

# **Systemic risk in corporate bond markets: Thematic vs. exogenous recessions**

## **Abstract**

Financial crises differ not only in severity but also in the channels through which risk propagates. This paper employs a risk classification framework distinguishing between thematic recessions – slow-building crises arising from structural imbalances – and exogenous recessions, triggered by sudden external shocks. Using corporate bond market data from the UK and US, we apply distribution-sensitive econometric techniques to trace how risk drivers evolve across the spectrum of bond risk. Each recession is segmented into three phases – pre-, during, and post-recession – and tested independently. The findings show that recession type, timing, and national context critically shape systemic vulnerabilities. Risk drivers operate in strongly non-linear ways, yet UK and US markets remain tightly interconnected, highlighting persistent cross-border co-movement. These insights demonstrate how recession characteristics shape systemic fragility, advance systemic risk analysis and risk governance, and offer actionable guidance for regulators, policymakers, and risk managers.

**Keywords:** Bond Risk; Recession Type; Co-Movement; Systemic Risk

**JEL Codes:** E32, F44, G01

## 1. Introduction

Recessions are among the most consequential systemic events, disrupting economies and reshaping the channels through which financial risk propagates. Within this landscape, corporate bond markets represent a central arena where systemic pressures become most visible. Bond risk reflects macroeconomic uncertainty and drives financial fragility during periods of stress. When macroeconomic risk is modelled appropriately, it can predict bond market volatility and credit spreads (Bekaert et al. 2021). However, heightened bond market challenges caused by economic uncertainty spill into the wider economy (Acharya et al. 2017; Black et al. 2025), amplifying stress across financial systems. This feedback loop reflects the “micro-contagion” patterns highlighted in systemic risk research. For instance, as macroeconomic risk escalates, corporate failures rise (Bams et al. 2016), business activity contracts (Hoque et al. 2023), and consumption weakens (Gourieroux et al. 2021). Network effects further exacerbate systemic vulnerability, with clusters of defaults magnifying systemic adversity (Elliott et al. 2014; Acemoglu et al. 2015; Azizpour et al. 2018). Thus, risk-driven shocks propagate from firms to sectors and ultimately across national markets (Xing et al. 2023).

Rising bond risk can raise required risk premia, intensifying systemic fragility and recessionary pressures (Corvino and Fusai, 2022). Although central banks may attempt pre-emptive interventions, such measures often entail trade-offs, including heightened inflation risks (Sokolova, 2015). On the post-recession side of the cycle, the unintended consequences of policy actions become most visible. Rapid interest rate reductions aimed at stimulating recovery can generate spillovers that destabilise international capital flows. In developed markets, such easing may trigger portfolio outflows into higher-yielding emerging economies (Chen et al. 2012), potentially creating liquidity shortages domestically over the longer term and raising concerns of credit fragility. Recovery phases also expose structural challenges in

the real economy, with long-term productivity levels permanently impaired by the recession despite growth rates returning to pre-crisis trends (Oulton, 2017). Taken together, these effects highlight that the pre-, during, and post-recession phases each represent distinct macro-financial environments with unique implications for systemic risk transmission.

While much of the empirical work on bond risk has emerged from finance and econometrics, broader risk science emphasises the systemic fragilities and uncertainties that underlie financial crises. Acharya et al. (2017) highlight how systemic risk manifests as collective vulnerability across institutions, highlighting the importance of understanding interconnections. Relatedly, Taleb (2007) argues that financial crises are characterized by “fat tails” and low-probability, high-impact events, challenging linear models of risk and calling for frameworks sensitive to tail behaviour. From a governance perspective, OECD (2011) stresses that global financial shocks should be treated as systemic risk events requiring adaptive risk governance frameworks that integrate uncertainty and contagion dynamics. Complementing these perspectives, Haldane and May (2011) conceptualize financial systems as ecosystems in which structural imbalances amplify instability, reinforcing the view that crises must be analysed through the lens of systemic fragility.

Building on these insights, this paper employs a risk classification framework to distinguish between *thematic* and *exogenous* recessions and evaluates their impact on systemic vulnerabilities in corporate bond markets. We define thematic recessions as slow-building crises arising from the accumulation of structural vulnerabilities within financial markets, and exogenous recessions as sudden crises triggered by circumstances outside the control of financial institutions. The distinction between thematic and exogenous recessions also implies different mechanisms of systemic risk transmission. Thematic recessions emerge from the gradual accumulation of financial imbalances within the economic system, including leverage expansion, credit mispricing, and interconnected balance sheet vulnerabilities. Since these

imbalances develop endogenously within financial markets, risk propagation during thematic recessions is expected to be more persistent and structurally embedded across financial sectors and countries. By contrast, exogenous recessions originate outside the financial system and are triggered by external shocks that abruptly disrupt economic activity. In such cases, systemic risk transmission may be driven more by sudden repricing, liquidity stress, and policy intervention rather than the unwinding of accumulated financial fragilities. This distinction suggests that the behaviour of risk determinants in corporate bond markets may differ across recession types, particularly when examined across phases of the business cycle and across different points of the risk distribution.

Despite extensive research on bond risk and macro-financial conditions, this distinction has not been methodically examined in the context of systemic risk transmission, leaving a gap that this paper addresses. The 2008 Great Recession exemplifies a thematic recession, driven by mispricing in credit markets and excessive leverage. In contrast, the Covid-19 recession was exogenous, triggered by a global health shock that rapidly cascaded into financial and economic disruption. These episodes also differed in their policy environments. The Great Recession was preceded by high interest rates, giving central banks scope for monetary easing, whereas the Covid-19 recession emerged in an ultra-low-rate setting. This limited monetary policy space and shifted the burden onto expansive fiscal interventions. Their aftermaths diverged as well, with the Covid-19 period marked by persistent inflation and rising interest rates. To address this gap, we conduct a comparative analysis of these two recession types using corporate bond data from the UK and US – two highly integrated economies with deep capital markets.

Our empirical framework implements a phased structure that divides each recession into pre-, during-, and post-crisis periods, constructed symmetrically around the recession window. This design enables a granular assessment of how the drivers of bond risk evolve over time,

capturing the accumulation of vulnerabilities before crises and their persistence afterward. We address three core research questions: (i) Do the determinants of bond risk remain stable across recession types (thematic vs. exogenous) and phases (pre-, during, post-recession), or do they vary with the nature and stage of the downturn? (ii) Are these influences consistent across the distribution of bond risk, or do they diverge at the extremes where systemic vulnerabilities are most pronounced? (iii) Do recession-induced changes in bond risk and its predictors alter the strength or direction of their relationships, thereby reshaping co-movement pathways?

Since thematic recessions arise from internally accumulated financial vulnerabilities while exogenous recessions originate from external shocks, the mechanisms through which systemic risk propagates across financial markets may differ across recession types. If systemic fragility builds gradually within the financial system, risk transmission may become more persistent and interconnected across markets. Conversely, externally triggered downturns may generate more abrupt but less structurally embedded transmission patterns. To examine whether these differences are observable in corporate bond markets, we test the following hypotheses: H1: The influence of bond risk determinants varies systematically with recession type, phase, and quantile-level risk distribution; H2: Recession-induced changes structurally reconfigure systemic risk transmission pathways. We evaluate these hypotheses using a multi-method empirical framework – bootstrapped quantile regression, fractional probit models, and conventional OLS estimation. This integrated approach captures asymmetric effects, non-linear dynamics, and structural shifts in the propagation of systemic risk in corporate bond markets across contrasting recessionary contexts.

Initial analysis indicates that, even before the Covid-19 recession, the UK economy exhibited signs of macro-financial compression. This suggests the pandemic shock may have masked an impending crisis or amplified pre-existing vulnerabilities. Our empirical results reveal a clear divergence across the risk distribution in the determinants of bond risk,

particularly in the US. Although several drivers are common across the UK and US, their influence varies markedly by recession phase – pre-, during, or post-crisis. Importantly, we find clear evidence of bi-directional co-movement. The UK co-moves with the US, which extends prior findings that predominantly identify the US as the primary contagion source (Bai et al. 2019; Luo et al. 2025).

Yield curves in both economies emerge as pivotal cross-border risk channels. They are consistently significant determinants of bond risk domestically and internationally, though their impact depends on recession type and phase. The yield curve has long been viewed as a crucial macroeconomic risk indicator, with flattening or inversion typically preceding crises (Engstrom and Sharpe, 2018; Bueno, 2023). However, its decisive predictive power (Fernandez-Perez et al. 2014) is questioned in the post-Great Recession era (Benzoni et al. 2018; Sabes and Sahuc, 2023). This was evident when the US yield curve inversion of July 2022 failed to precede a recession. Taken together, these findings highlight the need for a more nuanced understanding of the yield curve in systemic risk monitoring, with jointly constructed cross-border yield curves offering a credible pathway. While earlier studies downplayed this approach (Meldrum et al. 2023), we posit that such curves can capture systemic financial linkages and enhance bond risk assessment – with potential applications for risk management across the wider financial system.

We further find that bond risk and equity market performance co-move in the UK, whereas in the US equity markets serve more as a diversifying channel during periods of stress. The results also shed light on the contested role of alternative assets. Gold does not consistently behave as a safe haven in bond markets, despite evidence to the contrary in other markets (Klein et al. 2018; Mensi et al. 2022; Hoque et al. 2023). Bitcoin, often cited as a non-traditional hedge, also fails to provide safe haven benefits. Instead, it co-moves with bond market volatility, consistent with Bouri et al. (2017) and Oosterlinck et al. (2023). Together, these

findings challenge the reliability of both traditional and non-traditional safe havens in mitigating systemic bond risk.

When isolating recession-induced changes in bond risk and its predictors, we find an important result. The dynamics of these changes differ substantially from associations observed in full-sample, unsegmented models. This highlights the need to model crisis-induced shifts in risk behaviour, rather than rely solely on aggregate relationships. Cross-border co-movement between UK and US bond markets also shows high persistence, remaining significant across recession types and phases. However, structural breaks are evident during the Covid-19 recession, consistent with the exogenous nature of the shock. Only partial reversion is observed in the subsequent recovery phase.

We extend prior work (e.g., Gopalakrishnan and Mohapatra, 2020) by highlighting that supervisory frameworks targeting corporate bond markets may play a critical role in strengthening systemic resilience. In particular, we highlight how such regimes can curb risk accumulation ahead of thematic recessions and provide a vital first line of defence against unforeseen exogenous shocks.

This paper contributes to the literature in five main ways: (i) It provides a comparative analysis of how the origin of recessions – whether internally accumulated (thematic) or externally triggered (exogenous) – affects the transmission of systemic risk in corporate bond markets; (ii) It introduces quantile-based insights into bond risk analysis, revealing non-linear effects across the risk distribution; (iii) It presents empirical evidence of persistent UK–US co-movement, regardless of recession type or phase; (iv) It demonstrates that recession-induced changes in bond risk do not necessarily mirror shifts in their determinants, revealing that the changes follow distinct dynamics not captured by full-sample models; and (v) It demonstrates the value of extending the conventional yield curve to cross-border computations as a tool for systemic risk management.

The remainder of the paper is structured as follows. Section 2 outlines the data and empirical framework. Section 3 presents the results. Section 4 concludes with policy recommendations for strengthening systemic risk monitoring in bond markets and beyond.

## **2. Data and empirical framework**

### *2.1. Data*

The dataset was compiled from Eikon, the Bank of England, and Investing UK. A key consideration in this paper is the definition of recessions, which differs between the two countries under analysis. In the UK, a recession is officially defined as two consecutive quarters of negative GDP growth. By contrast, the US follows the classification of the National Bureau of Economic Research (NBER), which dates recessions based on a broader evaluation of multiple economic indicators. These national definitions provide the foundation for our construction of recession phases and the alignment of variables used in the empirical analysis.

#### *2.1.1. Constructing the recessionary periods*

The UK entered the Great Recession in Q2 2008 and exited in Q3 2009 (ONS, 2022), while the US entered in December 2007 and exited in July 2009 (NBER, 2010). Although the two countries entered the downturn at different times, they exited the recession concurrently. In the case of the Covid-19 Recession, the UK entered in Q1 2020 and exited in Q3 2020 (ONS, 2022), whereas the US recession spanned from March to May 2020 (NBER, 2021). For the empirical analysis, we focus on daily trading data during the recessions. The Great Recession covers 317 trading days for the UK and 398 for the US, while the Covid-19 Recession spans 125 trading days in the UK and 42 in the US. We adopt a symmetrical segmentation around each recession: if a recession lasted for  $n$  trading days, the pre-recession phase comprises the

$n$  trading days preceding the recession's start, and the post-recession phase comprises the  $n$  trading days following its end.

The pre- and post-recession windows are constructed symmetrically around the recession period in order to maintain balanced observation windows across phases of the economic cycle. This approach allows the analysis to compare the behaviour of bond risk determinants before, during, and after recession episodes using comparable time horizons. Since the objective of the study is to examine how risk dynamics evolve around recession events, symmetric windows provide a consistent framework for evaluating changes in risk transmission without allowing one phase to dominate the statistical analysis due to differences in sample length. At the same time, we acknowledge that the real-world accumulation and recovery of systemic risk need not occur over perfectly symmetric timeframes. Financial vulnerabilities may build and dissipate at a different pace around a recessionary phase. Accordingly, the symmetric construction should be interpreted as a methodological device that facilitates comparability across phases, rather than a claim that recession dynamics themselves are inherently symmetric. The full timeline is summarised in Table 1 and visualised in Figures 1 and 2.

**Table 1**

Recession timelines for the Great Recession and Covid-19 Recession in the UK and US

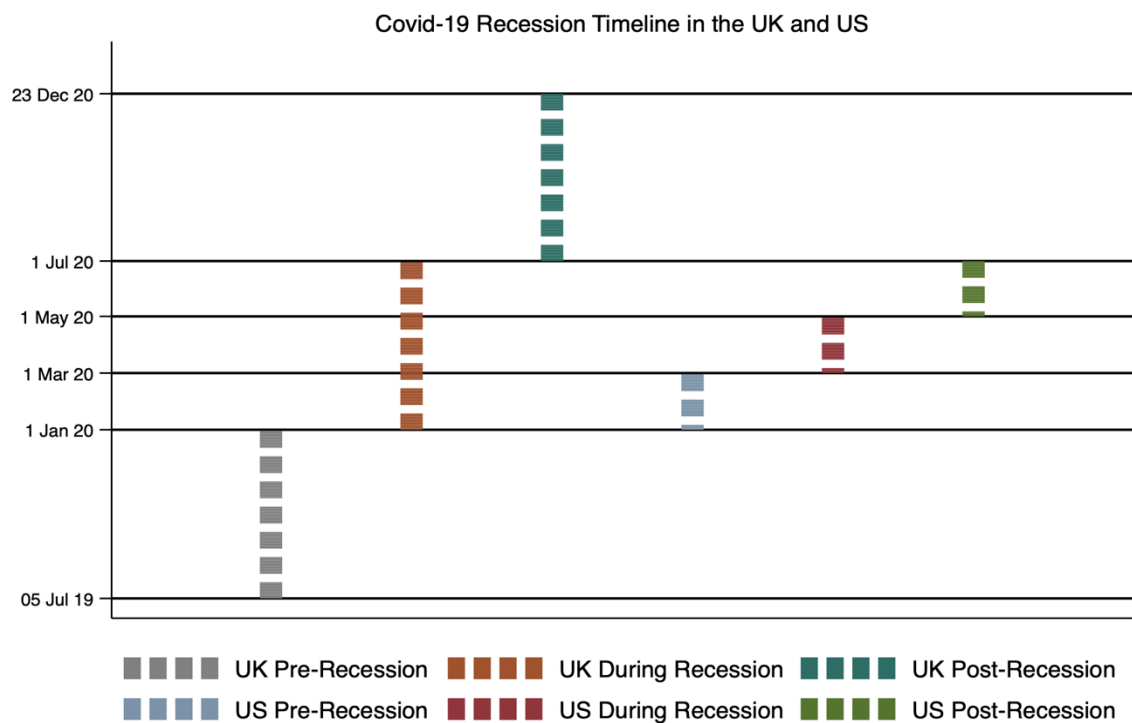
|           | <b>Great Recession</b>                                 | <b>No of<br/>Trading Days</b> | <b>Covid-19 Recession</b>                             | <b>No of<br/>Trading Days</b> |
|-----------|--------------------------------------------------------|-------------------------------|-------------------------------------------------------|-------------------------------|
| <b>UK</b> |                                                        |                               |                                                       |                               |
| Pre       | 29 <sup>th</sup> Dec 2006 to 31 <sup>st</sup> Mar 2008 | 317                           | 5 <sup>th</sup> Jul 2019 to 31 <sup>st</sup> Dec 2019 | 125                           |
| During    | 1 <sup>st</sup> Apr 2008 to 30 <sup>th</sup> Jun 2009  | 317                           | 1 <sup>st</sup> Jan 2020 to 30 <sup>th</sup> Jun 2020 | 125                           |
| Post      | 1 <sup>st</sup> Jul 2009 to 29 <sup>th</sup> Sep 2010  | 317                           | 1 <sup>st</sup> Jul 2020 to 23 <sup>rd</sup> Dec 2020 | 125                           |
| <b>US</b> |                                                        |                               |                                                       |                               |
| Pre       | 10 <sup>th</sup> May 2006 to 30 <sup>th</sup> Nov 2007 | 398                           | 2 <sup>nd</sup> Jan 2020 to 28 <sup>th</sup> Feb 2020 | 42                            |
| During    | 1 <sup>st</sup> Dec 2007 to 30 <sup>th</sup> Jun 2009  | 398                           | 1 <sup>st</sup> Mar 2020 to 30 <sup>th</sup> Apr 2020 | 42                            |
| Post      | 1 <sup>st</sup> Jul 2009 to 25 <sup>th</sup> Jan 2011  | 398                           | 1 <sup>st</sup> May 2020 to 1 <sup>st</sup> Jul 2020  | 42                            |

The table summarises the timelines of the Great Recession and the Covid-19 Recession, segmented into pre-recession, during recession, and post-recession phases.



**Fig. 1.** Timeline of the Great Recession in the UK and US

The figure presents the pre-recession, during recession, and post-recession phases of the Great Recession in the UK and US



**Fig. 2.** Timeline of the Covid-19 Recession in the UK and US

The figure presents the pre-recession, during recession, and post-recession phases of the Covid-19 Recession in the UK and US

From the US perspective, the Great Recession was the longest downturn since World War II, whereas the Covid-19 Recession was the shortest on record since 1854. During the Great Recession, all recession-related phases in the UK overlapped substantially with those in the US. Specifically, approximately 75% of the UK's pre-recession phase coincided with the US pre-recession phase, while the remaining 25% overlapped with the US recessionary period. The two countries experienced near-complete synchronicity during the recession itself and exited the downturn simultaneously. However, due to the difference in recession lengths, the UK's post-recession phase was entirely contained within the US post-recession period, representing roughly 80% overlap. An inverse pattern is observed during the Covid-19 Recession. Except for a single day (1 July 2020), the entirety of the US recession – including its pre-, during-, and post-recession phases – occurred within the UK's recessionary timeline. In other words, during the time the UK experienced the Covid-19 Recession, the US had already entered, endured, and exited its own. These overlaps are expected to manifest in the empirical results, particularly in the form of co-movement related effects.

### *2.1.2. Regression variables*

Table 2 lists the variables used in the regression analysis, together with their definitions and proxy functions. The indicators are grouped into two categories: Macroeconomic and Financial, all constructed at a daily frequency. Bond risk is proxied by the yield spread between Moody's 10-year BBA-rated corporate bond and the corresponding 10-year sovereign bond yield. Credit spreads are widely used as indicators of risk conditions in corporate bond markets because they capture the compensation investors require for holding corporate debt relative to risk-free securities. However, literature shows that credit spreads incorporate several components beyond expected default losses, including liquidity premia and compensation for bearing systematic credit market risk. For example, Giesecke et al. (2011) show that time variation in credit spreads is driven primarily by changes in credit and liquidity risk premia

rather than by changes in realized default probabilities. Accordingly, the spread variable used in this study should be interpreted as capturing broader corporate bond market risk embedded in credit spreads rather than a direct measure of default probability.

The term structure of interest rates is defined as the yield differential between 10-year and 5-year government bonds, rather than the conventional 10-year/3-month spread. This specification reflects recent evidence that the 5-year tenor more effectively transmits forward-looking information and liquidity conditions along the yield curve (Chen, 2023). Equity market performance is measured by returns on the FTSE 100 (UK) and S&P 500 (US), representing large-cap equity benchmarks. To capture hedging behaviour and flight-to-safety dynamics, we include gold, proxied by returns on the COMEX gold composite future, and Bitcoin. The latter is included only in the Covid-19 regressions to account for the role of non-traditional assets during crisis episodes.

**Table 2**

Definitions of regression variables, daily frequency (%)

| Category                 | Regression Variable      | Proxy For                           | Definition                                                  |
|--------------------------|--------------------------|-------------------------------------|-------------------------------------------------------------|
| Macroeconomic Indicators | <i>UK Bond Risk</i>      | Corporate bond risk in the UK       | Difference between Moody's BBA and 10year UK Treasury Yield |
|                          | <i>US Bond Risk</i>      | Corporate bond risk in the US       | Difference between Moody's BBA and 10year US Treasury Yield |
|                          | <i>UK Term Structure</i> | Term structure slope of the UK      | Difference between 10year and 5year UK Treasury Yields      |
|                          | <i>US Term Structure</i> | Term structure slope of the US      | Difference between 10year and 5year US Treasury Yields      |
| Financial Indicators     | <i>FTSE 100</i>          | Equity market performance in the UK | Return on FTSE 100 index                                    |
|                          | <i>S&amp;P 500</i>       | Equity market performance in the US | Return on S&P 500 index                                     |
|                          | <i>Gold</i>              | Traditional safe haven              | Return on COMEX gold composite future                       |
|                          | <i>Bitcoin</i>           | Non-traditional safe haven          | Return on Bitcoin (cryptocurrency)                          |

The table reports the regression variables, their proxy functions, and operational definitions. Variables are grouped into macroeconomic and financial indicators, all constructed at a daily frequency.

### 2.1.3. Univariate discussions and correlation coefficients

Table 3 presents summary statistics for the dependent variables, which are visualised in Figures 3 and 4. During the Great Recession, bond risk rose sharply in both countries. In the UK, mean bond risk nearly doubled from 1.89% pre-recession to 3.44% during the recession, before moderating to 2.34% post-recession. The US showed an even stronger increase, by more than doubling from 1.77% to 4.04%, and remained elevated post-recession (2.70%). These patterns highlight persistent fragility beyond the official recession end. In contrast, the Covid-19 Recession produced smaller shifts. UK bond risk rose only modestly (3.16% to 3.35%), while US risk increased from 2.45% to 3.04%, falling quickly afterwards. The relative stability

of the Covid-19 episode likely reflects shorter duration and swifter policy responses. The pre-Covid-19 levels were much higher than those seen in the pre-Great recession period, especially in the UK, which suggests lingering fragility absent the pandemic.

**Table 3**

Summary statistics of dependent variables by recession phase (daily, %)

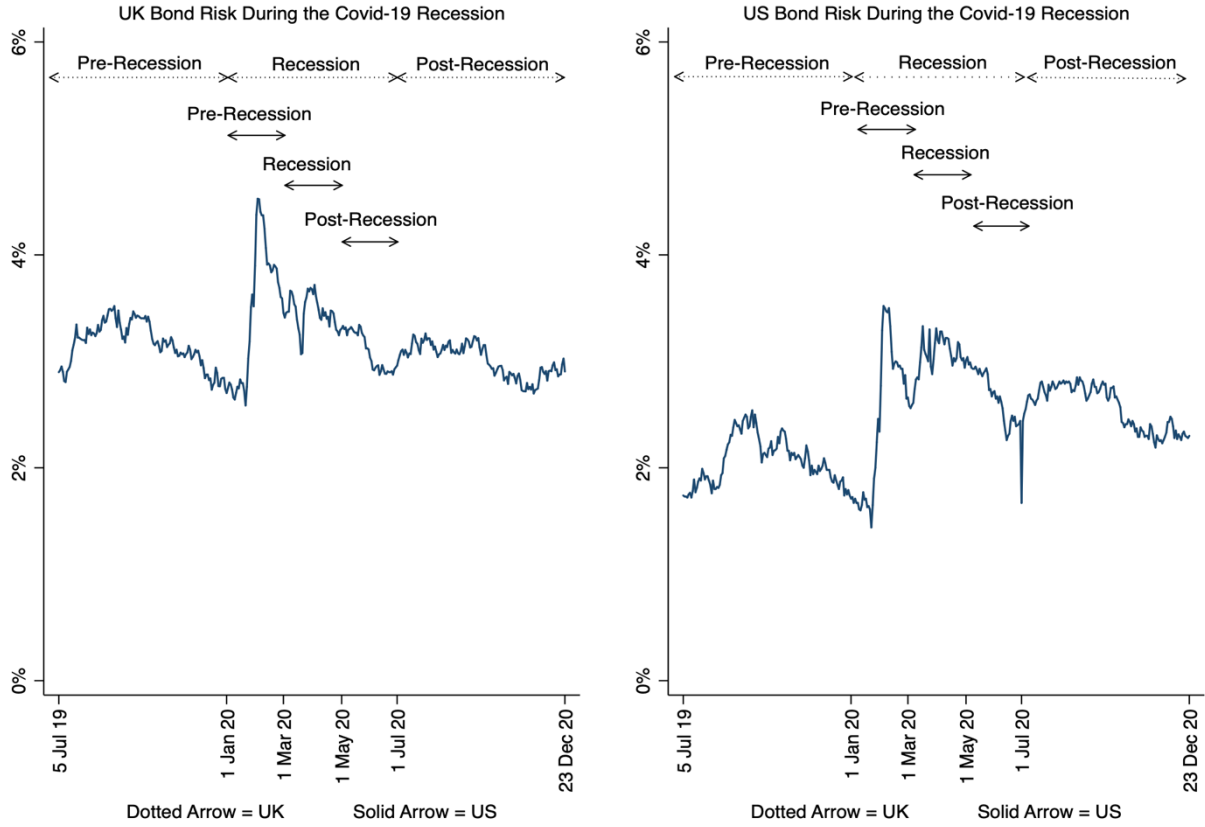
|                     | Great Recession |            |      |      | Covid-19 Recession |            |      |      |
|---------------------|-----------------|------------|------|------|--------------------|------------|------|------|
|                     | Mean            | Std<br>Dev | Min  | Max  | Mean               | Std<br>Dev | Min  | Max  |
| <b>UK Bond Risk</b> |                 |            |      |      |                    |            |      |      |
| Pre                 | 1.89            | 0.52       | 0.98 | 3.27 | 3.16               | 0.21       | 2.70 | 3.52 |
| During              | 3.44            | 0.57       | 2.30 | 4.80 | 3.35               | 0.43       | 2.58 | 4.53 |
| Post                | 2.34            | 0.45       | 1.30 | 3.23 | 3.00               | 0.15       | 2.70 | 3.26 |
| <b>US Bond Risk</b> |                 |            |      |      |                    |            |      |      |
| Pre                 | 1.77            | 0.41       | 1.00 | 2.71 | 2.45               | 0.70       | 1.44 | 3.52 |
| During              | 4.04            | 0.80       | 2.44 | 6.05 | 3.04               | 0.19       | 2.56 | 3.33 |
| Post                | 2.70            | 0.50       | 1.53 | 3.68 | 2.67               | 0.23       | 2.26 | 3.04 |

The table reports descriptive statistics of the dependent variables during the Great Recession and Covid-19 Recession, segmented into pre-, during, and post-recession phases.



**Fig. 3.** Bond Risk in the UK and US: Great Recession

The figure presents the evolution of bond risk in the UK and US during the Great Recession. The three phases, pre-recession, recession, and post-recession, are indicated for each country to highlight differences in timing and risk dynamics.



**Fig. 4.** Bond Risk in the UK and US: Covid-19 Recession

The figure presents the evolution of bond risk in the UK and US during the Covid-19 Recession. The three phases, pre-recession, recession, and post-recession, are indicated for each country to highlight differences in timing and risk dynamics.

Table 4 presents summary statistics for the predictor variables. Term structure slopes steepened significantly during the Great Recession (UK:  $-0.09\%$  to  $0.53\%$ ; US:  $0.10\%$  to  $0.87\%$ ), consistent with recovery expectations under accommodative policy. In the Covid-19 Recession changes were muted, particularly in the UK, where rates were already low. Equity markets in both countries experienced negative or near-zero returns during recessions, with volatility spiking sharply, before partial recovery post-crisis. Gold showed modest but stable returns and heightened volatility, consistent with its role as a safe haven. Bitcoin, included only in the Covid-19 analysis, displayed highly volatile returns with weak safe-haven properties, behaving more like a speculative diversifier.

Taking these insights together with the earlier bond risk analysis, the UK appears more fragile in the pre-Covid recession period than it did during the pre-Great Recession period, possibly a result of post-Brexit market stress. This suggests that absent the pandemic, it may have entered a downturn regardless, perhaps not as sharply. Collectively, the divergence in recovery speed, risk adjustment, and asset dynamics highlights the importance of distinguishing thematic vs. exogenous recession episodes in empirical risk modelling.

**Table 4**

Summary statistics of predictor variables by recession phase (daily, %)

|                          | Great Recession |         |       |      | Covid-19 Recession |         |        |       |
|--------------------------|-----------------|---------|-------|------|--------------------|---------|--------|-------|
|                          | Mean            | Std Dev | Min   | Max  | Mean               | Std Dev | Min    | Max   |
| <b>Panel I: UK</b>       |                 |         |       |      |                    |         |        |       |
| <b>UK Term Structure</b> |                 |         |       |      |                    |         |        |       |
| Pre                      | -0.09           | 0.20    | -0.32 | 0.44 | 0.27               | 0.04    | 0.19   | 0.37  |
| During                   | 0.53            | 0.37    | -0.14 | 1.19 | 0.25               | 0.04    | 0.13   | 0.37  |
| Post                     | 1.11            | 0.18    | 0.68  | 1.33 | 0.33               | 0.03    | 0.26   | 0.41  |
| <b>FTSE 100</b>          |                 |         |       |      |                    |         |        |       |
| Pre                      | -0.02           | 1.28    | -5.48 | 4.75 | 0.00               | 0.79    | -3.23  | 2.25  |
| During                   | -0.06           | 2.24    | -8.85 | 9.84 | -0.13              | 2.33    | -10.87 | 9.05  |
| Post                     | 0.09            | 1.14    | -3.18 | 5.16 | 0.03               | 1.20    | -3.37  | 4.67  |
| <b>Gold</b>              |                 |         |       |      |                    |         |        |       |
| Pre                      | 0.14            | 1.14    | -5.83 | 3.51 | 0.06               | 0.78    | -2.25  | 2.37  |
| During                   | 0.02            | 1.90    | -5.10 | 9.03 | 0.13               | 1.52    | -4.63  | 5.94  |
| Post                     | 0.12            | 1.00    | -4.41 | 2.93 | 0.05               | 1.18    | -4.98  | 2.68  |
| <b>Bitcoin</b>           |                 |         |       |      |                    |         |        |       |
| Pre                      |                 |         |       |      | 1.13               | 4.47    | -13.06 | 19.41 |
| During                   |                 |         |       |      | -0.13              | 4.61    | -14.40 | 11.83 |
| Post                     |                 |         |       |      | 0.53               | 3.49    | -11.19 | 9.86  |
| <b>Panel II: US</b>      |                 |         |       |      |                    |         |        |       |
| <b>US Term Structure</b> |                 |         |       |      |                    |         |        |       |
| Pre                      | 0.10            | 0.10    | -0.12 | 0.49 | 0.19               | 0.02    | 0.15   | 0.23  |
| During                   | 0.87            | 0.23    | 0.20  | 1.47 | 0.27               | 0.08    | 0.08   | 0.46  |
| Post                     | 1.21            | 0.14    | 0.81  | 1.62 | 0.34               | 0.05    | 0.24   | 0.44  |

|                    |       |      |       |       |       |      |        |       |  |
|--------------------|-------|------|-------|-------|-------|------|--------|-------|--|
| <b>S&amp;P 500</b> |       |      |       |       |       |      |        |       |  |
| Pre                | 0.04  | 0.82 | -3.47 | 2.92  | -0.19 | 1.18 | -4.41  | 1.50  |  |
| During             | -0.08 | 2.41 | -9.03 | 11.58 | 0.01  | 4.60 | -11.98 | 9.38  |  |
| Post               | 0.08  | 1.12 | -3.90 | 4.40  | 0.13  | 1.68 | -5.89  | 3.15  |  |
| <b>Gold</b>        |       |      |       |       |       |      |        |       |  |
| Pre                | 0.07  | 1.23 | -7.30 | 4.60  | 0.20  | 0.72 | -1.70  | 1.73  |  |
| During             | 0.06  | 1.81 | -5.83 | 9.03  | 0.13  | 2.33 | -4.63  | 5.94  |  |
| Post               | 0.10  | 1.01 | -4.41 | 3.41  | 0.09  | 1.01 | -2.48  | 2.23  |  |
| <b>Bitcoin</b>     |       |      |       |       |       |      |        |       |  |
| Pre                |       |      |       |       | 0.56  | 3.39 | -5.62  | 9.81  |  |
| During             |       |      |       |       | -0.72 | 4.94 | -14.40 | 10.88 |  |
| Post               |       |      |       |       | -0.32 | 5.29 | -10.97 | 11.83 |  |

The table reports descriptive statistics of the predictor variables during the Great Recession and Covid-19 Recession, segmented into pre-, during, and post-recession phases.

Table 5 reports Pearson correlations between UK and US variables by recession phase. During the Great Recession, correlations were exceptionally high, particularly for bond risk (0.97–0.98) and term structures ( $\geq 0.81$ ), signalling strong synchronisation. These relationships weakened substantially outside the recession window. During the Covid-19 Recession, cross-country correlations were generally lower and more variable, with only moderate alignment in bond risk and term structure. These findings suggest that thematic recessions induce systemic macro-financial synchronisation, while exogenous shocks generate more fragmented responses, further supporting the importance of recession type distinction in risk analysis.

**Table 5**

Pearson correlation matrix: Variable-on-variable overlayed

|                          | Great Recession |        |       | Covid-19 Recession |        |       |
|--------------------------|-----------------|--------|-------|--------------------|--------|-------|
|                          | Pre             | During | Post  | Pre                | During | Post  |
| <b>UK Bond Risk</b>      | 0.13            | 0.97   | -0.30 | -0.69              | 0.06   | -0.64 |
| <b>US Bond Risk</b>      | 0.54            | 0.98   | -0.30 | -0.50              | -0.32  | -0.06 |
| <b>UK Term Structure</b> | 0.82            | 1.00   | 0.77  | -0.33              | 0.36   | -0.05 |
| <b>US Term Structure</b> | 0.81            | 1.00   | 0.15  | 0.26               | 0.28   | 0.61  |
| <b>FTSE 100</b>          | 0.02            | 1.00   | 0.13  | -0.09              | 0.03   | 0.06  |
| <b>S&amp;P 500</b>       | 0.07            | 1.00   | 0.03  | -0.20              | -0.05  | 0.19  |
| <b>Gold</b>              | -0.07           | 1.00   | 0.10  | -0.21              | -0.10  | -0.03 |
| <b>Bitcoin</b>           |                 |        |       | 0.02               | -0.06  | 0.14  |

The table reports the correlation coefficients between UK and US variables, calculated by pairing each variable's performance in one country with its counterpart in the same recession phase in the other country.

## 2.2. Empirical framework

Previous studies have analysed bond risk primarily through regulatory interventions (Nozawa and Qiu, 2021), macroeconomic cyclicalities (Xing et al. 2023), or long-run regional dynamics (Gopalakrishnan and Mohapatra, 2020). We take a different approach by directly comparing two recession types – the thematic Great Recession and the exogenous Covid-19 Recession – using a timeline construction that symmetrically incorporates pre- and post-recession phases.

### **H1: The influence of bond risk determinants varies systematically with recession type, phase, and quantile-level risk distribution**

Our first hypothesis is that the impact of bond risk determinants changes systematically across the pre-, during, and post-recession phases, reflecting evolving macro-financial conditions. For example, investors may demand higher premia before a downturn (Corvino and Fusai, 2022), while the aftermath of recessions often brings lasting productivity losses (Oulton,

2017) and tighter capital constraints (Chen et al. 2011). We also extend this argument across the distribution of bond risk itself, expecting higher risk bonds to respond differently to the same variables than lower risk bonds.

To test this, we estimate bootstrapped quantile regressions (Equation 1) at the 25th, 50th, and 75th percentiles, representing the lower, median, and upper segments of the risk distribution. Each quantile is estimated with up to 500 bootstrap replications in intervals of 100, striking a balance between efficiency and reliability. This is particularly relevant given the daily frequency of our data and the varying regression windows (42 to 398 trading days). The Covid-19 recession represents an unusually short economic contraction, with the NBER dating the downturn from February to April 2020. As a result, the US recession phase contains only 42 trading observations, which is substantially smaller than the corresponding recession window for the Great Recession. This feature reflects the abrupt and compressed nature of the Covid shock rather than a methodological design choice. To mitigate potential small-sample concerns in the quantile regressions, all models are estimated using bootstrap procedures, which help stabilise inference when estimation windows are relatively short. Nevertheless, the Covid-period results should be viewed primarily as evidence of short-run bond risk dynamics during an unusually rapid economic shock. While Guo et al. (2023) apply bootstrapped quantile regression in a panel context, they do not specify replication design. Our framework adds robustness by explicitly layering replications across quantiles. The inclusion of cross-country variables allows the analysis to capture co-movement in corporate bond market risk between the UK and US. These coefficients are therefore reflective of cross-market co-movement in bond risk conditions rather than as definitive evidence of causal contagion.

$$\begin{aligned}
Q_{Bond\ Risk,t}(\tau|Bond\ Risk_{i,t}) \\
&= \alpha(\tau) + \beta_1(\tau)Bond\ Risk_{t-1} + \beta_2(\tau)UK\ Term\ Structure_{t-1} \\
&+ \beta_3(\tau)US\ Term\ Structure_{t-1} + \beta_4(\tau)FTSE\ 100_{t-1} + \beta_5(\tau)SP\ 500_{t-1} \\
&+ \beta_6(\tau)Gold_{t-1} + \beta_7(\tau)Bitcoin_{t-1} + \varepsilon_{t-1}
\end{aligned} \tag{1}$$

The dependent variable is UK or US Bond Risk during the Great Recession and the Covid-19 Recession, segmented into pre-, during, and post-recession phases.  $\tau$  denotes the conditional quantile, with estimation at the 25th, 50th, and 75th percentiles.  $t$  indexes the trading day. Predictor variables are defined in Table 2 (Section 2.1.2). When UK Bond Risk is the dependent variable, US Bond Risk enters as a predictor, and vice versa. Bitcoin is included only for the Covid-19 analyses.

While quantile regression captures conditional effects across the risk distribution, we also examine average effects using a mean-based specification. Specifically, we estimate a fractional probit model (Equation 2), which accommodates dependent variables bounded between 0 and 1. This approach allows us to test whether the patterns observed at different quantiles persist at the mean level, without requiring data transformation.

$$\begin{aligned}
E(Bond\ Risk_t) = & \Phi(\alpha + \beta_1 Bond\ Risk_{t-1} + \beta_2 UK\ Term\ Structure_{t-1} \\
& + \beta_3 US\ Term\ Structure_{t-1} + \beta_4 FTSE\ 100_{t-1} + \beta_5 SP\ 500_{t-1} + \beta_6 Gold_{t-1} \\
& + \beta_7 Bitcoin_{t-1} + \varepsilon_{t-1})
\end{aligned} \tag{2}$$

The dependent variable, bounded between 0 and 1, represents either UK or US Bond Risk during the Great Recession and the Covid-19 Recession, segmented into pre-, during-, and post-recession phases.  $\Phi$  is the cumulative distribution function of the standard normal distribution.  $t$  indexes the trading day. Predictor variables are defined in Table 2 (Section 2.1.2). When UK Bond Risk is the dependent variable, US Bond Risk is included as a predictor, and vice versa. Bitcoin enters only for the Covid-19 analyses

## **H2: Recession-induced changes structurally reconfigure systemic risk transmission pathways.**

This hypothesis examines whether recessions disrupt the established link between bond risk and its predictors. By focusing on changes rather than levels, we assess whether crisis conditions alter the sensitivity of bond risk to macro-financial dynamics. This provides a novel lens for understanding how external shocks reconfigure systemic risk transmission.

To capture these dynamics, we compare bond risk during the recession with the pre-recession phase, and the post-recession phase with the recession itself. Using the symmetrical construction of phases, we introduce a Recession-Induced Change (RIC) measure. For a recession of  $n$  trading days, with  $t$  denoting a trading day in either the recessionary or post-recessionary window, the RIC of a variable is defined as the difference between its value on day  $t$  and its value on day  $t-n$  (Equation 3).

$$RIC_t(Variable) = Variable\ Value_t - Variable\ Value_{t-n} \quad (3)$$

We then estimate OLS regressions (Equations 4 and 5) to evaluate how these induced changes affect the relationship between bond risk and its determinants.

$(RIC)Bond\ Risk_t$

$$\begin{aligned} &= \alpha + \beta_1 Bond\ Risk_{t-1} + \beta_2 UK\ Term\ Structure_{t-1} + \beta_3 US\ Term\ Structure_{t-1} \\ &+ \beta_4 FTSE\ 100_{t-1} + \beta_5 SP\ 500_{t-1} + \beta_6 Gold_{t-1} + \beta_7 Bitcoin_{t-1} \\ &+ \varepsilon_{t-1} \end{aligned} \quad (4)$$

$(RIC)Bond\ Risk_t$

$$\begin{aligned} &= \alpha + \beta_1 (RIC)\ Bond\ Risk_{t-1} + \beta_2 (RIC) UK\ Term\ Structure_{t-1} \\ &+ \beta_3 (RIC) US\ Term\ Structure_{t-1} + \beta_4 (RIC) FTSE\ 100_{t-1} + \beta_5 (RIC) SP\ 500_{t-1} \\ &+ \beta_6 (RIC) Gold_{t-1} + \beta_7 (RIC) Bitcoin_{t-1} + \varepsilon_{t-1} \end{aligned} \quad (5)$$

The dependent variable is UK or US Bond Risk during the Great Recession and the Covid-19 Recession, segmented into pre-, during, and post-recession phases. The prefix *RIC* denotes that the variable is expressed as a recession-induced change, calculated using Equation (3).  $t$  indexes the trading day. Predictor variables are defined in Table 2 (Section 2.1.2). When UK Bond Risk is the dependent variable, US Bond Risk enters as a predictor, and vice versa. Bitcoin is included only for the Covid-19 analyses.

### 2.2.1. Addressing multicollinearity

The empirical framework accounts for country, recession type, phase, and the quantile level of bond risk. As the predictor sets in Equations (1), (2), and (4) are identical, with adjustments applied for Equation (5), pairwise correlation matrices are reported in the Appendix. We adopt a  $\pm 0.70$  threshold to flag multicollinearity. When correlations exceed this threshold, Principal Component Analysis (PCA) is applied to derive orthogonal components. This ensures that systemic risk drivers are identified independently, avoiding distortion from correlated signals. Table 6 summarises the coefficient ranges and variables requiring PCA for Equations (1), (2), and (4), while Table 7 reports the same for Equation (5).

**Table 6**

Summary of Pearson correlation coefficients and PCA assessment: Equations 1, 2, and 4

|                    | Great Recession                     |                                                                                                                                               | Covid-19 Recession                  |                                                                                                 |
|--------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------|
|                    | Acceptable Range:<br>+0.69 to -0.69 | Outliers for PCA<br>(Correlation Coefficient)                                                                                                 | Acceptable Range:<br>+0.69 to -0.69 | Outliers for PCA<br>(Correlation Coefficient)                                                   |
| <b>Panel I: UK</b> |                                     |                                                                                                                                               |                                     |                                                                                                 |
| Pre                | 0.07 to -0.14                       | US Bond Risk & UK<br>Term Structure (0.92);<br>US Bond Risk & US<br>Term Structure (0.89);<br>UK Term Structure & US<br>Term Structure (0.95) | 0.10 to -0.68                       | US Bond Risk & US<br>Term Structure (-0.70);<br>UK Term Structure & US<br>Term Structure (0.74) |

|                     |               |      |               |                                               |
|---------------------|---------------|------|---------------|-----------------------------------------------|
| During              | 0.62 to -0.46 | None | 0.61 to -0.34 | None                                          |
| Post                | 0.65 to -0.38 | None | 0.50 to -0.33 | US Bond Risk & US<br>Term Structure (-0.84)   |
| <b>Panel II: US</b> |               |      |               |                                               |
| Pre                 | 0.64 to -0.08 | None | 0.63 to -0.66 | None                                          |
| During              | 0.66 to -0.08 | None | 0.48 to -0.29 | FTSE 100 & S&P 500<br>(0.71)                  |
| Post                | 0.67 to -0.31 | None | 0.49 to -0.62 | UK Bond Risk and US<br>Term Structure (-0.74) |

The table reports the range of Pearson correlation coefficients and identifies predictor pairs exceeding the  $\pm 0.70$  threshold, requiring PCA adjustment for Equations (1), (2), and (4).

**Table 7**

Summary of Pearson correlation coefficients and PCA assessment: Equation 5

|                     | <b>Great Recession</b>                            |                                                                       | <b>Covid-19 Recession</b>                         |                                                                       |
|---------------------|---------------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------|
|                     | <b>Acceptable Range:</b><br><b>+0.69 to -0.69</b> | <b>Outliers for PCA</b><br><b>(Correlation</b><br><b>Coefficient)</b> | <b>Acceptable Range:</b><br><b>+0.69 to -0.69</b> | <b>Outliers for PCA</b><br><b>(Correlation</b><br><b>Coefficient)</b> |
| <b>Panel I: UK</b>  |                                                   |                                                                       |                                                   |                                                                       |
| During vs. Pre      | 0.58 to -0.21                                     | None                                                                  | 0.58 to -0.11                                     | None                                                                  |
| Post vs. During     | 0.35 to -0.31                                     | None                                                                  | 0.51 to -0.45                                     | None                                                                  |
| <b>Panel II: US</b> |                                                   |                                                                       |                                                   |                                                                       |
| During vs. Pre      | 0.51 to -0.05                                     | None                                                                  | 0.69 to -0.54                                     | None                                                                  |
| Post vs. During     | 0.48 to -0.59                                     | None                                                                  | 0.68 to -0.43                                     | None                                                                  |

The table reports the range of Pearson correlation coefficients and identifies predictor pairs exceeding the  $\pm 0.70$  threshold, requiring PCA adjustment for Equation (5).

Strong correlations are evident among several predictors in Equations (1), (2), and (4), necessitating PCA adjustment. In contrast, no multicollinearity is detected for the specifications in Equation (5). Table 8 presents the eigenvectors generated from PCA, which are subsequently used to back-transform regression coefficients, ensuring that the results retain appropriate economic interpretability.

**Table 8**

Eigenvectors from PCA applied to highly correlated predictors

| Variable                                       | Component 1 | Component 2 | Component 3 |
|------------------------------------------------|-------------|-------------|-------------|
| <b>Panel I: UK Pre-Great Recession</b>         |             |             |             |
| US Bond Risk                                   | 0.5715      | 0.7752      | 0.2692      |
| UK Term Structure                              | 0.5840      | -0.1538     | -0.7970     |
| US Term Structure                              | 0.5764      | -0.6128     | 0.5406      |
| <b>Panel II: UK Pre-Covid-19 Recession</b>     |             |             |             |
| US Bond Risk                                   | -0.5687     | 0.8074      | 0.1570      |
| UK Term Structure                              | 0.5788      | 0.5284      | -0.6211     |
| US Term Structure                              | 0.5845      | 0.2623      | 0.7679      |
| <b>Panel III: UK Post-Covid-19 Recession</b>   |             |             |             |
| US Bond Risk                                   | -0.7071     | 0.7071      |             |
| US Term Structure                              | 0.7071      | 0.7071      |             |
| <b>Panel III: US During Covid-19 Recession</b> |             |             |             |
| FTSE 100                                       | 0.7071      | 0.7071      |             |
| S&P 500                                        | 0.7071      | -0.7071     |             |
| <b>Panel IV: US Post-Covid-19 Recession</b>    |             |             |             |
| UK Bond Risk                                   | -0.7071     | 0.7071      |             |
| US Term Structure                              | 0.7071      | 0.7071      |             |

The table reports eigenvectors derived from PCA for variable pairs identified as highly correlated in Table 6. These eigenvectors are used to back-transform regression coefficients to preserve economic interpretability.

### 3. Results

#### *3.1. Bootstrap quantile-level determinants of risk*

Tables 9 to 20 report the results of testing H1 using the bootstrapped quantile regressions specified in Equation (1). The results are presented thematically for the two recessions. In discussing the findings, we describe coefficient patterns as either convex (U-shaped) or concave (inverted U-shaped), signalling non-linear relationships across quantiles. These non-linearities emerge consistently for both the UK and the US, highlighting the need to account for heterogeneity in the determinants of bond risk.

##### *3.1.1. Thematic Great Recession*

UK Bond Risk was consistently influenced by macroeconomic indicators across all three phases of the Great Recession, though the strength and structure of these relationships shifted over time. US Bond Risk exerted a positive effect throughout, mild and stable in the pre-recession phase – reflecting early cross-border market integration – before intensifying during the recession in a convex form; signalling co-movement under systemic stress. Post-recession, the effect remained strong but gradually declined, suggesting stabilisation alongside persistent interconnectedness. The US Term Structure followed a similar trajectory. Initially weak and negative, it turned strongly positive during the recession, adopting a convex pattern likely linked to shifting expectations around US monetary policy. Its impact reversed again post-recession, remaining negative at lower and median quantiles. The UK Term Structure also evolved: slightly positive and downward-sloping before the recession, strongly negative and upward-sloping during it, and maintaining this shape after. This indicates that yield curve steepening was read domestically as a sign of recovery and improving creditworthiness.

Overall, the results highlight persistent macroeconomic co-movement of the US with the UK, with integration deepening during crisis and continuing into recovery. Yet, interpretations

of yield curves diverged. In the UK, curve steepening initially signalled recession risk but later stabilisation, reflecting coordinated monetary and fiscal support. By contrast, for the UK bond market, the US curve steepening during the recession was seen as a warning signal that faded afterwards, consistent with its role as a proxy for credit conditions. Markets likely anticipated rate hikes before full recovery to offset inflationary and debt-driven risks from earlier stimulus.

Turning to financial indicators, their effects on UK Bond Risk were weak and inconsistent. During the recession, neither the FTSE 100 nor the S&P 500 had significant influence, indicating the disconnection between equity and bond markets under stress. In the pre-recession phase, the FTSE 100 had a minor negative effect at the upper quantile, reappearing post-recession at the lower and median quantiles. The S&P 500 showed a negative impact only at the post-recession median quantile. These results suggest that equity–bond linkages were confined to non-crisis periods and were stronger for domestic equities. Gold showed no significant effect throughout, implying its traditional safe-haven role was not directly reflected in UK bond risk at this time.

US Bond Risk showed a strong and evolving relationship with macroeconomic indicators, highlighting consistent co-movement with the UK. A positive influence was exerted by UK Bond Risk across all phases. Strong and concave before the recession that intensified further during it, and post-recession remaining elevated but shifting to a convex shape, signalling altered sensitivity across the risk distribution. The UK Term Structure also displayed a dynamic role. Strongly negative and downward-sloping in the pre-recession phase, it disappeared during the recession but re-emerged post-recession as strongly positive with a concave form. By contrast, the US Term Structure followed an inverted path: strongly positive and concave pre-recession, negative and convex during the recession, and modestly positive at only the lower quantile post-recession.

These results confirm the existence of a tightly integrated transatlantic risk transmission channel, through co-movement between the UK and the US appearing more pronounced. Importantly, yield curve signals were interpreted differently. In the UK, post-recession steepening suggested recovery and stabilisation, while in the US it was seen as a sign of forthcoming monetary tightening that could strain credit conditions. This divergence highlights how the same signal was read through different macro-financial lenses, with US Bond Risk already embedding much of the yield curve's risk expectations.

Financial indicators exhibited more varied but still crisis-sensitive patterns. The S&P 500 exerted a mild positive influence at the lower quantile pre-recession, disappeared during the recession, and returned post-recession at the lower and upper quantiles. The FTSE 100 had only a marginal positive effect post-recession, limited to the lower and median quantiles. Gold showed a weak positive effect at the median quantile pre-recession but was otherwise insignificant. Unlike in the UK, where equity–bond linkages were more aligned, the US results point to an inverse relationship: equities appear to serve as a diversification outlet when bond risk is elevated. The limited role of gold suggests its traditional safe-haven function was confined to early instability signals.

**Table 9**

Bootstrapped quantile regression results for UK Bond Risk – Pre-Great Recession

|                              | 25th Quantile |           |           |           |           | 50th Quantile |           |           |           |           | 75th Quantile |           |           |           |           |
|------------------------------|---------------|-----------|-----------|-----------|-----------|---------------|-----------|-----------|-----------|-----------|---------------|-----------|-----------|-----------|-----------|
| Replications                 | 100           | 200       | 300       | 400       | 500       | 100           | 200       | 300       | 400       | 500       | 100           | 200       | 300       | 400       | 500       |
| <b>US Bond<br/>Risk</b>      | 0.002***      | 0.002***  | 0.002***  | 0.002***  | 0.002***  | 0.002***      | 0.002***  | 0.002***  | 0.002***  | 0.002***  | 0.002***      | 0.002***  | 0.002***  | 0.002***  | 0.002***  |
|                              | (26.26)       | (25.55)   | (25.69)   | (25.75)   | (25.82)   | (21.43)       | (22.63)   | (20.81)   | (21.08)   | (21.19)   | (28.50)       | (26.63)   | (26.25)   | (26.54)   | (26.48)   |
|                              | (6.27)        | (6.76)    | (7.09)    | (7.21)    | (7.30)    | (8.63)        | (8.73)    | (8.80)    | (8.95)    | (8.94)    | (6.18)        | (6.24)    | (6.35)    | (6.36)    | (6.35)    |
|                              | (-3.09)       | (-3.16)   | (-3.07)   | (-3.09)   | (-2.98)   | (-3.21)       | (-3.36)   | (-3.24)   | (-3.21)   | (-3.18)   | (-4.96)       | (-5.31)   | (-5.40)   | (-5.35)   | (-5.40)   |
| <b>UK Term<br/>Structure</b> | 0.004***      | 0.004***  | 0.004***  | 0.004***  | 0.004***  | 0.003***      | 0.003***  | 0.003***  | 0.003***  | 0.003***  | 0.003***      | 0.003***  | 0.003***  | 0.003***  | 0.003***  |
|                              | (26.26)       | (25.55)   | (25.69)   | (25.75)   | (25.82)   | (21.43)       | (22.63)   | (20.81)   | (21.08)   | (21.19)   | (28.50)       | (26.63)   | (26.25)   | (26.54)   | (26.48)   |
|                              | (6.27)        | (6.76)    | (7.09)    | (7.21)    | (7.30)    | (8.63)        | (8.73)    | (8.80)    | (8.95)    | (8.94)    | (6.18)        | (6.24)    | (6.35)    | (6.36)    | (6.35)    |
|                              | (-3.09)       | (-3.16)   | (-3.07)   | (-3.09)   | (-2.98)   | (-3.21)       | (-3.36)   | (-3.24)   | (-3.21)   | (-3.18)   | (-4.96)       | (-5.31)   | (-5.40)   | (-5.35)   | (-5.40)   |
| <b>US Term<br/>Structure</b> | -0.002***     | -0.002*** | -0.002*** | -0.002*** | -0.002*** | -0.002***     | -0.002*** | -0.002*** | -0.002*** | -0.002*** | -0.002***     | -0.002*** | -0.002*** | -0.002*** | -0.002*** |
|                              | (26.26)       | (25.55)   | (25.69)   | (25.75)   | (25.82)   | (21.43)       | (22.63)   | (20.81)   | (21.08)   | (21.19)   | (28.50)       | (26.63)   | (26.25)   | (26.54)   | (26.48)   |
|                              | (6.27)        | (6.76)    | (7.09)    | (7.21)    | (7.30)    | (8.63)        | (8.73)    | (8.80)    | (8.95)    | (8.94)    | (6.18)        | (6.24)    | (6.35)    | (6.36)    | (6.35)    |
|                              | (-3.09)       | (-3.16)   | (-3.07)   | (-3.09)   | (-2.98)   | (-3.21)       | (-3.36)   | (-3.24)   | (-3.21)   | (-3.18)   | (-4.96)       | (-5.31)   | (-5.40)   | (-5.35)   | (-5.40)   |
| <b>FTSE 100</b>              | -0.028        | -0.028    | -0.028    | -0.028    | -0.028    | -0.015        | -0.015    | -0.015    | -0.015    | -0.015    | -0.019**      | -0.019*   | -0.019*   | -0.019*   | -0.019*   |
|                              | (-1.35)       | (-1.35)   | (-1.36)   | (-1.37)   | (-1.35)   | (-1.24)       | (-1.31)   | (-1.26)   | (-1.23)   | (-1.22)   | (-2.04)       | (-1.95)   | (-1.84)   | (-1.79)   | (-1.60)   |
| <b>S&amp;P 500</b>           | -0.027        | -0.027    | -0.027    | -0.027    | -0.027    | -0.020        | -0.020    | -0.020    | -0.020    | -0.020    | -0.010        | -0.010    | -0.010    | -0.010    | -0.010    |
|                              | (-1.51)       | (-1.56)   | (-1.52)   | (-1.51)   | (-1.52)   | (-1.34)       | (-1.34)   | (-1.35)   | (-1.38)   | (-1.39)   | (-1.11)       | (-1.09)   | (-1.10)   | (-1.13)   | (-1.14)   |
| <b>Gold</b>                  | 0.007         | 0.007     | 0.007     | 0.007     | 0.007     | 0.016         | 0.016     | 0.016     | 0.016     | 0.016     | 0.007         | 0.007     | 0.007     | 0.007     | 0.007     |
|                              | (0.49)        | (0.51)    | (0.52)    | (0.50)    | (0.50)    | (1.16)        | (1.17)    | (1.17)    | (1.13)    | (1.13)    | (0.87)        | (0.86)    | (0.84)    | (0.86)    | (0.88)    |
| <b>Constant</b>              | 0.017***      | 0.017***  | 0.017***  | 0.017***  | 0.017***  | 0.019***      | 0.019***  | 0.019***  | 0.019***  | 0.019***  | 0.020***      | 0.020***  | 0.020***  | 0.020***  | 0.020***  |
|                              | (84.96)       | (91.91)   | (91.65)   | (92.70)   | (93.45)   | (96.25)       | (91.21)   | (94.79)   | (93.01)   | (94.85)   | (152.63)      | (150.12)  | (156.39)  | (153.53)  | (151.79)  |
| <b>Pseudo R<sup>2</sup></b>  | 0.580         | 0.580     | 0.580     | 0.580     | 0.580     | 0.607         | 0.607     | 0.607     | 0.607     | 0.607     | 0.669         | 0.669     | 0.669     | 0.669     | 0.669     |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's pre-Great Recession phase (29 Dec 2006 to 31 Mar 2008). To address multicollinearity, PCA was applied

was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

**Table 10**

Bootstrapped quantile regression results for UK Bond Risk – During Great Recession

|                             | 25 <sup>th</sup> Quantile |                      |                      |                      |                      | 50 <sup>th</sup> Quantile |                      |                      |                      |                      | 75 <sup>th</sup> Quantile |                      |                      |                      |                      |
|-----------------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Replications                | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  |
| <b>US Bond Risk</b>         | 0.664***<br>(21.29)       | 0.664***<br>(22.13)  | 0.664***<br>(21.47)  | 0.664***<br>(21.82)  | 0.664***<br>(21.82)  | 0.638***<br>(27.84)       | 0.638***<br>(24.06)  | 0.638***<br>(24.50)  | 0.638***<br>(24.17)  | 0.638***<br>(23.86)  | 0.655***<br>(22.58)       | 0.655***<br>(22.07)  | 0.655***<br>(22.17)  | 0.655***<br>(22.09)  | 0.655***<br>(22.01)  |
| <b>UK Term Structure</b>    | -0.335***<br>(-4.42)      | -0.335***<br>(-4.45) | -0.335***<br>(-4.25) | -0.335***<br>(-4.32) | -0.335***<br>(-4.33) | -0.460***<br>(-6.10)      | -0.460***<br>(-5.44) | -0.460***<br>(-5.20) | -0.460***<br>(-5.28) | -0.460***<br>(-5.36) | -0.464***<br>(-4.35)      | -0.464***<br>(-3.92) | -0.464***<br>(-4.07) | -0.464***<br>(-4.00) | -0.464***<br>(-4.00) |
| <b>US Term Structure</b>    | 1.006***<br>(7.02)        | 1.006***<br>(6.80)   | 1.006***<br>(6.78)   | 1.006***<br>(6.84)   | 1.006***<br>(6.92)   | 0.969***<br>(6.21)        | 0.969***<br>(6.25)   | 0.969***<br>(6.22)   | 0.969***<br>(6.24)   | 0.969***<br>(6.24)   | 1.012***<br>(7.13)        | 1.012***<br>(6.96)   | 1.012***<br>(7.26)   | 1.012***<br>(7.14)   | 1.012***<br>(7.02)   |
| <b>FTSE 100</b>             | -0.004<br>(-0.36)         | -0.004<br>(-0.32)    | -0.004<br>(-0.32)    | -0.004<br>(-0.32)    | -0.004<br>(-0.32)    | -0.005<br>(-0.44)         | -0.005<br>(-0.42)    | -0.005<br>(-0.40)    | -0.005<br>(-0.39)    | -0.005<br>(-0.40)    | -0.009<br>(-1.32)         | -0.009<br>(-1.28)    | -0.009<br>(-1.25)    | -0.009<br>(-1.22)    | -0.009<br>(-1.23)    |
| <b>S&amp;P 500</b>          | 0.009<br>(0.86)           | 0.009<br>(0.85)      | 0.009<br>(0.90)      | 0.009<br>(0.93)      | 0.009<br>(0.94)      | 0.001<br>(0.02)           | 0.001<br>(0.02)      | 0.001<br>(0.02)      | 0.001<br>(0.02)      | 0.001<br>(0.02)      | -0.011<br>(-1.46)         | -0.011<br>(-1.53)    | -0.011<br>(-1.54)    | -0.011<br>(-1.51)    | -0.011<br>(-1.51)    |
| <b>Gold</b>                 | -0.001<br>(-0.11)         | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | 0.001<br>(0.11)           | 0.001<br>(0.11)      | 0.001<br>(0.11)      | 0.001<br>(0.10)      | 0.001<br>(0.11)      | -0.005<br>(-0.68)         | -0.005<br>(-0.67)    | -0.005<br>(-0.62)    | -0.005<br>(-0.62)    | -0.005<br>(-0.63)    |
| <b>Constant</b>             | -0.003<br>(-1.36)         | -0.003<br>(-1.40)    | -0.003<br>(-1.36)    | -0.003<br>(-1.39)    | -0.003<br>(-1.40)    | 0.001<br>(0.49)           | 0.001<br>(0.45)      | 0.001<br>(0.46)      | 0.001<br>(0.45)      | 0.001<br>(0.44)      | 0.001<br>(1.07)           | 0.001<br>(1.06)      | 0.001<br>(1.09)      | 0.001<br>(1.06)      | 0.001<br>(1.04)      |
| <b>Pseudo R<sup>2</sup></b> | 0.497                     | 0.497                | 0.497                | 0.497                | 0.497                | 0.534                     | 0.534                | 0.534                | 0.534                | 0.534                | 0.540                     | 0.540                | 0.540                | 0.540                | 0.540                |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's Great Recession phase (1 Apr 2008 to 30 Jun 2009). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

Table 11

Bootstrapped quantile regression results for UK Bond Risk – Post-Great Recession

|                             | 25 <sup>th</sup> Quantile |                      |                      |                      |                      | 50 <sup>th</sup> Quantile |                      |                      |                      |                      | 75 <sup>th</sup> Quantile |                      |                      |                      |                      |
|-----------------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Replications                | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  |
| <b>US Bond Risk</b>         | 0.831***<br>(20.27)       | 0.831***<br>(21.56)  | 0.831***<br>(21.86)  | 0.831***<br>(21.62)  | 0.831***<br>(21.96)  | 0.804***<br>(31.58)       | 0.804***<br>(30.77)  | 0.804***<br>(30.29)  | 0.804***<br>(30.43)  | 0.804***<br>(31.20)  | 0.797***<br>(20.20)       | 0.797***<br>(20.58)  | 0.797***<br>(20.27)  | 0.797***<br>(20.29)  | 0.797***<br>(20.33)  |
| <b>UK Term Structure</b>    | -0.257**<br>(-2.55)       | -0.257***<br>(-2.64) | -0.257**<br>(-2.48)  | -0.257**<br>(-2.50)  | -0.257**<br>(-2.50)  | -0.321***<br>(-3.11)      | -0.321***<br>(-3.03) | -0.321***<br>(-3.01) | -0.321***<br>(-3.08) | -0.321***<br>(-3.05) | -0.453***<br>(-3.28)      | -0.453***<br>(-3.26) | -0.453***<br>(-3.22) | -0.453***<br>(-3.12) | -0.453***<br>(-3.21) |
| <b>US Term Structure</b>    | -0.250<br>(-1.63)         | -0.250*<br>(-1.75)   | -0.250*<br>(-1.83)   | -0.250*<br>(-1.83)   | -0.250*<br>(-1.84)   | -0.276**<br>(-2.01)       | -0.276*<br>(-1.87)   | -0.276*<br>(-1.89)   | -0.276*<br>(-1.90)   | -0.276*<br>(-1.85)   | -0.052<br>(-0.22)         | -0.052<br>(-0.21)    | -0.052<br>(-0.20)    | -0.052<br>(-0.20)    | -0.052<br>(-0.20)    |
| <b>FTSE 100</b>             | -0.043**<br>(-2.48)       | -0.043***<br>(-2.69) | -0.043***<br>(-2.75) | -0.043***<br>(-2.81) | -0.043***<br>(-2.80) | -0.034**<br>(-2.11)       | -0.034**<br>(-2.21)  | -0.034**<br>(-2.26)  | -0.034**<br>(-2.30)  | -0.034**<br>(-2.23)  | -0.002<br>(-0.18)         | -0.002<br>(-0.19)    | -0.002<br>(-0.20)    | -0.002<br>(-0.20)    | -0.002<br>(-0.20)    |
| <b>S&amp;P 500</b>          | -0.006<br>(-0.42)         | -0.006<br>(-0.45)    | -0.006<br>(-0.45)    | -0.006<br>(-0.44)    | -0.006<br>(-0.44)    | -0.025**<br>(-2.27)       | -0.025**<br>(-2.14)  | -0.025**<br>(-2.19)  | -0.025**<br>(-2.21)  | -0.025**<br>(-2.20)  | -0.025<br>(-1.46)         | -0.025<br>(-1.39)    | -0.025<br>(-1.41)    | -0.025<br>(-1.35)    | -0.025<br>(-1.37)    |
| <b>Gold</b>                 | -0.017<br>(-1.05)         | -0.017<br>(-1.08)    | -0.017<br>(-1.08)    | -0.017<br>(-1.06)    | -0.017<br>(-1.06)    | -0.006<br>(-0.65)         | -0.006<br>(-0.63)    | -0.006<br>(-0.62)    | -0.006<br>(-0.64)    | -0.006<br>(-0.61)    | 0.005<br>(0.27)           | 0.005<br>(0.27)      | 0.005<br>(0.28)      | 0.005<br>(0.28)      | 0.005<br>(0.27)      |
| <b>Constant</b>             | 0.006**<br>(2.33)         | 0.006**<br>(2.49)    | 0.006***<br>(2.58)   | 0.006***<br>(2.62)   | 0.006***<br>(2.64)   | 0.009***<br>(4.57)        | 0.009***<br>(4.60)   | 0.009***<br>(4.52)   | 0.009***<br>(4.57)   | 0.009***<br>(4.56)   | 0.009***<br>(3.30)        | 0.009***<br>(3.31)   | 0.009***<br>(3.19)   | 0.009***<br>(3.23)   | 0.009***<br>(3.17)   |
| <b>Pseudo R<sup>2</sup></b> | 0.633                     | 0.633                | 0.633                | 0.633                | 0.633                | 0.562                     | 0.562                | 0.562                | 0.562                | 0.562                | 0.492                     | 0.492                | 0.492                | 0.492                | 0.492                |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's post-Great Recession phase (1 Jul 2009 to 29 Sep 2010). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

Table 12

Bootstrapped quantile regression results for US Bond Risk – Pre-Great Recession

|                             | 25 <sup>th</sup> Quantile |                       |                       |                       |                       | 50 <sup>th</sup> Quantile |                       |                       |                       |                       | 75 <sup>th</sup> Quantile |                      |                      |                      |                      |
|-----------------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Replications                | 100                       | 200                   | 300                   | 400                   | 500                   | 100                       | 200                   | 300                   | 400                   | 500                   | 100                       | 200                  | 300                  | 400                  | 500                  |
| <b>UK Bond Risk</b>         | 0.700***<br>(8.22)        | 0.700***<br>(8.24)    | 0.700***<br>(8.27)    | 0.700***<br>(8.44)    | 0.700***<br>(8.41)    | 0.715***<br>(12.91)       | 0.715***<br>(12.47)   | 0.715***<br>(12.48)   | 0.715***<br>(12.61)   | 0.715***<br>(12.90)   | 0.673***<br>(15.68)       | 0.673***<br>(15.43)  | 0.673***<br>(14.35)  | 0.673***<br>(14.02)  | 0.673***<br>(14.17)  |
| <b>UK Term Structure</b>    | -3.913***<br>(-14.67)     | -3.913***<br>(-15.90) | -3.913***<br>(-16.10) | -3.913***<br>(-15.99) | -3.913***<br>(-15.65) | -3.096***<br>(-9.89)      | -3.096***<br>(-10.24) | -3.096***<br>(-10.29) | -3.096***<br>(-10.20) | -3.096***<br>(-10.30) | -2.194***<br>(-5.82)      | -2.194***<br>(-5.93) | -2.194***<br>(-5.63) | -2.194***<br>(-5.32) | -2.194***<br>(-5.28) |
| <b>US Term Structure</b>    | 2.817***<br>(9.51)        | 2.817***<br>(8.40)    | 2.817***<br>(8.47)    | 2.817***<br>(8.78)    | 2.817***<br>(8.87)    | 2.923***<br>(15.88)       | 2.923***<br>(16.16)   | 2.923***<br>(16.22)   | 2.923***<br>(16.18)   | 2.923***<br>(16.07)   | 2.553***<br>(10.46)       | 2.553***<br>(10.27)  | 2.553***<br>(9.91)   | 2.553***<br>(9.39)   | 2.553***<br>(9.32)   |
| <b>FTSE 100</b>             | 0.015<br>(1.02)           | 0.015<br>(1.04)       | 0.015<br>(1.06)       | 0.015<br>(1.07)       | 0.015<br>(1.03)       | 0.031<br>(1.39)           | 0.031<br>(1.44)       | 0.031<br>(1.35)       | 0.031<br>(1.39)       | 0.031<br>(1.40)       | 0.017<br>(0.84)           | 0.017<br>(0.84)      | 0.017<br>(0.82)      | 0.017<br>(0.83)      | 0.017<br>(0.82)      |
| <b>S&amp;P 500</b>          | 0.043**<br>(2.36)         | 0.043**<br>(2.18)     | 0.043**<br>(2.13)     | 0.043*<br>(2.13)      | 0.043**<br>(2.10)     | -0.017<br>(-0.64)         | -0.017<br>(-0.64)     | -0.017<br>(-0.64)     | -0.017<br>(-0.65)     | -0.017<br>(-0.64)     | 0.011<br>(0.77)           | 0.011<br>(0.66)      | 0.011<br>(0.64)      | 0.011<br>(0.63)      | 0.011<br>(0.63)      |
| <b>Gold</b>                 | 0.005<br>(0.39)           | 0.006<br>(0.35)       | 0.006<br>(0.35)       | 0.006<br>(0.36)       | 0.006<br>(0.35)       | 0.025**<br>(2.19)         | 0.025**<br>(2.07)     | 0.025**<br>(2.02)     | 0.025**<br>(2.08)     | 0.025**<br>(2.03)     | 0.009<br>(0.60)           | 0.009<br>(0.58)      | 0.009<br>(1.59)      | 0.009<br>(0.58)      | 0.009<br>(0.58)      |
| <b>Constant</b>             | -0.006***<br>(-4.07)      | -0.006***<br>(-3.98)  | -0.006***<br>(-4.02)  | -0.006***<br>(-4.04)  | -0.006***<br>(-4.08)  | -0.002**<br>(-1.97)       | -0.002*<br>(-1.93)    | -0.002**<br>(-1.99)   | -0.002*<br>(-1.97)    | -0.002**<br>(-2.01)   | 0.001<br>(1.12)           | 0.001<br>(1.14)      | 0.001<br>(1.06)      | 0.001<br>(1.00)      | 0.001<br>(1.00)      |
| <b>Pseudo R<sup>2</sup></b> | 0.415                     | 0.415                 | 0.415                 | 0.415                 | 0.415                 | 0.376                     | 0.376                 | 0.376                 | 0.376                 | 0.376                 | 0.376                     | 0.376                | 0.376                | 0.376                | 0.376                |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' pre-Great Recession phase (10 May 2006 to 30 Nov 2007). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

**Table 13**

Bootstrapped quantile regression results for US Bond Risk – During Great Recession

|                             | 25 <sup>th</sup> Quantile |                     |                     |                     |                     | 50 <sup>th</sup> Quantile |                     |                     |                     |                     | 75 <sup>th</sup> Quantile |                     |                     |                     |                     |
|-----------------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|
| Replications                | 100                       | 200                 | 300                 | 400                 | 500                 | 100                       | 200                 | 300                 | 400                 | 500                 | 100                       | 200                 | 300                 | 400                 | 500                 |
| <b>UK Bond Risk</b>         | 1.126***<br>(17.91)       | 1.126***<br>(18.66) | 1.126***<br>(18.21) | 1.126***<br>(18.06) | 1.126***<br>(17.96) | 1.188***<br>(32.01)       | 1.188***<br>(33.04) | 1.188***<br>(33.70) | 1.188***<br>(33.90) | 1.188***<br>(33.25) | 1.168***<br>(30.36)       | 1.168***<br>(27.27) | 1.168***<br>(26.23) | 1.168***<br>(26.62) | 1.168***<br>(26.53) |
| <b>UK Term Structure</b>    | -0.081<br>(-0.56)         | -0.081<br>(-0.54)   | -0.081<br>(-0.52)   | -0.081<br>(-0.52)   | -0.081<br>(-0.53)   | -0.073<br>(-0.55)         | -0.073<br>(-0.58)   | -0.073<br>(-0.57)   | -0.073<br>(-0.58)   | -0.073<br>(-0.58)   | 0.081<br>(0.51)           | 0.081<br>(0.49)     | 0.081<br>(0.48)     | 0.081<br>(0.47)     | 0.081<br>(0.47)     |
| <b>US Term Structure</b>    | -0.399*<br>(-1.91)        | -0.399*<br>(-1.86)  | -0.399*<br>(-1.81)  | -0.399*<br>(-1.83)  | -0.399*<br>(-1.84)  | -0.329<br>(-1.60)         | -0.329*<br>(-1.70)  | -0.329*<br>(-1.66)  | -0.329*<br>(-1.68)  | -0.329*<br>(-1.69)  | -0.721**<br>(-2.37)       | -0.721**<br>(-2.30) | -0.721**<br>(-2.30) | -0.721**<br>(-2.30) | -0.721**<br>(-2.28) |
| <b>FTSE 100</b>             | 0.004<br>(0.41)           | 0.004<br>(0.38)     | 0.004<br>(0.38)     | 0.004<br>(0.38)     | 0.004<br>(0.37)     | -0.001<br>(-0.09)         | -0.001<br>(-0.09)   | -0.001<br>(-0.10)   | -0.001<br>(-0.10)   | -0.001<br>(-0.10)   | -0.001<br>(-0.03)         | -0.001<br>(-0.03)   | -0.001<br>(-0.03)   | -0.001<br>(-0.03)   | -0.001<br>(-0.03)   |
| <b>S&amp;P 500</b>          | 0.012<br>(1.22)           | 0.012<br>(1.25)     | 0.012<br>(1.19)     | 0.012<br>(1.22)     | 0.012<br>(1.20)     | 0.007<br>(0.73)           | 0.007<br>(0.77)     | 0.007<br>(0.80)     | 0.007<br>(0.79)     | 0.007<br>(0.80)     | -0.001<br>(-0.08)         | -0.001<br>(-0.08)   | -0.001<br>(-0.08)   | -0.001<br>(-0.08)   | -0.001<br>(-0.08)   |
| <b>Gold</b>                 | -0.002<br>(-0.23)         | -0.002<br>(-0.23)   | -0.002<br>(-0.22)   | -0.002<br>(-0.21)   | -0.002<br>(-0.21)   | -0.008<br>(-0.61)         | -0.008<br>(-0.58)   | -0.008<br>(-0.58)   | -0.008<br>(-0.58)   | -0.008<br>(-0.58)   | 0.002<br>(0.18)           | 0.002<br>(0.17)     | 0.002<br>(0.17)     | 0.002<br>(0.16)     | 0.002<br>(0.17)     |
| <b>Constant</b>             | 0.005**<br>(2.25)         | 0.005**<br>(2.36)   | 0.005**<br>(2.41)   | 0.005**<br>(2.41)   | 0.005**<br>(2.40)   | 0.004***<br>(3.07)        | 0.004***<br>(3.02)  | 0.004***<br>(2.98)  | 0.004***<br>(3.02)  | 0.004***<br>(3.07)  | 0.010***<br>(4.63)        | 0.010***<br>(4.26)  | 0.010***<br>(4.39)  | 0.010***<br>(4.40)  | 0.010***<br>(4.55)  |
| <b>Pseudo R<sup>2</sup></b> | 0.523                     | 0.523               | 0.523               | 0.523               | 0.523               | 0.573                     | 0.573               | 0.573               | 0.573               | 0.573               | 0.567                     | 0.567               | 0.567               | 0.567               | 0.567               |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' Great Recession phase (1 Dec 2007 to 30 Jun 2009). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

**Table 14**

Bootstrapped quantile regression results for US Bond Risk – Post-Great Recession

|                             | 25 <sup>th</sup> Quantile |                      |                      |                      |                      | 50 <sup>th</sup> Quantile |                      |                      |                      |                      | 75 <sup>th</sup> Quantile |                     |                     |                      |                     |
|-----------------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|---------------------|---------------------|----------------------|---------------------|
| Replications                | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                 | 300                 | 400                  | 500                 |
| <b>UK Bond Risk</b>         | 1.052***<br>(37.50)       | 1.052***<br>(40.96)  | 1.052***<br>(39.52)  | 1.052***<br>(38.05)  | 1.052***<br>(39.26)  | 1.042***<br>(29.60)       | 1.042***<br>(31.79)  | 1.042***<br>(32.00)  | 1.042***<br>(31.74)  | 1.042***<br>(32.37)  | 1.068***<br>(31.00)       | 1.068***<br>(29.19) | 1.068***<br>(29.97) | 1.068***<br>(30.30)  | 1.068***<br>(30.26) |
| <b>UK Term Structure</b>    | 0.521***<br>(5.47)        | 0.521***<br>(5.38)   | 0.521***<br>(5.52)   | 0.521***<br>(5.51)   | 0.521***<br>(5.37)   | 0.729***<br>(5.43)        | 0.729***<br>(5.66)   | 0.729***<br>(5.51)   | 0.729***<br>(5.51)   | 0.729***<br>(5.53)   | 0.523***<br>(4.44)        | 0.523***<br>(4.62)  | 0.523***<br>(4.56)  | 0.523***<br>(4.63)   | 0.523***<br>(4.59)  |
| <b>US Term Structure</b>    | 0.256**<br>(2.31)         | 0.256**<br>(2.37)    | 0.256**<br>(2.30)    | 0.256**<br>(2.24)    | 0.256**<br>(2.22)    | 0.031<br>(0.26)           | 0.031<br>(0.27)      | 0.031<br>(0.25)      | 0.031<br>(0.25)      | 0.031<br>(0.25)      | 0.150<br>(0.92)           | 0.150<br>(0.93)     | 0.150<br>(0.93)     | 0.150<br>(0.94)      | 0.150<br>(0.94)     |
| <b>FTSE 100</b>             | 0.028***<br>(2.66)        | 0.028***<br>(2.73)   | 0.028***<br>(2.79)   | 0.028***<br>(2.74)   | 0.028***<br>(2.73)   | 0.028*<br>(1.67)          | 0.028*<br>(1.74)     | 0.028*<br>(1.69)     | 0.028*<br>(1.70)     | 0.028*<br>(1.71)     | 0.016<br>(0.86)           | 0.016<br>(0.82)     | 0.016<br>(0.85)     | 0.016<br>(0.83)      | 0.016<br>(0.83)     |
| <b>S&amp;P 500</b>          | 0.025***<br>(2.62)        | 0.025**<br>(2.16)    | 0.025**<br>(2.26)    | 0.025**<br>(2.22)    | 0.025**<br>(2.26)    | 0.015<br>(1.29)           | 0.015<br>(1.07)      | 0.015<br>(1.03)      | 0.015<br>(1.01)      | 0.015<br>(1.02)      | 0.024*<br>(1.85)          | 0.024*<br>(1.78)    | 0.024*<br>(1.75)    | 0.024*<br>(1.74)     | 0.024*<br>(1.73)    |
| <b>Gold</b>                 | 0.002<br>(0.33)           | 0.002<br>(0.34)      | 0.002<br>(0.33)      | 0.002<br>(0.32)      | 0.002<br>(0.31)      | 0.013<br>(0.87)           | 0.013<br>(0.91)      | 0.013<br>(0.88)      | 0.013<br>(0.90)      | 0.013<br>(0.89)      | 0.005<br>(0.28)           | 0.005<br>(0.29)     | 0.005<br>(0.29)     | 0.005<br>(0.29)      | 0.005<br>(0.29)     |
| <b>Constant</b>             | -0.008***<br>(-5.56)      | -0.008***<br>(-6.01) | -0.008***<br>(-6.05) | -0.008***<br>(-5.68) | -0.008***<br>(-5.84) | -0.006***<br>(-3.76)      | -0.006***<br>(-3.97) | -0.006***<br>(-4.05) | -0.006***<br>(-3.91) | -0.006***<br>(-3.99) | -0.004**<br>(-2.57)       | -0.004**<br>(-2.46) | -0.004**<br>(-2.52) | -0.004***<br>(-2.61) | -0.004**<br>(-2.60) |
| <b>Pseudo R<sup>2</sup></b> | 0.639                     | 0.639                | 0.639                | 0.639                | 0.639                | 0.602                     | 0.602                | 0.602                | 0.602                | 0.602                | 0.592                     | 0.592               | 0.592               | 0.592                | 0.592               |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' post-Great Recession phase (1 Jul 2009 to 25 Jan 2011). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

### *3.1.2. Exogenous Covid-19 Recession*

During the Covid-19 Recession, UK Bond Risk was shaped exclusively by macroeconomic indicators, suggesting that the exogenous nature of the shock temporarily severed its link with financial markets. US Bond Risk exerted a consistently positive influence across all phases: marginal before and after the crisis, but sharply stronger and upward-sloping during the recession, consistent with heightened co-movement under peak uncertainty.

The US Term Structure had a marginally positive effect in the pre-recession phase but reversed during the recession, becoming strongly negative with an upward-sloping pattern. Post-recession, the effect remained statistically significant but was economically negligible, as PCA back-transformation showed it was offset by US Bond Risk. The UK Term Structure retained a consistently negative influence across phases. Its effect was marginal in the pre-recession phase, confined to lower and median quantiles, but intensified during the recession and evolved into a strong convex shape in the post-recession period.

These patterns highlight persistent macroeconomic co-movement with the US and underscore the distinct signalling role of yield curves. The US yield curve, when steepening, was interpreted as an indicator of rising borrowing costs and tighter monetary policy expectations, echoing dynamics from the Great Recession. By contrast, the UK curve was read as reflecting domestic macroeconomic conditions unrelated to external financing costs.

US Bond Risk remained primarily shaped by macroeconomic indicators throughout the Covid-19 Recession. The influence of UK Bond Risk was consistently positive but phase-dependent. Strong and downward-sloping before the recession, disappearing during the recession – indicating temporary decoupling of cross-border dynamics – before returning in the post-recession phase with only marginal, stable effects. The UK Term Structure shifted from insignificant pre-recession, to weakly positive during the recession (upper quantile only), and then strongly convex post-recession, signalling that US markets viewed it as a proxy for

potential monetary tightening. The US Term Structure showed a marginal positive effect at the lower quantile during the recession, broadening post-recession, though its impact was partly diluted due to high correlation with UK Bond Risk, requiring PCA and back-transformation.

Financial indicators mattered only in the pre-recession phase. The S&P 500 exerted a positive, downward-sloping effect at the median and upper quantiles, while the FTSE 100 showed a negative concave influence. This divergence, echoing patterns from the Great Recession, suggests that UK equities tend to move with bond market dynamics, whereas US equities serve as a diversification channel during uncertainty. Gold displayed no significant influence, contrasting with its earlier weak behaviour as a safe-haven asset before the Great Recession, indicating that the Covid-19 shock did not prompt traditional flight-to-safety dynamics. Bitcoin had a negative impact confined to the median quantile, reinforcing its role as a speculative asset aligned with macroeconomic volatility rather than as a reliable non-traditional risk hedge.

**Table 15**

Bootstrapped quantile regression results for UK Bond Risk – Pre-Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile |           |           |           |           | 50 <sup>th</sup> Quantile |           |           |           |           | 75 <sup>th</sup> Quantile |          |          |          |          |
|-----------------------------|---------------------------|-----------|-----------|-----------|-----------|---------------------------|-----------|-----------|-----------|-----------|---------------------------|----------|----------|----------|----------|
| Replications                | 100                       | 200       | 300       | 400       | 500       | 100                       | 200       | 300       | 400       | 500       | 100                       | 200      | 300      | 400      | 500      |
| <b>US Bond Risk</b>         | 0.001***                  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***                  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***                  | 0.001*** | 0.001*** | 0.001*** | 0.001*** |
|                             | (-4.52)                   | (-4.59)   | (-4.64)   | (-4.70)   | (-4.62)   | (-5.44)                   | (-5.50)   | (-5.58)   | (-5.72)   | (-5.78)   | (-4.76)                   | (-4.78)  | (-4.66)  | (-4.64)  | (-4.67)  |
|                             | (4.35)                    | (3.88)    | (3.90)    | (3.81)    | (3.90)    | (2.96)                    | (2.82)    | (2.78)    | (2.81)    | (2.81)    | (1.15)                    | (1.16)   | (1.17)   | (1.15)   | (1.15)   |
|                             | (1.73)                    | (1.73)    | (1.74)    | (1.78)    | (1.77)    | (2.68)                    | (2.50)    | (2.33)    | (2.40)    | (2.42)    | (1.42)                    | (1.43)   | (1.39)   | (1.37)   | (1.40)   |
| <b>UK Term Structure</b>    | -0.001***                 | -0.001*** | -0.001*** | -0.001*** | -0.001*** | -0.001***                 | -0.001*** | -0.001*** | -0.001*** | -0.001*** | -0.001                    | -0.001   | -0.001   | -0.001   | -0.001   |
|                             | (-4.52)                   | (-4.59)   | (-4.64)   | (-4.70)   | (-4.62)   | (-5.44)                   | (-5.50)   | (-5.58)   | (-5.72)   | (-5.78)   | (-4.76)                   | (-4.78)  | (-4.66)  | (-4.64)  | (-4.67)  |
|                             | (4.35)                    | (3.88)    | (3.90)    | (3.81)    | (3.90)    | (2.96)                    | (2.82)    | (2.78)    | (2.81)    | (2.81)    | (1.15)                    | (1.16)   | (1.17)   | (1.15)   | (1.15)   |
|                             | (1.73)                    | (1.73)    | (1.74)    | (1.78)    | (1.77)    | (2.68)                    | (2.50)    | (2.33)    | (2.40)    | (2.42)    | (1.42)                    | (1.43)   | (1.39)   | (1.37)   | (1.40)   |
| <b>US Term Structure</b>    | 0.001*                    | 0.001*    | 0.001*    | 0.001*    | 0.001*    | 0.001***                  | 0.001**   | 0.001**   | 0.001**   | 0.001**   | 0.001                     | 0.001    | 0.001    | 0.001    | 0.001    |
|                             | (-4.52)                   | (-4.59)   | (-4.64)   | (-4.70)   | (-4.62)   | (-5.44)                   | (-5.50)   | (-5.58)   | (-5.72)   | (-5.78)   | (-4.76)                   | (-4.78)  | (-4.66)  | (-4.64)  | (-4.67)  |
|                             | (4.35)                    | (3.88)    | (3.90)    | (3.81)    | (3.90)    | (2.96)                    | (2.82)    | (2.78)    | (2.81)    | (2.81)    | (1.15)                    | (1.16)   | (1.17)   | (1.15)   | (1.15)   |
|                             | (1.73)                    | (1.73)    | (1.74)    | (1.78)    | (1.77)    | (2.68)                    | (2.50)    | (2.33)    | (2.40)    | (2.42)    | (1.42)                    | (1.43)   | (1.39)   | (1.37)   | (1.40)   |
| <b>FTSE 100</b>             | -0.002                    | -0.002    | -0.002    | -0.002    | -0.002    | -0.036                    | -0.036    | -0.036    | -0.036    | -0.036    | -0.040                    | -0.040   | -0.040   | -0.040   | -0.040   |
|                             | (-0.11)                   | (-0.09)   | (-0.09)   | (-0.10)   | (-0.09)   | (-1.10)                   | (-1.14)   | (-1.14)   | (-1.16)   | (-1.15)   | (-1.50)                   | (-1.49)  | (-1.48)  | (-1.54)  | (-1.55)  |
| <b>S&amp;P 500</b>          | -0.043                    | -0.043    | -0.043    | -0.043    | -0.043    | -0.038                    | -0.038    | -0.038    | -0.038    | -0.038    | -0.007                    | -0.007   | -0.007   | -0.007   | -0.007   |
|                             | (-1.41)                   | (-1.24)   | (-1.23)   | (-1.23)   | (-1.325)  | (-1.41)                   | (-1.44)   | (-1.50)   | (-1.51)   | (-1.50)   | (-0.21)                   | (-0.21)  | (-0.21)  | (-0.22)  | (-0.22)  |
| <b>Gold</b>                 | 0.020                     | 0.020     | 0.020     | 0.020     | 0.020     | 0.018                     | 0.018     | 0.018     | 0.018     | 0.018     | 0.032                     | 0.032    | 0.032    | 0.032    | 0.032    |
|                             | (0.78)                    | (0.79)    | (0.878)   | (0.77)    | (0.78)    | (0.61)                    | (0.58)    | (0.60)    | (0.60)    | (0.61)    | (1.06)                    | (0.95)   | (0.98)   | (0.96)   | (0.96)   |
| <b>Bitcoin</b>              | -0.003                    | -0.003    | -0.003    | -0.003    | -0.003    | -0.002                    | -0.002    | -0.002    | -0.002    | -0.002    | 0.003                     | 0.003    | 0.003    | 0.003    | 0.003    |
|                             | (-0.87)                   | (-0.91)   | (-0.91)   | (-0.89)   | (-0.89)   | (-0.46)                   | (-0.47)   | (-0.48)   | (-0.48)   | (-0.47)   | (0.75)                    | (0.66)   | (0.67)   | (0.68)   | (0.69)   |
| <b>Constant</b>             | 0.030***                  | 0.030***  | 0.030***  | 0.030***  | 0.030***  | 0.031***                  | 0.031***  | 0.031***  | 0.031***  | 0.031***  | 0.032***                  | 0.032*** | 0.032*** | 0.032*** | 0.032*** |
|                             | (152.09)                  | (144.24)  | (148.68)  | (152.72)  | (157.09)  | (145.02)                  | (145.88)  | (147.08)  | (147.27)  | (152.17)  | (105.22)                  | (113.79) | (114.82) | (112.01) | (113.83) |
| <b>Pseudo R<sup>2</sup></b> | 0.397                     | 0.397     | 0.397     | 0.397     | 0.397     | 0.303                     | 0.303     | 0.303     | 0.303     | 0.303     | 0.262                     | 0.262    | 0.262    | 0.262    | 0.262    |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's pre-Covid-19 Recession phase (5 Jul 2019 to 31 Dec 2019). To address multicollinearity, PCA was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

**Table 16**

Bootstrapped quantile regression results for UK Bond Risk – During Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile |                      |                      |                      |                      | 50 <sup>th</sup> Quantile |                      |                      |                      |                      | 75 <sup>th</sup> Quantile |                      |                      |                      |                      |
|-----------------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Replications                | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                  | 300                  | 400                  | 500                  |
| <b>US Bond Risk</b>         | 0.528***<br>(9.37)        | 0.528***<br>(9.47)   | 0.528***<br>(9.15)   | 0.528***<br>(9.48)   | 0.528***<br>(9.09)   | 0.604***<br>(8.92)        | 0.604***<br>(9.09)   | 0.604***<br>(8.62)   | 0.604***<br>(9.15)   | 0.604***<br>(9.27)   | 0.691***<br>(8.53)        | 0.691***<br>(9.41)   | 0.691***<br>(9.19)   | 0.691***<br>(9.37)   | 0.691***<br>(9.36)   |
| <b>UK Term Structure</b>    | 0.173<br>(0.22)           | 0.173<br>(0.21)      | 0.173<br>(0.21)      | 0.173<br>(0.22)      | 0.173<br>(0.22)      | -1.235*<br>(-1.89)        | -1.235*<br>(-1.78)   | -1.235*<br>(-1.74)   | -1.235*<br>(-1.80)   | -1.235*<br>(-1.79)   | -1.049<br>(-1.11)         | -1.049<br>(-1.13)    | -1.049<br>(-1.05)    | -1.049<br>(-1.07)    | -1.049<br>(-1.07)    |
| <b>US Term Structure</b>    | -1.079***<br>(-2.96)      | -1.079***<br>(-3.11) | -1.079***<br>(-2.92) | -1.079***<br>(-2.98) | -1.079***<br>(-2.88) | -1.982***<br>(-5.34)      | -1.982***<br>(-5.35) | -1.982***<br>(-5.08) | -1.982***<br>(-5.19) | -1.982***<br>(-5.20) | -2.189***<br>(-5.66)      | -2.189***<br>(-5.95) | -2.189***<br>(-5.95) | -2.189***<br>(-5.96) | -2.189***<br>(-5.90) |
| <b>FTSE 100</b>             | 0.001<br>(0.00)           | 0.001<br>(0.01)      | 0.001<br>(0.01)      | 0.001<br>(0.01)      | 0.001<br>(0.01)      | -0.005<br>(-0.35)         | -0.005<br>(-0.39)    | -0.005<br>(-0.39)    | -0.005<br>(-0.38)    | -0.005<br>(-0.39)    | 0.021<br>(0.95)           | 0.021<br>(0.92)      | 0.021<br>(0.94)      | 0.021<br>(0.96)      | 0.021<br>(0.94)      |
| <b>S&amp;P 500</b>          | -0.001<br>(-0.10)         | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | -0.001<br>(-0.10)    | 0.007<br>(0.49)           | 0.007<br>(0.50)      | 0.007<br>(0.48)      | 0.007<br>(0.47)      | 0.007<br>(0.48)      | -0.008<br>(-0.36)         | -0.008<br>(-0.36)    | -0.008<br>(-0.36)    | -0.008<br>(-0.37)    | -0.008<br>(-0.37)    |
| <b>Gold</b>                 | 0.024<br>(1.07)           | 0.024<br>(1.06)      | 0.024<br>(1.03)      | 0.024<br>(1.01)      | 0.024<br>(1.00)      | 0.021<br>(0.92)           | 0.021<br>(0.93)      | 0.021<br>(0.91)      | 0.021<br>(0.93)      | 0.021<br>(0.93)      | 0.034<br>(1.14)           | 0.034<br>(1.12)      | 0.034<br>(1.11)      | 0.034<br>(1.13)      | 0.034<br>(1.14)      |
| <b>Bitcoin</b>              | 0.002<br>(0.67)           | 0.002<br>(0.56)      | 0.002<br>(0.57)      | 0.002<br>(0.58)      | 0.002<br>(0.57)      | 0.008<br>(1.31)           | 0.008<br>(1.27)      | 0.008<br>(1.27)      | 0.008<br>(1.26)      | 0.008<br>(1.23)      | 0.006<br>(0.94)           | 0.006<br>(0.89)      | 0.006<br>(0.89)      | 0.006<br>(0.87)      | 0.006<br>(0.87)      |
| <b>Constant</b>             | 0.019***<br>(6.49)        | 0.019***<br>(6.35)   | 0.019***<br>(6.60)   | 0.019***<br>(6.75)   | 0.019***<br>(6.76)   | 0.025***<br>(9.57)        | 0.025***<br>(9.28)   | 0.025***<br>(9.15)   | 0.025***<br>(9.72)   | 0.025***<br>(9.69)   | 0.024***<br>(5.94)        | 0.024***<br>(6.16)   | 0.024***<br>(6.05)   | 0.024***<br>(6.17)   | 0.024***<br>(6.15)   |
| <b>Pseudo R<sup>2</sup></b> | 0.503                     | 0.503                | 0.503                | 0.503                | 0.503                | 0.469                     | 0.469                | 0.469                | 0.469                | 0.469                | 0.462                     | 0.462                | 0.462                | 0.462                | 0.462                |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's Covid-19 Recession phase (1 Jan 2020 to 30 Jun 2020). T-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

Table 17

Bootstrapped quantile regression results for UK Bond Risk – Post-Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile |           |           |           |           | 50 <sup>th</sup> Quantile |           |           |           |           | 75 <sup>th</sup> Quantile |           |           |           |           |
|-----------------------------|---------------------------|-----------|-----------|-----------|-----------|---------------------------|-----------|-----------|-----------|-----------|---------------------------|-----------|-----------|-----------|-----------|
| Replications                | 100                       | 200       | 300       | 400       | 500       | 100                       | 200       | 300       | 400       | 500       | 100                       | 200       | 300       | 400       | 500       |
| <b>US Bond</b>              | 0.001***                  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***                  | 0.001***  | 0.001***  | 0.001***  | 0.001***  | 0.001***                  | 0.001***  | 0.001***  | 0.001***  | 0.001***  |
| <b>Risk</b>                 | (-7.57)                   | (-7.71)   | (-7.71)   | (-7.87)   | (-7.79)   | (-12.16)                  | (-13.10)  | (-12.57)  | (-12.85)  | (-12.64)  | (-9.35)                   | (-9.12)   | (-9.03)   | (-9.27)   | (-9.35)   |
|                             | (5.10)                    | (5.42)    | (5.23)    | (5.34)    | (5.26)    | (5.95)                    | (6.08)    | (6.04)    | (6.01)    | (5.97)    | (7.18)                    | (7.11)    | (6.63)    | (6.63)    | (6.40)    |
| <b>UK Term</b>              | -1.810***                 | -1.810*** | -1.810*** | -1.810*** | -1.810*** | -1.202***                 | -1.202*** | -1.202*** | -1.202*** | -1.202*** | -1.353***                 | -1.353*** | -1.353*** | -1.353*** | -1.353*** |
| <b>Structure</b>            | (-4.24)                   | (-4.17)   | (-4.30)   | (-4.34)   | (-4.28)   | (-3.97)                   | (-4.15)   | (-4.18)   | (-4.14)   | (-4.26)   | (-4.65)                   | (-4.34)   | (-4.19)   | (-4.26)   | (-4.30)   |
| <b>US Term</b>              | 0.000***                  | 0.000***  | 0.000***  | 0.000***  | 0.000***  | 0.000***                  | 0.000***  | 0.000***  | 0.000***  | 0.000***  | 0.000***                  | 0.000***  | 0.000***  | 0.000***  | 0.000***  |
| <b>Structure</b>            | (-7.57)                   | (-7.71)   | (-7.71)   | (-7.87)   | (-7.79)   | (-12.16)                  | (-13.10)  | (-12.57)  | (-12.85)  | (-12.64)  | (-9.35)                   | (-9.12)   | (-9.03)   | (-9.27)   | (-9.35)   |
|                             | (5.10)                    | (5.42)    | (5.23)    | (5.34)    | (5.26)    | (5.95)                    | (6.08)    | (6.04)    | (6.01)    | (5.97)    | (7.18)                    | (7.11)    | (6.63)    | (6.63)    | (6.40)    |
| <b>FTSE 100</b>             | -0.001                    | -0.001    | -0.001    | -0.001    | -0.001    | -0.004                    | -0.004    | -0.004    | -0.004    | -0.004    | -0.001                    | -0.001    | -0.001    | -0.001    | -0.001    |
|                             | (-0.10)                   | (-0.09)   | (-0.10)   | (-0.09)   | (-0.10)   | (-0.54)                   | (-0.51)   | (-0.52)   | (-0.51)   | (-0.51)   | (-0.19)                   | (-0.20)   | (-0.20)   | (-0.19)   | (-0.19)   |
| <b>S&amp;P 500</b>          | -0.009                    | -0.009    | -0.009    | -0.009    | -0.009    | -0.010                    | -0.010    | -0.010    | -0.010    | -0.010    | -0.004                    | -0.004    | -0.004    | -0.004    | -0.004    |
|                             | (-0.88)                   | (-0.97)   | (-0.97)   | (-0.97)   | (-0.98)   | (-1.08)                   | (-1.11)   | (-1.09)   | (-1.09)   | (-1.07)   | (-0.64)                   | (-0.59)   | (-0.57)   | (-0.55)   | (-0.54)   |
| <b>Gold</b>                 | 0.001                     | 0.001     | 0.001     | 0.001     | 0.001     | 0.003                     | 0.003     | 0.003     | 0.003     | 0.003     | 0.002                     | 0.002     | 0.002     | 0.002     | 0.002     |
|                             | (0.22)                    | (0.21)    | (0.21)    | (0.21)    | (0.21)    | (0.32)                    | (0.31)    | (0.31)    | (0.30)    | (0.30)    | (0.31)                    | (0.29)    | (0.29)    | (0.29)    | (0.29)    |
| <b>Bitcoin</b>              | -0.001                    | -0.001    | -0.001    | -0.001    | -0.001    | -0.001                    | -0.001    | -0.001    | -0.001    | -0.001    | -0.001                    | -0.001    | -0.001    | -0.001    | -0.001    |
|                             | (-0.42)                   | (-0.40)   | (-0.40)   | (-0.40)   | (-0.40)   | (-0.10)                   | (-0.11)   | (-0.11)   | (-0.11)   | (-0.11)   | (-0.05)                   | (-0.05)   | (-0.05)   | (-0.05)   | (-0.05)   |
| <b>Constant</b>             | 0.035***                  | 0.035***  | 0.035***  | 0.035***  | 0.035***  | 0.034***                  | 0.034***  | 0.034***  | 0.034***  | 0.034***  | 0.035***                  | 0.035***  | 0.035***  | 0.035***  | 0.035***  |
|                             | (25.39)                   | (25.01)   | (25.78)   | (26.07)   | (25.67)   | (33.99)                   | (35.40)   | (35.92)   | (35.61)   | (36.70)   | (35.24)                   | (33.21)   | (32.11)   | (32.65)   | (32.93)   |
| <b>Pseudo R<sup>2</sup></b> | 0.586                     | 0.586     | 0.586     | 0.586     | 0.586     | 0.601                     | 0.601     | 0.601     | 0.601     | 0.601     | 0.564                     | 0.564     | 0.564     | 0.564     | 0.564     |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is UK Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the UK's post-Covid-19 Recession phase (1 Jul 2020 to 23 Dec 2020). To address multicollinearity, PCA was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8

(Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

**Table 18**

Bootstrapped quantile regression results for US Bond Risk – Pre-Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile |                     |                     |                     |                     | 50 <sup>th</sup> Quantile |                      |                      |                      |                      | 75 <sup>th</sup> Quantile |                     |                     |                     |                     |
|-----------------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|---------------------|---------------------|---------------------|---------------------|
| Replications                | 100                       | 200                 | 300                 | 400                 | 500                 | 100                       | 200                  | 300                  | 400                  | 500                  | 100                       | 200                 | 300                 | 400                 | 500                 |
| <b>UK Bond Risk</b>         | 1.025***<br>(19.33)       | 1.025***<br>(18.16) | 1.025***<br>(18.84) | 1.025***<br>(18.28) | 1.025***<br>(18.24) | 1.008***<br>(15.45)       | 1.008***<br>(15.25)  | 1.008***<br>(15.48)  | 1.008***<br>(16.10)  | 1.008***<br>(16.52)  | 0.981***<br>(12.39)       | 0.981***<br>(12.39) | 0.981***<br>(12.49) | 0.981***<br>(12.57) | 0.981***<br>(12.84) |
| <b>UK Term Structure</b>    | -0.036<br>(-0.03)         | -0.036<br>(-0.03)   | -0.036<br>(-0.03)   | -0.036<br>(-0.03)   | -0.036<br>(-0.03)   | -0.816<br>(-0.78)         | -0.816<br>(-0.78)    | -0.816<br>(-0.80)    | -0.816<br>(-0.80)    | -0.816<br>(-0.81)    | -0.934<br>(-0.77)         | -0.934<br>(-0.75)   | -0.934<br>(-0.76)   | -0.934<br>(-0.75)   | -0.934<br>(-0.75)   |
| <b>US Term Structure</b>    | -1.697<br>(-0.99)         | -1.697<br>(-0.89)   | -1.697<br>(-0.91)   | -1.697<br>(-0.87)   | -1.697<br>(-0.87)   | -0.319<br>(-0.19)         | -0.319<br>(-0.16)    | -0.319<br>(-0.16)    | -0.319<br>(-0.16)    | -0.319<br>(-0.16)    | -0.906<br>(-0.39)         | -0.906<br>(-0.38)   | -0.906<br>(-0.39)   | -0.906<br>(-0.39)   | -0.906<br>(-0.40)   |
| <b>FTSE 100</b>             | -0.060*<br>(-2.01)        | -0.060*<br>(-1.00)  | -0.060*<br>(-2.00)  | -0.060*<br>(-2.00)  | -0.060**<br>(-2.05) | -0.089***<br>(-2.82)      | -0.089***<br>(-3.01) | -0.089***<br>(-2.87) | -0.089***<br>(-2.84) | -0.089***<br>(-2.82) | -0.078*<br>(-1.91)        | -0.078*<br>(-1.97)  | -0.078*<br>(-1.88)  | -0.078*<br>(-1.79)  | -0.078*<br>(-1.83)  |
| <b>S&amp;P 500</b>          | 0.048<br>(1.48)           | 0.048<br>(1.46)     | 0.048<br>(1.48)     | 0.048<br>(1.46)     | 0.048<br>(1.49)     | 0.061*<br>(2.02)          | 0.061*<br>(1.90)     | 0.061*<br>(1.99)     | 0.061**<br>(2.07)    | 0.061*<br>(2.00)     | 0.053<br>(1.31)           | 0.053<br>(1.25)     | 0.053<br>(1.37)     | 0.053<br>(1.42)     | 0.053<br>(1.40)     |
| <b>Gold</b>                 | 0.006<br>(0.16)           | 0.006<br>(0.16)     | 0.006<br>(0.17)     | 0.006<br>(0.16)     | 0.006<br>(0.16)     | -0.016<br>(-0.31)         | -0.016<br>(-0.31)    | -0.016<br>(-0.32)    | -0.016<br>(-0.31)    | -0.016<br>(-0.31)    | -0.044<br>(-0.76)         | -0.044<br>(-0.91)   | -0.044<br>(-0.79)   | -0.044<br>(-0.78)   | -0.044<br>(-0.79)   |
| <b>Bitcoin</b>              | -0.010<br>(-1.41)         | -0.010<br>(-1.36)   | -0.010<br>(-1.41)   | -0.010<br>(-1.39)   | -0.010<br>(-1.39)   | -0.021**<br>(-2.55)       | -0.021**<br>(-2.32)  | -0.021**<br>(-2.32)  | -0.021**<br>(-2.30)  | -0.021**<br>(-2.30)  | -0.011<br>(-1.03)         | -0.011<br>(-0.96)   | -0.011<br>(-1.00)   | -0.011<br>(-1.01)   | -0.011<br>(-1.02)   |
| <b>Constant</b>             | -0.008<br>(-1.64)         | -0.008<br>(-1.49)   | -0.008<br>(-1.54)   | -0.008<br>(-1.50)   | -0.008<br>(-1.49)   | -0.007<br>(-1.22)         | -0.007<br>(-1.16)    | -0.007<br>(-1.19)    | -0.007<br>(-1.22)    | -0.007<br>(-1.26)    | -0.004<br>(-0.56)         | -0.004<br>(-0.60)   | -0.004<br>(-0.57)   | -0.004<br>(-0.56)   | -0.004<br>(-0.58)   |
| <b>Pseudo R<sup>2</sup></b> | 0.857                     | 0.857               | 0.857               | 0.857               | 0.857               | 0.877                     | 0.877                | 0.877                | 0.877                | 0.877                | 0.855                     | 0.855               | 0.855               | 0.855               | 0.855               |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and

all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' pre-Covid-19 Recession phase (2 Jan 2020 to 28 Feb 2020). t-statistics are reported in parentheses.

Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

**Table 19**

Bootstrapped quantile regression results for US Bond Risk – During Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile  |                            |                            |                            |                            | 50 <sup>th</sup> Quantile |                           |                           |                           |                           | 75 <sup>th</sup> Quantile  |                            |                            |                            |                            |
|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Replications                | 100                        | 200                        | 300                        | 400                        | 500                        | 100                       | 200                       | 300                       | 400                       | 500                       | 100                        | 200                        | 300                        | 400                        | 500                        |
| <b>UK Bond Risk</b>         | -0.245<br>(-0.70)          | -0.245<br>(-0.65)          | -0.245<br>(-0.68)          | -0.245<br>(-0.68)          | -0.245<br>(-0.66)          | 0.416<br>(1.07)           | 0.416<br>(1.11)           | 0.416<br>(1.15)           | 0.416<br>(1.16)           | 0.416<br>(1.17)           | 0.343<br>(0.96)            | 0.343<br>(1.12)            | 0.343<br>(1.10)            | 0.343<br>(1.10)            | 0.343<br>(1.09)            |
| <b>UK Term Structure</b>    | -0.124<br>(-0.13)          | -0.124<br>(-0.12)          | -0.124<br>(-0.12)          | -0.124<br>(-0.12)          | -0.124<br>(-0.12)          | 0.913<br>(0.82)           | 0.913<br>(0.87)           | 0.913<br>(0.90)           | 0.913<br>(0.88)           | 0.913<br>(0.80)           | 2.052*<br>(2.00)           | 2.052**<br>(2.15)          | 2.052**<br>(2.20)          | 2.052**<br>(2.10)          | 2.052**<br>(2.09)          |
| <b>US Term Structure</b>    | 1.600*<br>(1.89)           | 1.600*<br>(1.74)           | 1.600*<br>(1.80)           | 1.600*<br>(1.82)           | 1.600*<br>(1.81)           | 0.109<br>(0.11)           | 0.109<br>(0.11)           | 0.109<br>(0.11)           | 0.109<br>(0.11)           | 0.109<br>(0.11)           | -0.012<br>(-0.02)          | -0.012<br>(-0.02)          | -0.012<br>(-0.02)          | -0.012<br>(-0.02)          | -0.012<br>(-0.02)          |
| <b>FTSE 100</b>             | 0.000<br>(0.44)<br>(-0.47) | 0.000<br>(0.40)<br>(-0.50) | 0.000<br>(0.40)<br>(-0.51) | 0.000<br>(0.41)<br>(-0.47) | 0.000<br>(0.42)<br>(-0.49) | 0.000<br>(0.24)<br>(0.40) | 0.000<br>(0.24)<br>(0.40) | 0.000<br>(0.23)<br>(0.40) | 0.000<br>(0.23)<br>(0.42) | 0.000<br>(0.24)<br>(0.42) | 0.000<br>(0.14)<br>(-0.05) | 0.000<br>(0.14)<br>(-0.05) | 0.000<br>(0.13)<br>(-0.05) | 0.000<br>(0.13)<br>(-0.05) | 0.000<br>(0.13)<br>(-0.05) |
| <b>S&amp;P 500</b>          | 0.001<br>(0.44)<br>(-0.47) | 0.001<br>(0.40)<br>(-0.50) | 0.001<br>(0.40)<br>(-0.51) | 0.001<br>(0.41)<br>(-0.47) | 0.001<br>(0.42)<br>(-0.49) | 0.000<br>(0.24)<br>(0.40) | 0.000<br>(0.24)<br>(0.40) | 0.000<br>(0.23)<br>(0.40) | 0.000<br>(0.23)<br>(0.42) | 0.000<br>(0.24)<br>(0.42) | 0.001<br>(0.14)<br>(-0.05) | 0.001<br>(0.14)<br>(-0.05) | 0.001<br>(0.13)<br>(-0.05) | 0.001<br>(0.13)<br>(-0.05) | 0.001<br>(0.13)<br>(-0.05) |
| <b>Gold</b>                 | -0.029<br>(-1.04)          | -0.029<br>(-0.97)          | -0.029<br>(-0.95)          | -0.029<br>(-0.95)          | -0.029<br>(-0.96)          | -0.027<br>(-0.93)         | -0.027<br>(-0.95)         | -0.027<br>(-0.93)         | -0.027<br>(-0.96)         | -0.027<br>(-0.96)         | -0.013<br>(-0.62)          | -0.013<br>(-0.68)          | -0.013<br>(-0.64)          | -0.013<br>(-0.66)          | -0.013<br>(-0.66)          |
| <b>Bitcoin</b>              | 0.001<br>(0.21)            | 0.001<br>(0.23)            | 0.001<br>(0.23)            | 0.001<br>(0.23)            | 0.001<br>(0.24)            | -0.001<br>(-0.01)         | -0.001<br>(-0.01)         | -0.001<br>(-0.01)         | -0.001<br>(-0.01)         | -0.001<br>(-0.02)         | 0.004<br>(0.54)            | 0.004<br>(0.59)            | 0.004<br>(0.59)            | 0.004<br>(0.62)            | 0.004<br>(0.62)            |
| <b>Constant</b>             | 0.033***<br>(2.84)         | 0.033**<br>(2.65)          | 0.033***<br>(2.72)         | 0.033***<br>(2.73)         | 0.033**<br>(2.68)          | 0.013<br>(1.11)           | 0.013<br>(1.17)           | 0.013<br>(1.21)           | 0.013<br>(1.23)           | 0.013<br>(1.26)           | 0.014<br>(1.25)            | 0.014<br>(1.46)            | 0.014<br>(1.46)            | 0.014<br>(1.47)            | 0.014<br>(1.46)            |
| <b>Pseudo R<sup>2</sup></b> | 0.218                      | 0.218                      | 0.218                      | 0.218                      | 0.218                      | 0.117                     | 0.117                     | 0.117                     | 0.117                     | 0.117                     | 0.209                      | 0.209                      | 0.209                      | 0.209                      | 0.209                      |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' Covid-19 Recession phase (1 Mar 2020 to 30 Apr 2020). To address multicollinearity, PCA was applied was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section

2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency.

Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

**Table 20**

Bootstrapped quantile regression results for US Bond Risk – Post-Covid-19 Recession

|                             | 25 <sup>th</sup> Quantile      |                                |                                |                                |                                | 50 <sup>th</sup> Quantile      |                                |                                |                                |                                | 75 <sup>th</sup> Quantile      |                                |                                |                                |                                |
|-----------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| Replications                | 100                            | 200                            | 300                            | 400                            | 500                            | 100                            | 200                            | 300                            | 400                            | 500                            | 100                            | 200                            | 300                            | 400                            | 500                            |
| <b>UK Bond Risk</b>         | 0.001***<br>(-11.28)<br>(2.32) | 0.001***<br>(-10.56)<br>(2.21) | 0.001***<br>(-11.15)<br>(2.20) | 0.001***<br>(-11.41)<br>(2.20) | 0.001***<br>(-11.44)<br>(2.18) | 0.001***<br>(-12.12)<br>(2.64) | 0.001***<br>(-11.04)<br>(2.55) | 0.001***<br>(-11.27)<br>(2.52) | 0.001***<br>(-11.55)<br>(2.53) | 0.001***<br>(-11.56)<br>(2.53) | 0.002***<br>(-10.69)<br>(3.31) | 0.002***<br>(-10.75)<br>(2.90) | 0.002***<br>(-10.76)<br>(2.97) | 0.002***<br>(-10.55)<br>(2.99) | 0.002***<br>(-10.64)<br>(2.88) |
| <b>UK Term Structure</b>    | 1.663<br>(1.65)                | 1.663<br>(1.62)                | 1.663<br>(1.64)                | 1.663*<br>(1.70)               | 1.663<br>(1.69)                | 1.485**<br>(2.16)              | 1.485*<br>(1.99)               | 1.485*<br>(1.94)               | 1.485*<br>(1.97)               | 1.485*<br>(1.97)               | 2.231***<br>(2.90)             | 2.231***<br>(2.91)             | 2.231***<br>(2.85)             | 2.231***<br>(2.86)             | 2.231***<br>(2.90)             |
| <b>US Term Structure</b>    | 0.000**<br>(-11.28)<br>(2.32)  | 0.000**<br>(-10.56)<br>(2.21)  | 0.000**<br>(-11.15)<br>(2.20)  | 0.000**<br>(-11.41)<br>(2.20)  | 0.000**<br>(-11.44)<br>(2.18)  | 0.000**<br>(-12.12)<br>(2.64)  | 0.000**<br>(-11.04)<br>(2.55)  | 0.000**<br>(-11.27)<br>(2.52)  | 0.000**<br>(-11.55)<br>(2.53)  | 0.000**<br>(-11.56)<br>(2.53)  | 0.000***<br>(-10.69)<br>(3.31) | 0.000***<br>(-10.75)<br>(2.90) | 0.000***<br>(-10.76)<br>(2.97) | 0.000***<br>(-10.55)<br>(2.99) | 0.000***<br>(-10.64)<br>(2.88) |
| <b>FTSE 100</b>             | 0.007<br>(0.64)                | 0.007<br>(0.59)                | 0.007<br>(0.60)                | 0.007<br>(0.61)                | 0.007<br>(0.61)                | -0.005<br>(-0.50)              | -0.005<br>(-0.46)              | -0.005<br>(-0.46)              | -0.005<br>(-0.47)              | -0.005<br>(-0.46)              | -0.001<br>(-0.02)              | -0.001<br>(-0.02)              | -0.001<br>(-0.02)              | -0.001<br>(-0.02)              | -0.001<br>(-0.02)              |
| <b>S&amp;P 500</b>          | -0.005<br>(-0.53)              | -0.005<br>(-0.46)              | -0.005<br>(-0.46)              | -0.005<br>(-0.46)              | -0.005<br>(-0.46)              | 0.006<br>(0.81)                | 0.006<br>(0.70)                | 0.006<br>(0.71)                | 0.006<br>(0.72)                | 0.006<br>(0.71)                | -0.09<br>(1.08)                | -0.09<br>(1.07)                | -0.09<br>(1.12)                | -0.09<br>(1.12)                | -0.09<br>(1.08)                |
| <b>Gold</b>                 | -0.018<br>(-0.81)              | -0.018<br>(-0.74)              | -0.018<br>(-0.73)              | -0.018<br>(-0.74)              | -0.018<br>(-0.75)              | 0.003<br>(0.16)                | 0.003<br>(0.14)                | 0.003<br>(0.13)                | 0.003<br>(0.13)                | 0.003<br>(0.14)                | -0.019<br>(-0.92)              | -0.019<br>(-0.83)              | -0.019<br>(-0.84)              | -0.019<br>(-0.87)              | -0.019<br>(-0.89)              |
| <b>Bitcoin</b>              | 0.001<br>(0.14)                | 0.001<br>(0.12)                | 0.001<br>(0.12)                | 0.001<br>(0.12)                | 0.001<br>(0.112)               | -0.001<br>(-0.51)              | -0.001<br>(-0.49)              | -0.001<br>(-0.50)              | -0.001<br>(-0.51)              | -0.001<br>(-0.50)              | 0.002<br>(0.90)                | 0.002<br>(0.85)                | 0.002<br>(0.84)                | 0.002<br>(0.84)                | 0.002<br>(0.82)                |
| <b>Constant</b>             | 0.022***<br>(8.66)             | 0.022***<br>(8.52)             | 0.022***<br>(8.70)             | 0.022***<br>(9.01)             | 0.022***<br>(8.94)             | 0.022***<br>(12.82)            | 0.022***<br>(11.98)            | 0.022***<br>(11.78)            | 0.022***<br>(11.96)            | 0.022***<br>(11.99)            | 0.021***<br>(10.90)            | 0.021***<br>(11.03)            | 0.021***<br>(10.82)            | 0.021***<br>(10.85)            | 0.021***<br>(10.99)            |
| <b>Pseudo R<sup>2</sup></b> | 0.740                          | 0.740                          | 0.740                          | 0.740                          | 0.740                          | 0.776                          | 0.776                          | 0.776                          | 0.776                          | 0.776                          | 0.752                          | 0.752                          | 0.752                          | 0.752                          | 0.752                          |

This table reports results from the quantile regression estimated using the bootstrapped methodology described in Equation (1) (Section 2.2). The dependent variable is US Bond Risk, and all variables are defined in Table 2 (Section 2.1.2). The sample corresponds to the US' post-Covid-19 Recession phase (1 May 2020 to 1 Jul 2020). To address multicollinearity, PCA was applied was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section

2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency.

Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

### *3.2. Mean-level validation of bond risk determinants*

Table 21 reports the marginal effects from the fractional probit regressions specified in Equation (2), with full fixed-effects coefficients provided in the Appendix. This complementary approach validates the quantile regression results by examining impacts on the conditional mean of bond risk rather than across its distribution. The findings are broadly consistent with the quantile-level analysis, reinforcing the robustness of the results. However, several divergences emerge, reflecting the differing characteristics of the two recession types, which will also remain the focus of our analysis.

#### *3.2.1. Thematic Great Recession*

Collectively, divergences between the quantile and mean-level results arise for the Great Recession mainly in the pre- and post-recession phases for both the UK and the US. By contrast, the recession period itself shows close alignment, suggesting that the thematic nature of the crisis generated uniformly elevated risk perceptions and a more homogenous bond risk structure. This stands in contrast to the Covid-19 Recession, where divergences emerged earlier, reflecting its exogenous nature and the initially uncoordinated market responses that only converged later in the post-recession period.

Focusing on the Great Recession, the UK results show that the US Term Structure loses significance in the post-recession phase, diverging from its earlier negative influence at the lower and median quantiles. The FTSE 100 exerts a negative effect in both the pre- and post-recession phases, though its significance was previously confined to specific quantiles (upper in the pre-recession; lower and median in the post-recession). Similarly, the S&P 500 demonstrates a broader negative impact in the post-recession phase, beyond its earlier significance at only the median quantile.

For the US, the US Term Structure displays a positive effect in the post-recession phase, expanding beyond its earlier role at the lower quantile. The S&P 500 shows a consistent positive influence in the pre- and post-recession phases, extending beyond its prior effects at the lower (pre-recession) and lower/upper (post-recession) quantiles. The FTSE 100 follows a similar trajectory, with post-recession significance at the mean level despite earlier influence being confined to lower and median quantiles. By contrast, Gold, which had a weak positive effect at the median quantile during the pre-recession phase, is insignificant at the mean-level.

Taken together, these findings suggest that during the Great Recession, divergences across the bond risk distribution are most pronounced for the US yield curve and financial indicators. The US yield curve emerges as a stronger determinant for US Bond Risk than for UK Bond Risk. Equity markets show broader mean-level influence, reinforcing the interpretation that in the UK, equities and bonds tend to move in tandem, whereas in the US, equities function more clearly as a diversifying channel.

### *3.2.2. Exogenous Covid-19 Recession*

For the Covid-19 Recession, divergences between quantile- and mean-level results emerge in both countries during the pre-recession and recession phases. In the UK, Bond Risk was negatively influenced by the UK Term Structure in the pre-recession phase, whereas its earlier influence had been limited to the lower and median quantiles. This negative effect persisted into the recession but increased sharply in magnitude, despite previously being confined to the median quantile. The US Term Structure exerted a positive influence in the pre-recession phase, extending beyond its earlier impact at only the lower and median quantiles. Gold displayed a positive effect in the pre-recession phase, diverging from its earlier insignificance and marking a rare instance of potential safe-haven behaviour in the UK context.

For the US, UK Bond Risk had no influence during the recession, despite its earlier limited effect at the upper quantile. The US Term Structure shifted from being insignificant in the pre-recession quantile results to exerting a negative influence at the mean level, before turning positive during the recession – contrasting with its earlier significance only at the lower quantile. The S&P 500 showed a broader positive influence in the pre-recession phase, expanding beyond its earlier significance at the median and upper quantiles. Bitcoin also exhibited a negative effect, consistent with its earlier influence but now extending beyond the median quantile.

Unlike the Great Recession, both macroeconomic and financial indicators show broader divergences during the Covid-19 crisis. The UK market remained sensitive to both domestic and US yield curves, highlighting the importance of term structure dynamics in shaping risk perceptions. Gold's pre-recession role marks its first display of potential safe-haven behaviour in this context. In contrast, the US market displayed signs of temporary decoupling from macroeconomic variables, with risk dynamics driven more by tail events. Domestic equities retained their role as a key risk-diversification mechanism, while Bitcoin continued to lack the stabilising features of a non-traditional safe-haven asset.

**Table 21**

Mean-level fractional probit regression results – Marginal effects

|                          | UK                                         |                      |                      |                                          |                      |                                | US                    |                      |                     |                      |                              |                                |
|--------------------------|--------------------------------------------|----------------------|----------------------|------------------------------------------|----------------------|--------------------------------|-----------------------|----------------------|---------------------|----------------------|------------------------------|--------------------------------|
|                          | Great Recession                            |                      |                      | Covid-19 Recession                       |                      |                                | Great Recession       |                      |                     | Covid-19 Recession   |                              |                                |
|                          | Pre                                        | During               | Post                 | Pre                                      | During               | Post                           | Pre                   | During               | Post                | Pre                  | During                       | Post                           |
| <b>UK Bond Risk</b>      |                                            |                      |                      |                                          |                      |                                | 0.756***<br>(16.98)   | 1.157***<br>(42.33)  | 1.062***<br>(44.06) | 0.981***<br>(24.88)  | 0.025<br>(0.14)              | 0.001***<br>(-19.27)<br>(4.18) |
| <b>US Bond Risk</b>      | 0.002***<br>(33.51)<br>(10.56)<br>(-4.57)  | 0.638***<br>(31.73)  | 0.846***<br>(31.61)  | 0.001***<br>(-9.38)<br>(5.10)<br>(3.30)  | 0.616***<br>(12.85)  | 0.001***<br>(-16.31)<br>(9.12) |                       |                      |                     |                      |                              |                                |
| <b>UK Term Structure</b> | 0.001***<br>(33.51)<br>(10.56)<br>(-4.57)  | -0.333***<br>(-5.27) | -0.463***<br>(-5.35) | -0.001***<br>(-9.38)<br>(5.10)<br>(3.30) | -1.105**<br>(-2.24)  | -1.342***<br>(-6.83)           | -3.066***<br>(-12.63) | 0.151<br>(1.61)      | 0.413***<br>(5.05)  | -1.695**<br>(-2.13)  | 0.653<br>(1.23)              | 1.549***<br>(3.64)             |
| <b>US Term Structure</b> | -0.001***<br>(33.51)<br>(10.56)<br>(-4.57) | 0.913***<br>(8.94)   | -0.145<br>(-1.20)    | 0.001***<br>(-9.38)<br>(5.10)<br>(3.30)  | -1.755***<br>(-5.68) | 0.000***<br>(-16.31)<br>(9.12) | 2.712***<br>(15.77)   | -0.738***<br>(-5.07) | 0.206**<br>(2.02)   | -1.191<br>(-1.08)    | 1.029**<br>(2.10)            | 0.000***<br>(-19.27)<br>(4.18) |
| <b>FTSE 100</b>          | -0.016*<br>(-1.65)                         | -0.007<br>(-1.05)    | -0.025**<br>(-2.47)  | -0.026<br>(-1.49)                        | 0.006<br>(0.55)      | -0.006<br>(-1.26)              | 0.007<br>(0.51)       | -0.001<br>(-0.24)    | 0.021**<br>(2.14)   | -0.079***<br>(-4.27) | -0.001<br>(-0.03)<br>(-0.19) | -0.001<br>(-0.05)              |
| <b>S&amp;P 500</b>       | -0.011<br>(-1.06)                          | -0.005<br>(-0.86)    | -0.025***<br>(-2.58) | -0.034<br>(-1.84)                        | -0.003<br>(-0.23)    | -0.008<br>(-1.45)              | 0.022<br>(1.10)       | 0.007<br>(1.07)      | 0.019**<br>(2.12)   | 0.048***<br>(2.79)   | 0.000<br>(-0.03)<br>(-0.19)  | 0.005<br>(1.03)                |
| <b>Gold</b>              | 0.009                                      | -0.001               | -0.009               | 0.013**                                  | 0.028                | 0.002                          | 0.014                 | -0.004               | 0.004               | -0.018               | -0.020                       | -0.002                         |

|                |        |         |         |         |        |         |        |         |        |          |         |         |
|----------------|--------|---------|---------|---------|--------|---------|--------|---------|--------|----------|---------|---------|
|                | (0.95) | (-0.16) | (-0.83) | (0.66)  | (1.49) | (0.49)  | (1.33) | (-0.55) | (0.39) | (-0.73)  | (-1.25) | (-0.21) |
| <b>Bitcoin</b> |        |         |         | -0.001  | 0.006  | -0.001  |        |         |        | -0.014** | -0.001  | 0.001   |
|                |        |         |         | (-0.48) | (1.23) | (-0.30) |        |         |        | (-2.34)  | (-0.42) | (0.83)  |

This table reports the marginal effects from the fractional probit regression described in Equation (2) (Section 2.2). The dependent variables are UK Bond Risk and US Bond Risk. All variable definitions are provided in Table 2 (Section 2.1.2), and the sample periods are specified in Table 1 (Section 2.1.1). To address multicollinearity, PCA was applied was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, z-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*)

### *3.3. Recession-induced change in bond risk and its determinants*

Tables 22 and 23 report the results from testing H2 using the RIC-based OLS regressions outlined in Equations (4) and (5). Our discussion focuses only on findings that diverge from those established in the quantile-level (Section 3.1) and mean-level (Section 3.2) analyses. For clarity, the term vector form is used to denote the original, untransformed specification of a variable. References to a vector's initial influence pattern therefore describe its behaviour in the quantile and mean-level regressions.

#### *3.3.1. Thematic Great Recession*

During the Great Recession, the RIC results diverge in several respects from the quantile- and mean-level findings. For the UK, the UK Term Structure exerts a positive influence on (RIC)UK Bond Risk in the post-recession phase, reversing its earlier negative effects. This points to a structural break in how yield-curve dynamics shape credit risk: while the overall risk profile stabilises, recession-induced changes in bond risk dissipate more slowly. A similar reversal is observed for the (RIC)US Term Structure, which turns negative in the post-recession phase, contradicting the negative patterns of its vector form. This suggests that shifts in the US curve stabilised more slowly than the curve itself.

For the US, (RIC)US Bond Risk is negatively affected by the (RIC)UK Term Structure, despite the latter showing no significance in its vector form. This implies that abrupt changes in UK monetary expectations were transmitted directly into US credit markets, reinforcing the transatlantic co-movement channel. Post-recession, these dynamics persist; the UK Term Structure – both in vector and RIC forms – remains negative. By contrast, the (RIC)US Term Structure is insignificant during the recession, contradicting the earlier negative effects of its vector. However, it turns negative in the post-recession phase, opposing its earlier positive influence. This pattern suggests that while the overall US risk profile remains unsettled amid

expectations of tighter monetary policy, recession-induced changes in US bond risk fade more quickly. In contrast, UK adjustment appears more gradual.

### *3.3.2. Exogenous Covid-19 Recession*

Structural divergences are even more pronounced during the Covid-19 Recession, reflecting the exogenous character of the shock. For the UK, (RIC)UK Bond Risk is unaffected by the US Term Structure during the recession, in contrast to the earlier negative effect. Post-recession, however, both US Bond Risk and the US Term Structure exert statistically significant positive influences, consistent with their earlier significance but with reversed economic magnitudes. Specifically, the previously meaningful coefficient for US Bond Risk becomes economically negligible, while the US Term Structure – which had been offset by the US Bond Risk despite statistical significance – now registers a marginal positive effect. This switch indicates that interactions among highly correlated macroeconomic indicators are sensitive not only to bond risk levels but also to the dynamics of recession-induced change. Further, (RIC)UK Term Structure and (RIC)US Term Structure show no influence post-recession, diverging from the earlier negative and economically negligible effects of their vector forms. For the first time, Bitcoin exhibits a negative effect, diverging from its earlier insignificance. This aligns with its behaviour in the US, suggesting that it continues to track macroeconomic volatility rather than function as a non-traditional safe haven.

In the US, divergences are concentrated in macroeconomic indicators. (RIC)US Bond Risk is positively influenced by (RIC)UK Bond Risk in the post-recession phase, in contrast to the vector's earlier insignificance. This suggests that the earlier decoupling was not structural, and that cross-border linkages proved more resilient than the exogenous shock itself. Both the US Term Structure and its RIC counterpart exert negative effects during the recession, diverging from the vector's earlier positive influence. This mirrors the Great Recession, though

in that case the shift occurred post-recession. The finding reinforces that while overall crisis-induced risk persists, recession-induced changes in risk stabilise more quickly. Similarly, in the post-recession phase, (RIC)US Term Structure retains a negative influence despite the vector's earlier statistically significant but economically negligible effect. By contrast, both the UK and US Term Structures become insignificant in the post-recession phase, diverging from their earlier positive though economically limited vector results. These dynamics suggest that the exogenous shock triggered temporary decoupling in bond risk determinants, which was not observed during the thematic Great Recession.

**Table 22**

Recession-induced change OLS regression results – RIC-transformed Dependent variable

|                               | UK                   |                       |                     |                              | US                   |                       |                              |                                |
|-------------------------------|----------------------|-----------------------|---------------------|------------------------------|----------------------|-----------------------|------------------------------|--------------------------------|
|                               | Great Recession      |                       | Covid-19 Recession  |                              | Great Recession      |                       | Covid-19 Recession           |                                |
|                               | During               | Post                  | During              | Post                         | During               | Post                  | During                       | Post                           |
|                               | vs.<br>Pre           | vs.<br>During         | vs.<br>Pre          | vs.<br>During                | vs.<br>Pre           | vs.<br>During         | vs.<br>Pre                   | vs.<br>During                  |
| <b>UK Bond Risk</b>           |                      |                       |                     |                              | 1.124***<br>(23.68)  | 1.422***<br>(15.17)   | -0.063<br>(-0.08)            | 0.001***<br>(-8.02)<br>(-0.33) |
| <b>US Bond Risk</b>           | 0.870***<br>(20.92)  | 1.347***<br>(20.17)   | 0.373***<br>(7.68)  | 0.000***<br>(3.66)<br>(1.76) |                      |                       |                              |                                |
| <b>UK Term Structure</b>      | -0.972***<br>(-9.85) | 1.990***<br>(9.44)    | -1.529**<br>(-2.28) | -3.221***<br>(-2.72)         | -0.142<br>(-1.33)    | -1.179***<br>(-3.88)  | 1.454<br>(0.61)              | -0.640<br>(-0.50)              |
| <b>US Term Structure</b>      | 0.482***<br>(2.85)   | -1.637***<br>(-5.17)  | -0.412<br>(-1.42)   | 0.001*<br>(3.66)<br>(1.76)   | -1.014***<br>(-5.95) | 1.751***<br>(4.50)    | -3.878**<br>(-2.41)          | -0.002<br>(-8.02)<br>(-0.33)   |
| <b>FTSE 100</b>               | -0.015<br>(-1.26)    | -0.080***<br>(-3.14)  | 0.008<br>(0.65)     | 0.001<br>(0.03)              | -0.008<br>(-0.62)    | 0.050<br>(1.38)       | -0.001<br>(-1.14)<br>(-0.28) | 0.002<br>(0.18)                |
| <b>S&amp;P 500</b>            | -0.015<br>(-1.53)    | -0.052**<br>(-2.19)   | -0.001<br>(-0.04)   | 0.011<br>(0.35)              | 0.006<br>(0.52)      | 0.026<br>(0.73)       | 0.000<br>(-1.14)<br>(-0.28)  | 0.002<br>(0.13)                |
| <b>Gold</b>                   | -0.006<br>(-0.43)    | -0.002<br>(-0.10)     | 0.014<br>(0.90)     | 0.004<br>(0.15)              | 0.0022<br>(0.14)     | 0.031<br>(0.79)       | -0.001<br>(-0.02)            | -0.001<br>(-0.01)              |
| <b>Bitcoin</b>                |                      |                       | 0.001<br>(0.18)     | -0.027***<br>(-2.81)         |                      |                       | 0.011<br>(0.55)              | -0.001<br>(-0.14)              |
| <b>Constant</b>               | -0.020***<br>(-8.21) | -0.049***<br>(-12.79) | -0.003<br>(-1.40)   | 0.007<br>(1.88)              | -0.004***<br>(-2.69) | -0.054***<br>(-11.59) | 0.015<br>(0.52)              | -0.002<br>(-0.63)              |
| <b>Adjusted R<sup>2</sup></b> | 0.744                | 0.663                 | 0.411               | 0.108                        | 0.619                | 0.379                 | 0.130                        | 0.731                          |
| <b>Mean VIF</b>               | 1.30                 | 1.36                  | 1.31                | 1.14                         | 1.34                 | 1.34                  | 1.45                         | 1.30                           |

This table reports the coefficients from the recession-induced change OLS regression described in Equation (4) (Section 2.2).

The dependent variables are RIC-transformed UK Bond Risk and US Bond Risk. All variable definitions are provided in Table 2 (Section 2.1.2), and the sample periods are specified in Table 1 (Section 2.1.1). To address multicollinearity, PCA was applied was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, t-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

**Table 23**

Recession-induced change OLS regression results – RIC-transformed Dependent and predictor variables

|                                | UK                   |                     |                      |                      | US                    |                      |                     |                      |
|--------------------------------|----------------------|---------------------|----------------------|----------------------|-----------------------|----------------------|---------------------|----------------------|
|                                | Great Recession      |                     | Covid-19 Recession   |                      | Great Recession       |                      | Covid-19 Recession  |                      |
|                                | During               | Post                | During               | Post                 | During                | Post                 | During              | Post                 |
|                                | vs.<br>Pre           | vs.<br>During       | vs.<br>Pre           | vs.<br>During        | vs.<br>Pre            | vs.<br>During        | vs.<br>Pre          | vs.<br>During        |
| <b>(RIC) UK Bond Risk</b>      |                      |                     |                      |                      | 1.049***<br>(29.71)   | 0.996***<br>(29.71)  | 0.876***<br>(11.19) | 1.350***<br>(6.34)   |
| <b>(RIC) US Bond Risk</b>      | 0.602***<br>(27.34)  | 0.735***<br>(29.16) | 0.609***<br>(14.27)  | 0.475***<br>(8.19)   |                       |                      |                     |                      |
| <b>(RIC) UK Term Structure</b> | -0.381***<br>(-4.27) | -0.213**<br>(-2.04) | -1.427***<br>(-3.78) | -0.559<br>(-0.93)    | -0.812***<br>(-10.09) | -0.217**<br>(-1.96)  | 1.602*<br>(1.81)    | 1.664*<br>(1.71)     |
| <b>(RIC) US Term Structure</b> | 0.586***<br>(5.49)   | 0.492***<br>(3.52)  | -0.738***<br>(-3.71) | 0.620<br>(1.11)      | -0.129<br>(-0.90)     | -0.376***<br>(-3.49) | -1.594**<br>(-2.50) | -1.635***<br>(-2.96) |
| <b>(RIC) FTSE 100</b>          | -0.011<br>(-1.37)    | -0.010<br>(-0.99)   | -0.003<br>(-0.35)    | 0.004<br>(0.36)      | -0.005<br>(-0.50)     | -0.003<br>(-0.32)    | 0.002<br>(0.15)     | 0.016<br>(1.17)      |
| <b>(RIC) S&amp;P 500</b>       | -0.007<br>(-1.06)    | -0.007<br>(-0.84)   | -0.002<br>(-0.27)    | -0.001<br>(-0.19)    | 0.007<br>(0.84)       | 0.002<br>(0.30)      | 0.001<br>(0.11)     | -0.005<br>(-0.47)    |
| <b>(RIC) Gold</b>              | -0.003<br>(-0.36)    | 0.009<br>(0.82)     | 0.012<br>(1.05)      | 0.002<br>(0.17)      | -0.004<br>(-0.43)     | -0.002<br>(-0.24)    | -0.008<br>(-0.43)   | -0.014<br>(-0.87)    |
| <b>(RIC) Bitcoin</b>           |                      |                     | 0.001<br>(0.54)      | -0.003<br>(-0.77)    |                       |                      | -0.005<br>(-0.80)   | -0.001<br>(-0.21)    |
| <b>Constant</b>                | 0.002***<br>(2.92)   | 0.001***<br>(1.28)  | -0.001***<br>(-4.74) | -0.003***<br>(-3.56) | 0.012***<br>(12.93)   | -0.001***<br>(-2.77) | 0.007***<br>(10.62) | 0.002***<br>(2.14)   |
| <b>Adjusted R<sup>2</sup></b>  | 0.839                | 0.739               | 0.637                | 0.459                | 0.712                 | 0.806                | 0.837               | 0.508                |
| <b>Mean VIF</b>                | 1.23                 | 1.09                | 1.28                 | 1.35                 | 1.18                  | 1.36                 | 1.77                | 1.58                 |

This table reports the coefficients from the recession-induced change OLS regression described in Equation (5) (Section 2.2).

The dependent variables are RIC-transformed UK Bond Risk and US Bond Risk, and the predictor variables are also RIC-transformed. All variable definitions are provided in Table 2 (Section 2.1.2), and the sample periods are specified in Table 1 (Section 2.1.1). t-statistics are reported in parentheses. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

#### **4. Conclusion and policy recommendation**

This study examined systemic risk in corporate bond markets through the novel lens of recession typologies, distinguishing between thematic recessions arising from structural imbalances and exogenous recessions triggered by sudden external shocks. By applying distribution-sensitive econometric techniques to UK and US bond data, and segmenting crises into pre-, during, and post-recession phases, we trace how systemic vulnerabilities evolve across different contexts and points in the risk distribution.

The findings demonstrate that recession type, timing, and national context critically shape systemic fragility. Risk drivers operate in non-linear ways, with quantile-specific dynamics that cannot be captured by conventional linear frameworks. Moreover, the persistence of cross-border co-movement between the UK and US highlights that systemic risk is not confined within national boundaries. It rather propagates through financial interconnections in ways that complicate governance and crisis management.

From a risk governance perspective, the results highlight four key implications: (i) Systemic risk monitoring and governance frameworks must explicitly distinguish between thematic and exogenous recession types, since their risk transmission channels and systemic impacts differ markedly; (ii) Policy design should incorporate distribution-sensitive risk models that can capture fat-tailed dynamics and phase-specific vulnerabilities, rather than relying solely on average effects; and (iii) Risk managers should develop and integrate cross-border yield curves into monitoring systems alongside domestic curves to improve detection of co-movement channels; and (iv) The persistence of UK-US co-movement calls for coordinated international governance mechanisms, since systemic fragility cannot be mitigated by domestic measures alone.

Taken together, these insights advance the field of risk analysis by providing an empirical framework for classifying crises and tracing their impact on systemic fragility. They also offer

practical guidance for regulators, policymakers, and risk managers tasked with safeguarding financial stability under uncertainty. As global markets continue to face both slow-building imbalances and sudden external shocks, adaptive and context-sensitive risk governance will be essential for anticipating, absorbing, and ultimately mitigating systemic fragility in global financial markets.

## References

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## Appendix

**Table A1**

Mean-level fractional probit regression results – Fixed effects

|                    | UK              |           |           |                    |            |            | US              |           |           |                    |          |           |
|--------------------|-----------------|-----------|-----------|--------------------|------------|------------|-----------------|-----------|-----------|--------------------|----------|-----------|
|                    | Great Recession |           |           | Covid-19 Recession |            |            | Great Recession |           |           | Covid-19 Recession |          |           |
|                    | Pre             | During    | Post      | Pre                | During     | Post       | Pre             | During    | Post      | Pre                | During   | Post      |
| <b>UK Bond</b>     |                 |           |           |                    |            |            | 17.389***       | 13.376*** | 17.070*** | 17.216***          | 0.366    | -0.030*** |
| <b>Risk</b>        |                 |           |           |                    |            |            | (17.00)         | (42.18)   | (43.91)   | (23.82)            | (0.14)   | (-19.29)  |
| <b>US Bond</b>     | 0.055***        | 8.391***  | 15.367*** | -0.010***          | 8.285***   | -0.011***  |                 |           |           |                    |          |           |
| <b>Risk</b>        | (33.50)         | (31.53)   | (31.71)   | (-9.37)            | (13.12)    | (-16.37)   |                 |           |           |                    |          |           |
| <b>UK Term</b>     | 0.083***        | -4.383*** | -8.411*** | 0.019***           | -14.856**  | -19.688*** | -70.475***      | 1.746     | 6.643***  | -29.743**          | 9.496    | 25.069*** |
| <b>Structure</b>   | (10.42)         | (-5.28)   | (-5.36)   | (5.09)             | (-2.25)    | (-6.83)    | (-12.38)        | (1.61)    | (5.04)    | (-2.14)            | (1.23)   | (3.65)    |
| <b>US Term</b>     | -0.053***       | 12.007*** | -2.649    | 0.011***           | -23.589*** | 0.021***   | 62.339***       | -8.537*** | 3.312**   | -20.903            | 14.948** | 0.013***  |
| <b>Structure</b>   | (-4.57)         | (8.99)    | (-1.20)   | (3.29)             | (-5.77)    | (9.12)     | (15.66)         | (-5.08)   | (2.02)    | (-1.08)            | (2.08)   | (4.19)    |
| <b>FTSE 100</b>    | -0.349*         | -0.098    | -0.456**  | -0.369             | 0.084      | -0.090     | 0.169           | -0.020    | 0.352**   | -1.386***          | -0.001   | -0.004    |
|                    | (-1.65)         | (-1.05)   | (-2.46)   | (-1.49)            | (0.55)     | (-1.26)    | (0.51)          | (-0.24)   | (2.14)    | (4.31)             | (-0.03)  | (-0.05)   |
| <b>S&amp;P 500</b> | -0.241          | -0.073    | -0.468*** | -0.482*            | -0.041     | -0.122     | 0.510           | 0.091     | 0.318**   | 0.855***           | -0.001   | 0.080     |
|                    | (-1.06)         | (-0.86)   | (-2.58)   | (-1.84)            | (-0.23)    | (-1.45)    | (1.10)          | (1.07)    | (2.12)    | (2.82)             | (-0.19)  | (1.03)    |
| <b>Gold</b>        | 0.201           | -0.017    | -0.163    | 0.184              | 0.387      | 0.037      | 0.337           | -0.056    | 0.064     | -0.329             | -0.295   | -0.041    |
|                    | (0.95)          | (-0.16)   | (-0.83)   | (0.66)             | (1.49)     | (0.49)     | (1.33)          | (-0.55)   | (0.39)    | (-0.73)            | (-1.26)  | (-0.21)   |

|                             |                        |                        |                       |                         |                       |                        |                        |                        |                        |                       |                      |                        |
|-----------------------------|------------------------|------------------------|-----------------------|-------------------------|-----------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|----------------------|------------------------|
| <b>Bitcoin</b>              |                        |                        |                       | -0.018<br>(-0.48)       | 0.075<br>(1.23)       | -0.007<br>(-0.30)      |                        |                        |                        | -0.251**<br>(-2.34)   | -0.024<br>(-0.42)    | 0.018<br>(0.83)        |
| <b>Constant</b>             | -2.086***<br>(-729.92) | -2.266***<br>(-133.92) | -2.271***<br>(-80.87) | -1.857***<br>(-1009.18) | -1.959***<br>(-67.10) | -1.814***<br>(-188.52) | -2.592***<br>(-102.47) | -2.123***<br>(-146.21) | -2.453***<br>(-122.02) | -2.464***<br>(-37.73) | 1.949***<br>(-22.80) | -1.996***<br>(-113.67) |
| <b>Pseudo R<sup>2</sup></b> | 0.006                  | 0.002                  | 0.003                 | 0.001                   | 0.001                 | 0.001                  | 0.003                  | 0.003                  | 0.003                  | 0.008                 | 0.001                | 0.001                  |

This table reports the marginal effects from the fractional probit regression described in Equation (2) (Section 2.2). The dependent variables are UK Bond Risk and US Bond Risk. All variable definitions are provided in Table 2 (Section 2.1.2), and the sample periods are specified in Table 1 (Section 2.1.1). To address multicollinearity, PCA was applied was applied to the variables listed in Table 6 (Section 2.2.1). As a result, the coefficients for these variables have been back-transformed using the eigenvectors shown in Table 8 (Section 2.2.1) to recover their economic interpretations. For each back-transformed coefficient, z-statistics for all associated principal components are reported in parentheses to ensure full transparency. Statistical significance is indicated by  $p < 0.10$  (\*),  $p < 0.05$  (\*\*), and  $p < 0.01$  (\*\*\*).

**Table A2**

Pearson correlation coefficients for predictor variables used in Equations (1), (2), and (4) – UK (Great Recession)

| Panel I: Pre-Recession     |              |                   |                   |          |         |      |
|----------------------------|--------------|-------------------|-------------------|----------|---------|------|
|                            | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| US Bond Risk               | 1.00         |                   |                   |          |         |      |
| UK Term Structure          | 0.92         | 1.00              |                   |          |         |      |
| US Term Structure          | 0.89         | 0.95              | 1.00              |          |         |      |
| FTSE 100                   | -0.02        | -0.02             | -0.04             | 1.00     |         |      |
| S&P 500                    | -0.08        | -0.08             | -0.07             | -0.14    | 1.00    |      |
| Gold                       | 0.04         | 0.01              | -0.01             | 0.07     | -0.08   | 1.00 |
| Panel II: During Recession |              |                   |                   |          |         |      |
|                            | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| US Bond Risk               | 1.00         |                   |                   |          |         |      |
| UK Term Structure          | -0.46        | 1.00              |                   |          |         |      |
| US Term Structure          | -0.38        | 0.62              | 1.00              |          |         |      |
| FTSE 100                   | -0.02        | 0.02              | 0.04              | 1.00     |         |      |
| S&P 500                    | -0.01        | 0.02              | 0.02              | -0.01    | 1.00    |      |

|                           |              |                   |                   |          |         |      |
|---------------------------|--------------|-------------------|-------------------|----------|---------|------|
| Gold                      | 0.01         | 0.04              | 0.09              | 0.05     | 0.05    | 1.00 |
| Panel III: Post-Recession |              |                   |                   |          |         |      |
|                           | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| US Bond Risk              | 1.00         |                   |                   |          |         |      |
| UK Term Structure         | -0.13        | 1.00              |                   |          |         |      |
| US Term Structure         | -0.38        | 0.65              | 1.00              |          |         |      |
| FTSE 100                  | 0.12         | -0.04             | -0.08             | 1.00     |         |      |
| S&P 500                   | 0.02         | -0.04             | -0.05             | 0.07     | 1.00    |      |
| Gold                      | 0.02         | -0.01             | -0.04             | -0.13    | -0.06   | 1.00 |

This table reports the Pearson correlation coefficients among the predictor variables used in the bootstrapped quantile regression (Equation 1), fractional probit regression (Equation 2), and recession-induced change OLS regression (Equation 4), focusing on the UK during the Great Recession.

**Table A3**

Pearson correlation coefficients for predictor variables used in Equations (1), (2), and (4) – US (Great Recession)

| Panel I: Pre-Recession     |              |                   |                   |          |         |      |
|----------------------------|--------------|-------------------|-------------------|----------|---------|------|
|                            | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| UK Bond Risk               | 1.00         |                   |                   |          |         |      |
| UK Term Structure          | 0.38         | 1.00              |                   |          |         |      |
| US Term Structure          | 0.28         | 0.64              | 1.00              |          |         |      |
| FTSE 100                   | 0.02         | -0.01             | 0.01              | 1.00     |         |      |
| S&P 500                    | -0.05        | -0.03             | -0.03             | -0.08    | 1.00    |      |
| Gold                       | 0.06         | -0.01             | 0.01              | -0.02    | 0.01    | 1.00 |
| Panel II: During Recession |              |                   |                   |          |         |      |
|                            | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| UK Bond Risk               | 1.00         |                   |                   |          |         |      |
| UK Term Structure          | -0.08        | 1.00              |                   |          |         |      |
| US Term Structure          | 0.17         | 0.66              | 1.00              |          |         |      |
| FTSE 100                   | -0.01        | 0.02              | 0.02              | 1.00     |         |      |
| S&P 500                    | -0.03        | 0.02              | 0.02              | -0.01    | 1.00    |      |

|                           |              |                   |                   |          |         |      |
|---------------------------|--------------|-------------------|-------------------|----------|---------|------|
| Gold                      | -0.01        | 0.02              | 0.03              | 0.08     | 0.02    | 1.00 |
| Panel III: Post-Recession |              |                   |                   |          |         |      |
|                           | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold |
| UK Bond Risk              | 1.00         |                   |                   |          |         |      |
| UK Term Structure         | -0.16        | 1.00              |                   |          |         |      |
| US Term Structure         | -0.31        | 0.67              | 1.00              |          |         |      |
| FTSE 100                  | 0.04         | -0.03             | -0.04             | 1.00     |         |      |
| S&P 500                   | -0.01        | -0.03             | 0.02              | 0.07     | 1.00    |      |
| Gold                      | 0.02         | -0.03             | -0.05             | -0.11    | -0.05   | 1.00 |

This table reports the Pearson correlation coefficients among the predictor variables used in the bootstrapped quantile regression (Equation 1), fractional probit regression (Equation 2), and recession-induced change OLS regression (Equation 4), focusing on the US during the Great Recession.

**Table A4**

Pearson correlation coefficients for predictor variables used in Equations (1), (2), and (4) – UK (Covid-19 Recession)

| Panel I: Pre-Recession     |              |                   |                   |          |         |      |         |
|----------------------------|--------------|-------------------|-------------------|----------|---------|------|---------|
|                            | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold | Bitcoin |
| US Bond Risk               | 1.00         |                   |                   |          |         |      |         |
| UK Term Structure          | -0.68        | 1.00              |                   |          |         |      |         |
| US Term Structure          | -0.70        | 0.74              | 1.00              |          |         |      |         |
| FTSE 100                   | 0.05         | -0.09             | -0.08             | 1.00     |         |      |         |
| S&P 500                    | 0.05         | -0.01             | -0.02             | 0.02     | 1.00    |      |         |
| Gold                       | -0.11        | 0.02              | 0.08              | 0.10     | -0.41   | 1.00 |         |
| Bitcoin                    | 0.08         | -0.03             | -0.09             | -0.07    | -0.07   | 0.06 | 1.00    |
| Panel II: During Recession |              |                   |                   |          |         |      |         |
|                            | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold | Bitcoin |
| US Bond Risk               | 1.00         |                   |                   |          |         |      |         |
| UK Term Structure          | -0.34        | 1.00              |                   |          |         |      |         |
| US Term Structure          | 0.06         | 0.26              | 1.00              |          |         |      |         |
| FTSE 100                   | -0.01        | 0.24              | 0.17              | 1.00     |         |      |         |

|         |       |      |      |      |      |      |      |
|---------|-------|------|------|------|------|------|------|
| S&P 500 | 0.01  | 0.13 | 0.11 | 0.61 | 1.00 |      |      |
| Gold    | -0.04 | 0.06 | 0.12 | 0.23 | 0.19 | 1.00 |      |
| Bitcoin | -0.15 | 0.15 | 0.01 | 0.10 | 0.10 | 0.16 | 1.00 |

Panel III: Post-Recession

|                   | US Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold | Bitcoin |
|-------------------|--------------|-------------------|-------------------|----------|---------|------|---------|
| US Bond Risk      | 1.00         |                   |                   |          |         |      |         |
| UK Term Structure | -0.33        | 1.00              |                   |          |         |      |         |
| US Term Structure | -0.84        | 0.50              | 1.00              |          |         |      |         |
| FTSE 100          | -0.10        | 0.08              | 0.07              | 1.00     |         |      |         |
| S&P 500           | 0.01         | -0.01             | -0.07             | 0.07     | 1.00    |      |         |
| Gold              | 0.04         | -0.11             | -0.08             | -0.07    | 0.17    | 1.00 |         |
| Bitcoin           | -0.01        | -0.04             | 0.01              | -0.01    | 0.03    | 0.04 | 1.00    |

This table reports the Pearson correlation coefficients among the predictor variables used in the bootstrapped quantile regression (Equation 1), fractional probit regression (Equation 2), and recession-induced change OLS regression (Equation 4), focusing on the UK during the Covid-19 Recession.

**Table A5**

Pearson correlation coefficients for predictor variables used in Equations (1), (2), and (4) – US (Covid-19 Recession)

| Panel 1: Pre-Recession     |              |                   |                   |          |         |      |         |
|----------------------------|--------------|-------------------|-------------------|----------|---------|------|---------|
|                            | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold | Bitcoin |
| UK Bond Risk               | 1.00         |                   |                   |          |         |      |         |
| UK Term Structure          | -0.66        | 1.00              |                   |          |         |      |         |
| US Term Structure          | -0.43        | 0.40              | 1.00              |          |         |      |         |
| FTSE 100                   | -0.03        | 0.21              | 0.25              | 1.00     |         |      |         |
| S&P 500                    | -0.08        | 0.29              | 0.56              | 0.63     | 1.00    |      |         |
| Gold                       | -0.02        | -0.23             | 0.01              | -0.15    | -0.16   | 1.00 |         |
| Bitcoin                    | -0.20        | 0.02              | 0.16              | -0.27    | -0.09   | 0.03 | 1.00    |
| Panel II: During Recession |              |                   |                   |          |         |      |         |
|                            | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold | Bitcoin |
| UK Bond Risk               | 1.00         |                   |                   |          |         |      |         |
| UK Term Structure          | -0.29        | 1.00              |                   |          |         |      |         |
| US Term Structure          | 0.48         | 0.26              | 1.00              |          |         |      |         |
| FTSE 100                   | -0.11        | 0.34              | 0.25              | 1.00     |         |      |         |

|         |      |      |      |      |      |      |      |
|---------|------|------|------|------|------|------|------|
| S&P 500 | 0.01 | 0.11 | 0.15 | 0.71 | 1.00 |      |      |
| Gold    | 0.16 | 0.16 | 0.28 | 0.32 | 0.29 | 1.00 |      |
| Bitcoin | 0.16 | 0.11 | 0.13 | 0.27 | 0.21 | 0.29 | 1.00 |

Panel III: Post-Recession

|                   | UK Bond Risk | UK Term Structure | US Term Structure | FTSE 100 | S&P 500 | Gold  | Bitcoin |
|-------------------|--------------|-------------------|-------------------|----------|---------|-------|---------|
| UK Bond Risk      | 1.00         |                   |                   |          |         |       |         |
| UK Term Structure | -0.62        | 1.00              |                   |          |         |       |         |
| US Term Structure | -0.74        | 0.49              | 1.00              |          |         |       |         |
| FTSE 100          | 0.01         | 0.02              | 0.07              | 1.00     |         |       |         |
| S&P 500           | 0.08         | 0.08              | -0.13             | 0.09     | 1.00    |       |         |
| Gold              | -0.03        | 0.03              | 0.13              | -0.01    | -0.27   | 1.00  |         |
| Bitcoin           | -0.09        | 0.29              | 0.04              | -0.01    | -0.01   | -0.01 | 1.00    |

This table reports the Pearson correlation coefficients among the predictor variables used in the bootstrapped quantile regression (Equation 1), fractional probit regression (Equation 2), and recession-induced change OLS regression (Equation 4), focusing on the US during the Covid-19 Recession.

**Table A6**

Pearson correlation coefficients for predictor variables used in Equation (5) – Great Recession

| Panel I: UK                                   |           |                |                |                |               |            |
|-----------------------------------------------|-----------|----------------|----------------|----------------|---------------|------------|
| Panel IA: During vs. Pre-Recession            |           |                |                |                |               |            |
|                                               | (RIC) US  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold |
|                                               | Bond Risk | Term Structure | Term Structure |                |               |            |
| (RIC) US                                      | 1.00      |                |                |                |               |            |
| Bond Risk                                     |           |                |                |                |               |            |
| (RIC) UK                                      | -0.17     | 1.00           |                |                |               |            |
| Term Structure                                |           |                |                |                |               |            |
| (RIC) US                                      | 0.58      | 0.10           | 1.00           |                |               |            |
| Term Structure                                |           |                |                |                |               |            |
| (RIC) FTSE 100                                | -0.05     | 0.02           | -0.21          | 1.00           |               |            |
| (RIC) S&P 500                                 | -0.07     | 0.01           | -0.05          | -0.04          | 1.00          |            |
| (RIC) Gold                                    | -0.01     | 0.02           | 0.03           | 0.01           | 0.06          | 1.00       |
| Panel IB: Post-Recession vs. During Recession |           |                |                |                |               |            |
|                                               | (RIC) US  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold |

|                | Bond Risk | Term Structure | Term Structure |      |      |      |
|----------------|-----------|----------------|----------------|------|------|------|
| (RIC) US       | 1.00      |                |                |      |      |      |
| Bond Risk      |           |                |                |      |      |      |
| (RIC) UK       | -0.08     | 1.00           |                |      |      |      |
| Term Structure |           |                |                |      |      |      |
| (RIC) US       | -0.31     | 0.35           | 1.00           |      |      |      |
| Term Structure |           |                |                |      |      |      |
| (RIC) FTSE 100 | -0.01     | 0.07           | -0.01          | 1.00 |      |      |
| (RIC) S&P 500  | -0.04     | 0.05           | 0.03           | 0.02 | 1.00 |      |
| (RIC) Gold     | 0.02      | 0.04           | 0.05           | 0.06 | 0.01 | 1.00 |

Panel II: US

Panel IIA: During vs. Pre-Recession

|           | (RIC) UK  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold |
|-----------|-----------|----------------|----------------|----------------|---------------|------------|
|           | Bond Risk | Term Structure | Term Structure |                |               |            |
| (RIC) UK  | 1.00      |                |                |                |               |            |
| Bond Risk |           |                |                |                |               |            |
| (RIC) UK  | 0.22      | 1.00           |                |                |               |            |

|                |       |      |       |       |      |      |
|----------------|-------|------|-------|-------|------|------|
| Term Structure |       |      |       |       |      |      |
| (RIC) US       | 0.37  | 0.51 | 1.00  |       |      |      |
| Term Structure |       |      |       |       |      |      |
| (RIC) FTSE 100 | -0.02 | 0.01 | 0.01  | 1.00  |      |      |
| (RIC) S&P 500  | -0.05 | 0.01 | -0.03 | -0.02 | 1.00 |      |
| (RIC) Gold     | 0.01  | 0.01 | -0.01 | 0.06  | 0.04 | 1.00 |

Panel IIB: Post-Recession vs. During Recession

|                |           |                |                |                |               |            |
|----------------|-----------|----------------|----------------|----------------|---------------|------------|
|                | (RIC) UK  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold |
|                | Bond Risk | Term Structure | Term Structure |                |               |            |
| (RIC) UK       | 1.00      |                |                |                |               |            |
| Bond Risk      |           |                |                |                |               |            |
| (RIC) UK       | -0.59     | 1.00           |                |                |               |            |
| Term Structure |           |                |                |                |               |            |
| (RIC) US       | -0.11     | 0.48           | 1.00           |                |               |            |
| Term Structure |           |                |                |                |               |            |
| (RIC) FTSE 100 | 0.01      | 0.01           | 0.01           | 1.00           |               |            |
| (RIC) S&P 500  | -0.01     | 0.01           | 0.01           | 0.01           | 1.00          |            |

|            |       |      |      |      |      |      |
|------------|-------|------|------|------|------|------|
| (RIC) Gold | -0.01 | 0.02 | 0.03 | 0.07 | 0.01 | 1.00 |
|------------|-------|------|------|------|------|------|

This table reports the Pearson correlation coefficients among the predictor variables used in the recession-induced change OLS regression (Equation 5), focusing on the Great Recession in the UK and US.

**Table A7**

Pearson correlation coefficients for predictor variables used in Equation (5) – Covid-19 Recession

| Panel I: UK                                   |           |                |                |                |               |            |               |
|-----------------------------------------------|-----------|----------------|----------------|----------------|---------------|------------|---------------|
| Panel 1A: During vs. Pre-Recession            |           |                |                |                |               |            |               |
|                                               | (RIC) US  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold | (RIC) Bitcoin |
|                                               | Bond Risk | Term Structure | Term Structure |                |               |            |               |
| (RIC) US                                      | 1.00      |                |                |                |               |            |               |
| Bond Risk                                     |           |                |                |                |               |            |               |
| (RIC) UK Term                                 | 0.09      | 1.00           |                |                |               |            |               |
| Structure                                     |           |                |                |                |               |            |               |
| (RIC) US Term                                 | 0.26      | 0.37           | 1.00           |                |               |            |               |
| Structure                                     |           |                |                |                |               |            |               |
| (RIC) FTSE 100                                | 0.13      | 0.07           | 0.04           | 1.00           |               |            |               |
| (RIC) S&P 500                                 | 0.11      | 0.07           | 0.04           | 0.58           | 1.00          |            |               |
| (RIC) Gold                                    | -0.04     | 0.03           | 0.14           | 0.24           | 0.20          | 1.00       |               |
| (RIC) Bitcoin                                 | -0.11     | 0.01           | -0.01          | 0.43           | 0.01          | 0.27       | 1.00          |
| Panel IB: Post-Recession vs. During Recession |           |                |                |                |               |            |               |

|                | (RIC) US  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold | (RIC) Bitcoin |
|----------------|-----------|----------------|----------------|----------------|---------------|------------|---------------|
|                | Bond Risk | Term Structure | Term Structure |                |               |            |               |
| (RIC) US       | 1.00      |                |                |                |               |            |               |
| Bond Risk      |           |                |                |                |               |            |               |
| (RIC) UK Term  | -0.45     | 1.00           |                |                |               |            |               |
| Structure      |           |                |                |                |               |            |               |
| (RIC) US Term  | 0.04      | 0.30           | 1.00           |                |               |            |               |
| Structure      |           |                |                |                |               |            |               |
| (RIC) FTSE 100 | -0.01     | 0.24           | 0.24           | 1.00           |               |            |               |
| (RIC) S&P 500  | 0.02      | 0.10           | 0.20           | 0.51           | 1.00          |            |               |
| (RIC) Gold     | 0.01      | -0.04          | 0.21           | 0.25           | 0.20          | 1.00       |               |
| (RIC) Bitcoin  | -0.22     | 0.10           | 0.11           | 0.07           | 0.06          | 0.22       | 1.00          |

Panel II: US

Panel IIA: During vs. Pre-Recession

|          | (RIC) UK  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold | (RIC) Bitcoin |
|----------|-----------|----------------|----------------|----------------|---------------|------------|---------------|
|          | Bond Risk | Term Structure | Term Structure |                |               |            |               |
| (RIC) UK | 1.00      |                |                |                |               |            |               |

|                |       |      |      |      |      |      |      |
|----------------|-------|------|------|------|------|------|------|
| Bond Risk      |       |      |      |      |      |      |      |
| (RIC) UK Term  | -0.54 | 1.00 |      |      |      |      |      |
| Structure      |       |      |      |      |      |      |      |
| (RIC) US Term  | -0.49 | 0.52 | 1.00 |      |      |      |      |
| Structure      |       |      |      |      |      |      |      |
| (RIC) FTSE 100 | -0.29 | 0.41 | 0.34 | 1.00 |      |      |      |
| (RIC) S&P 500  | -0.22 | 0.18 | 0.22 | 0.69 | 1.00 |      |      |
| (RIC) Gold     | -0.10 | 0.18 | 0.29 | 0.19 | 0.26 | 1.00 |      |
| (RIC) Bitcoin  | -0.05 | 0.05 | 0.29 | 0.26 | 0.22 | 0.37 | 1.00 |

Panel IIB: Post-Recession vs. During Recession

|               | (RIC) UK  | (RIC) UK       | (RIC) US       | (RIC) FTSE 100 | (RIC) S&P 500 | (RIC) Gold | (RIC) Bitcoin |
|---------------|-----------|----------------|----------------|----------------|---------------|------------|---------------|
|               | Bond Risk | Term Structure | Term Structure |                |               |            |               |
| (RIC) UK      | 1.00      |                |                |                |               |            |               |
| Bond Risk     |           |                |                |                |               |            |               |
| (RIC) UK Term | -0.43     | 1.00           |                |                |               |            |               |
| Structure     |           |                |                |                |               |            |               |

|                            |       |      |      |      |      |      |      |
|----------------------------|-------|------|------|------|------|------|------|
| (RIC) US Term<br>Structure | 0.28  | 0.19 | 1.00 |      |      |      |      |
| (RIC) FTSE 100             | 0.05  | 0.24 | 0.08 | 1.00 |      |      |      |
| (RIC) S&P 500              | 0.12  | 0.11 | 0.01 | 0.68 | 1.00 |      |      |
| (RIC) Gold                 | 0.17  | 0.19 | 0.31 | 0.28 | 0.29 | 1.00 |      |
| (RIC) Bitcoin              | -0.08 | 0.22 | 0.18 | 0.16 | 0.11 | 0.21 | 1.00 |

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This table reports the Pearson correlation coefficients among the predictor variables used in the recession-induced change OLS regression (Equation 5), focusing on the Covid-19 Recession in the UK and US.