Green versus conventional bonds during market stress: Threats to financial stability?

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Agenda

Summary

Research Questions:

- How do green bonds behave relative to conventional securities across the yield curve?
- Do green bonds act as risk diversifiers, safe-havens or shock transmitters?
- How does the connectedness between green and conventional bonds evolve during periods of market stress (e.g., the Russia–Ukraine war or the Covid-19 pandemic)?

Methodology:

- Two-stage empirical approach to assess connectedness between green and conventional bonds through yield curve components
- Stage 1: Dynamic Nelson-Siegel (DNS) model $\rightarrow$ extract level, slope and curvature yield factors
- Stage 2: Time-Varying Parameter Vector Autoregression (TVP-VAR) model $\rightarrow$ measure dynamic connectedness and spillovers

Results:

- Green bonds act as shock transmitters, especially under market stress
- Conventional sovereign bonds retain safe-haven status
- Implication: Integration of green finance adds a new dimension of systemic risk

Data

Sample overview

- **Period**: May 2021 - December 2024
- **Frequency**: Daily observations
- **Region**: Eurozone (focus on Germany and EIB)

Paired bonds

- Bond prices and yields of paired bonds (i.e. green and conventional securities issued by same entity) to control for issuer-specific credit risk and liquidity differences
  - Issuer 1: **European Investment Bank**: EIB (EIB benchmark bonds) vs EIB-G (climate awareness bonds)
  - Issuer 2: **German Government**: DBB (zero-coupon bonds) vs DBB-G (green federal securities)
  - Issuer 3: **Commercial Banks in Germany**: GCB (most liquid AAA-rated bonds) vs GCB-G (green bonds issued by KfW, NRW Bank, LR Bank)

Data sources

- Bond prices and yields: **LSEG** (former Refinitiv Eikon)
- Commercial bond yield parameters: **European Central Bank (ECB)**

Empirical Strategy

Goal

- Assess the connectedness between green and conventional bonds through yield curve components

Step 1: Yield Curve Estimation via Dynamic Nelson-Siegel model

- Extract three latent factors that represent yield curve structure:
  Level: long-term yield expectations
  Slope: short-term expectations
  Curvature: medium-term dynamics
- Generate a time series for each bond type for each of the three latent factors

Step 2: Connectedness Analysis

- Estimate a Time-Varying Parameter Vector Autoregression (TVP-VAR) model to derive generalized forecast error variance decompositions used to calculate directional and total connectedness measures
- Analyze spillovers to identify **net transmitters** of shocks versus **net receivers**.

Summary of Empirical Results

Static Connectedness (Full Sample)

- Green bonds are **net transmitters** across level, slope, and curvature factors.
- Conventional sovereign bonds remain **net receivers** (safe-haven role).
- *Implication:* Green bonds contribute to systemic interdependence even in normal periods.

Dynamic Connectedness (Time-Varying)

- **Level:** EIB, EIB-G, GCB, DBB-G are key transmitters; GCB-G loses safe-haven role during Russia–Ukraine war.
- **Slope:** EIB, GCB, EIB-G dominate transmission; DBB-G and GCB-G more exposed than conventional counterparts.
- **Curvature:** EIB, GCB, EIB-G consistently lead transmission; DBB-G switches from receiver to transmitter during war.
- DBB remains a **shock absorber** across all factors.

Crisis Periods (RU–UA War; Covid-19 Robustness)

- EIB, EIB-G, GCB, GCB-G and DBB-G act as transmitters across all factors.
- DBB consistently preserves its **safe-haven / absorber** role.

Suggestions - Conceptual

- What are the implications of paper's findings for financial stability and climate-related financial risk? The paper refers to the systemic relevance of green bonds; it would be helpful to clarify what this means in practice – e.g., through potential risk channels or examples of how instability could propagate.
- The results motivate expanding the analysis on the link between green bonds and financial (in)stability, such as examining how green bond performance responds to extreme weather events or physical climate risk.
- It would be interesting to explore the underlying economic forces that make green bonds persistent net transmitters. For example, how should we interpret the loss of the safe-haven role for GCB-G?
- Could transmission patterns differ between investment-grade and non-investment-grade green bonds?

Suggestions - Methodology

- How sensitive are the DNS factors to the choice of the parameter λ?
- How does the 10-day forecast horizon affect the connectedness results? Have you explored alternative horizons?
- What motivated the choice of a 100-observation rolling window, and how do the results change when selecting different observation windows (Antonakakis et al. 2020)?
- Have you considered alternative yield curve specifications, such as the Svensson model with an additional curvature term?
- It may be useful to examine whether the observed connectedness patterns are influenced by liquidity differences across bond segments.

Suggestions - Structure of the Paper

- The Introduction could more clearly isolate the paper's contribution relative to existing studies.
- It would strengthen the Introduction to provide a brief snapshot of the key empirical results.
- The Literature Review should more explicitly guide the reader toward the authors' hypotheses and expected results, rather than remaining mostly descriptive.
- The intuition behind Figures 1, 5, and 6 and their implications could be explained more clearly and integrated into the main text rather than confined to figure notes.

Overall: Relevant and timely research question. Good luck with the publication!

Thank you for your attention!