Eight Controls (Macro + Returns))

	Full Sample			Pre-2009			Post-2009		
Outcome	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Volatility	-0.0004*	(-1.794)	0.054	-0.0002	(-1.097)	0.138	-0.0005	(-0.700)	0.227
Bond Return	0.0126	(0.820)	0.198	0.0136*	(1.075)	0.086	-0.0399	(-1.327)	0.143
Equity Return	0.1615***	(2.689)	0.009	0.1434**	(1.660)	0.028	0.0589	(0.677)	0.292
60/40 Return	0.1002***	(3.012)	0.005	0.0918**	(1.900)	0.018	0.0201	(0.364)	0.381
<i>Equity Volatility</i>	<i>-0.0020*</i>	<i>(-1.397)</i>	<i>0.094</i>	<i>-0.0004</i>	<i>(-0.297)</i>	<i>0.271</i>	<i>-0.0042</i>	<i>(-1.172)</i>	<i>0.177</i>
<i>Portfolio Volatility</i>	<i>-0.0009*</i>	<i>(-1.424)</i>	<i>0.094</i>	<i>-0.0002</i>	<i>(-0.286)</i>	<i>0.312</i>	<i>-0.0020</i>	<i>(-1.159)</i>	<i>0.181</i>

Dummy specification, Eight Controls (Macro + Returns). t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness. Only the SB correlation coefficient is reported; inference on control coefficients is not bootstrapped.

Table 7C: Kitchen Sink — Continuous (Six Macro Controls)

	Full Sample			Pre-2009			Post-2009		
Outcome	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Volatility	-0.0009	(-1.281)	0.133	-0.0016**	(-1.753)	0.027	0.0003	(0.265)	0.349
Bond Return	-0.0510*	(-1.264)	0.070	-0.0129	(-0.231)	0.390	-0.1338***	(-2.574)	0.000
Equity Return	0.2795**	(1.593)	0.036	0.6209***	(2.073)	0.003	-0.1607*	(-1.151)	0.084
60/40 Return	0.1410*	(1.323)	0.073	0.3552***	(2.227)	0.001	-0.1508**	(-1.697)	0.011
<i>Equity Volatility</i>	<i>-0.0070*</i>	<i>(-1.470)</i>	<i>0.071</i>	<i>-0.0112**</i>	<i>(-1.468)</i>	<i>0.037</i>	<i>-0.0028</i>	<i>(-0.471)</i>	<i>0.336</i>
<i>Portfolio Volatility</i>	<i>-0.0022</i>	<i>(-1.003)</i>	<i>0.175</i>	<i>-0.0044*</i>	<i>(-1.338)</i>	<i>0.055</i>	<i>-0.0005</i>	<i>(-0.176)</i>	<i>0.480</i>

Continuous specification, Six Macro Controls. t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness. Only the SB correlation coefficient is reported; inference on control coefficients is not bootstrapped.

Table 7D: Kitchen Sink — Continuous (Eight Controls (Macro + Returns))

Outcome	Full Sample			Pre-2009			Post-2009		
	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot	β	(t-Boot)	p-Boot
Bond Volatility	-0.0007	(-1.161)	0.163	-0.0020***	(-2.076)	0.008	0.0002	(0.185)	0.439
Bond Return	-0.0330	(-0.817)	0.160	0.0014	(0.023)	0.496	-0.1022***	(-1.957)	0.007
Equity Return	0.2722**	(1.504)	0.029	0.6108***	(1.782)	0.007	-0.1331	(-0.876)	0.180
60/40 Return	0.1420**	(1.303)	0.046	0.3543***	(1.943)	0.003	-0.1248*	(-1.331)	0.069
<i>Equity Volatility</i>	<i>-0.0057*</i>	<i>(-1.444)</i>	<i>0.056</i>	<i>-0.0129**</i>	<i>(-1.515)</i>	<i>0.032</i>	<i>-0.0007</i>	<i>(-0.132)</i>	<i>0.422</i>
<i>Portfolio Volatility</i>	<i>-0.0020</i>	<i>(-1.123)</i>	<i>0.123</i>	<i>-0.0054**</i>	<i>(-1.533)</i>	<i>0.033</i>	<i>0.0002</i>	<i>(0.060)</i>	<i>0.439</i>

Continuous specification, Eight Controls (Macro + Returns). t-Boot = bootstrap t-statistic (beta / bootstrap SE). p-Boot = one-sided paired moving block bootstrap p-value (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). Stars on β reflect bootstrap p-values: *** p<0.01, ** p<0.05, * p<0.10. Rows above separator are primary outcomes. Rows below (italicized) reported for completeness. Only the SB correlation coefficient is reported; inference on control coefficients is not bootstrapped.

Figure 1: 252-day rolling stock-bond correlation, January 1995 – June 2026.

MSCI USA vs Bloomberg US Treasury | Red shading = positive regime | The vertical line indicates January 2009, the hypothesized regime break date motivated by the Federal Reserve's adoption of near-zero interest rates in December 2008.

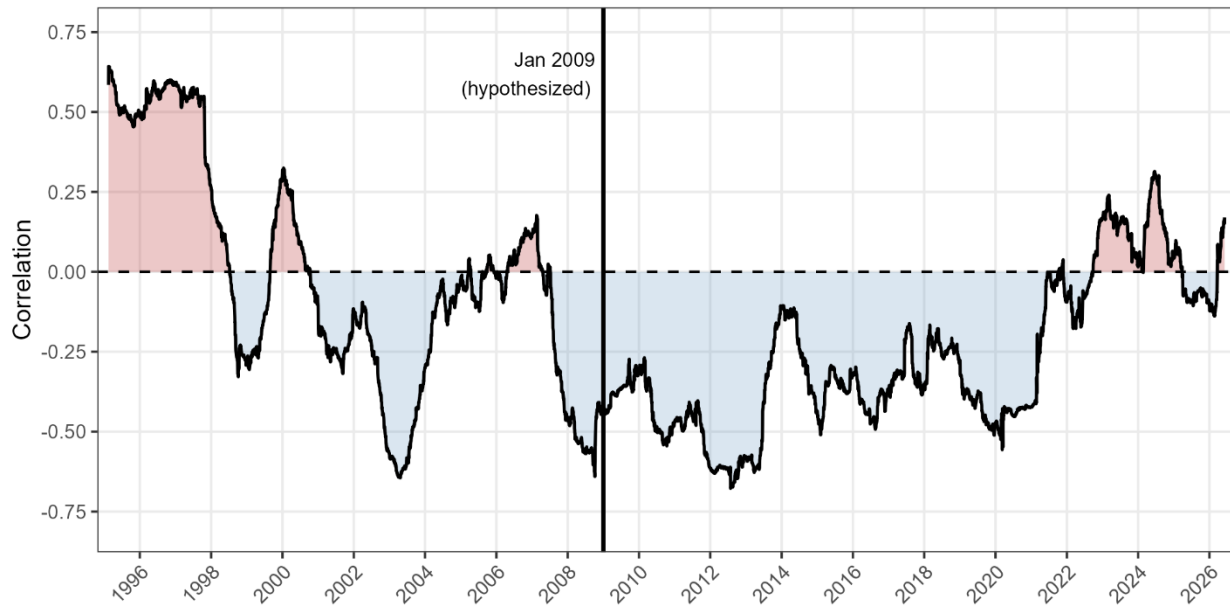
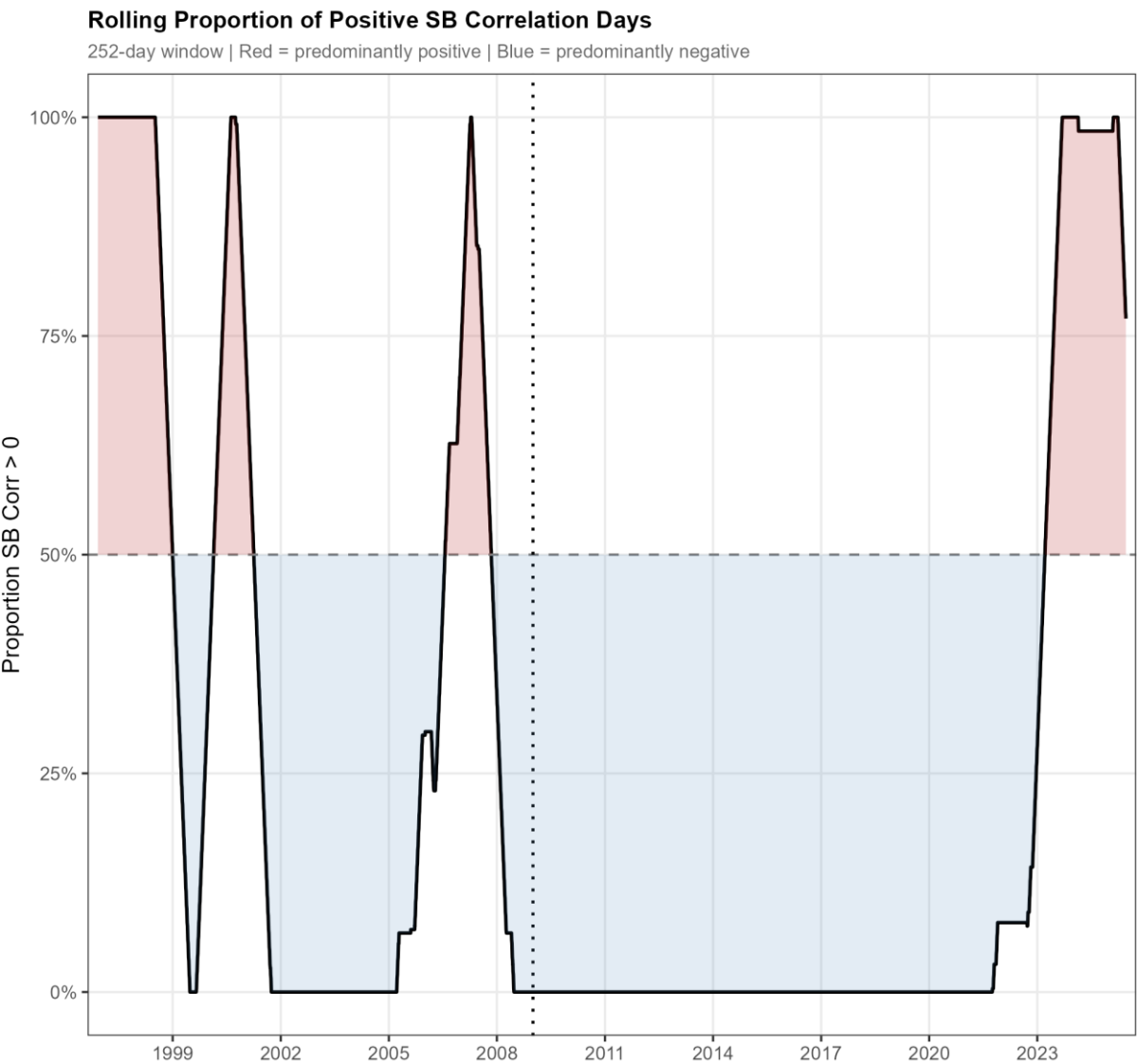


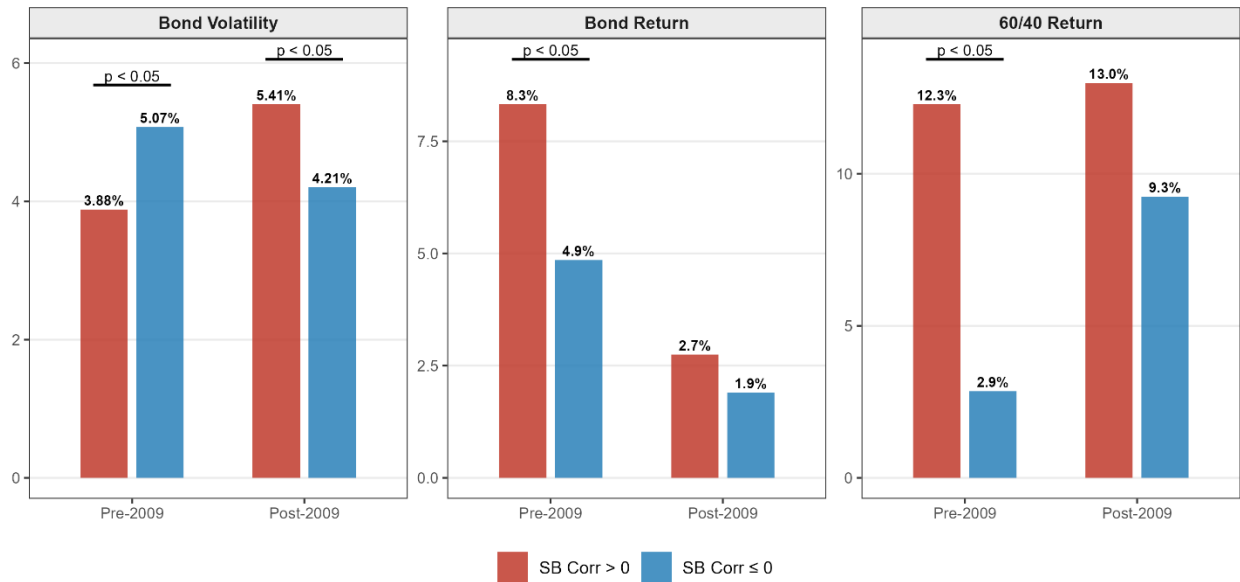
Figure 2: Rolling 252-day proportion of days with positive SB correlation



The rolling 252-day proportion of days with positive SB correlation.
Dashed horizontal line = 50% random benchmark. Dotted vertical line = January 2009 regime break.

Figure 3: Forward 252-Day Outcomes Conditional on SB Correlation Sign

MSCI USA vs Bloomberg US Treasury | 60/40 Annual Rebalancing | Significance from paired moving block bootstrap



Returns shown as cumulative 252-day sum × 100. Volatility shown as annualized daily std dev × 100. Brackets indicate statistical significance from univariate paired moving block bootstrap regressions (Kunsch, 1989; Liu and Singh, 1992; block size = 252, B = 5,000 replications). n.s. = not significant at the 10% level.

Appendix

Table A1: Full Sample Univariate Results — All Outcomes

Outcome	Dummy			Continuous		
	β	(t-stat)	R ²	β	(t-stat)	R ²
Bond Volatility	-0.0001	(-0.359)	0.0019	-0.0002	(-0.605)	0.0072
Bond Return	0.0346***	(2.880)	0.0910	0.0465***	(2.655)	0.0786
Equity Return	0.0710	(1.447)	0.0329	0.0622	(0.739)	0.0121
60/40 Return	0.0561**	(2.009)	0.0632	0.0551	(1.127)	0.0293
<i>Equity Volatility</i>	<i>-0.0010</i>	<i>(-0.889)</i>	<i>0.0087</i>	<i>-0.0022</i>	<i>(-0.982)</i>	<i>0.0210</i>
<i>Portfolio Volatility</i>	<i>-0.0000</i>	<i>(-0.002)</i>	<i>0.0000</i>	<i>-0.0002</i>	<i>(-0.204)</i>	<i>0.0009</i>

Newey-West SE, 252 lags. t-stats in parentheses. *** p<0.01, ** p<0.05, * p<0.10. N=7,696. Bond volatility, bond return, and 60/40 return are the three primary outcomes. Equity return is discussed in Section 5 in the context of the portfolio return finding. Equity volatility and portfolio volatility show no significant relationship with the SB correlation in any specification or period and are reported for completeness

Table A2: Subsample Results — Pre and Post 2009

Outcome	Specification	Pre-2009				Post-2009			
		β	(t)	R ²	N	β	(t)	R ²	N
Bond Volatility	Dummy	-0.0008***	(-3.371)	0.2446	3,402	0.0008**	(2.571)	0.1103	4,294
Bond Volatility	Continuous	-0.0015***	(-4.259)	0.4400	3,402	0.0015**	(2.536)	0.1719	4,294
Bond Return	Dummy	0.0348***	(3.049)	0.1709	3,402	0.0085	(0.677)	0.0039	4,294
Bond Return	Continuous	0.0486***	(2.814)	0.1571	3,402	-0.0161	(-0.434)	0.0057	4,294
Equity Return	Dummy	0.1376*	(1.728)	0.1082	3,402	0.0549	(1.613)	0.0243	4,294
Equity Return	Continuous	0.2504*	(1.935)	0.1684	3,402	-0.0597	(-0.612)	0.0116	4,294
60/40 Return	Dummy	0.0944**	(2.096)	0.1573	3,402	0.0373*	(1.941)	0.0308	4,294
60/40 Return	Continuous	0.1645**	(2.271)	0.2246	3,402	-0.0391	(-0.605)	0.0136	4,294

Newey-West SE, 252 lags. t-stats in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

