Cross-Country Sovereign Yield Spillovers

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Table of Contents

Motivation and Research Foundation

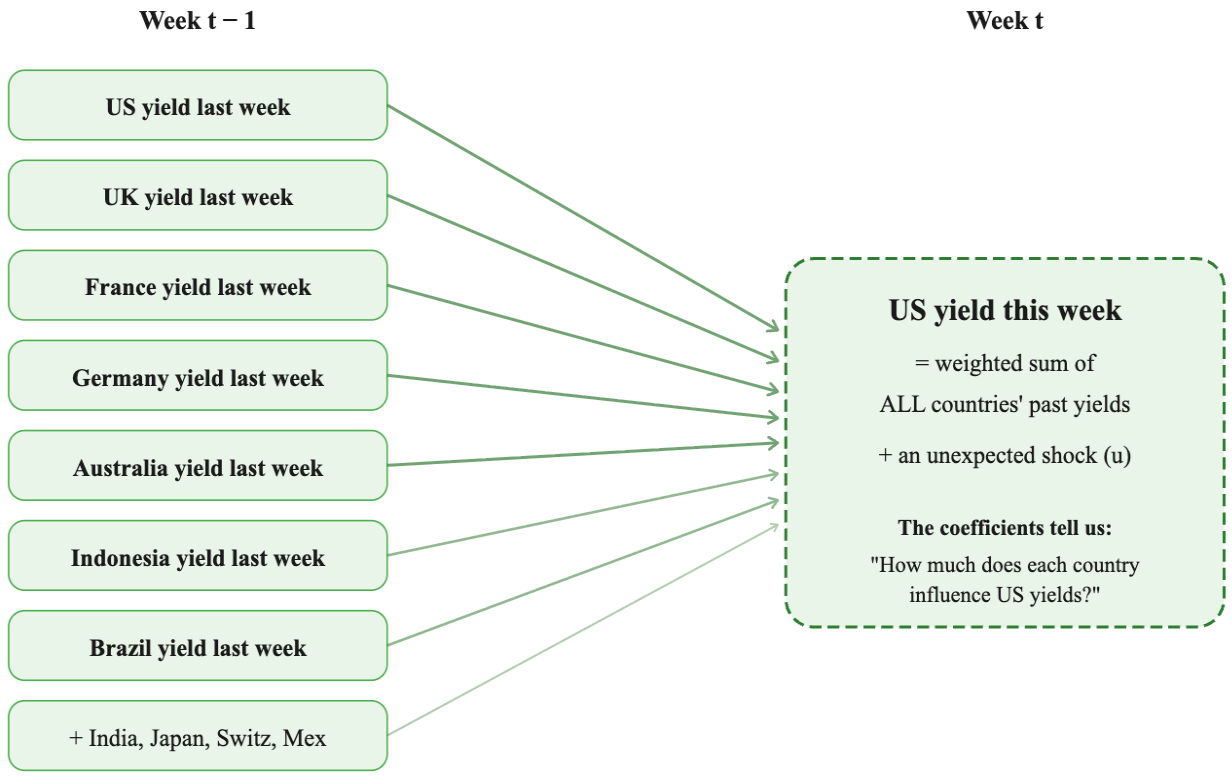
Cross-Country Spillover

Cross-country spillover, as defined in the Diebold–Yilmaz Spillover Index, measures how shocks or volatility in one country's financial market affect others. Using a VAR model and forecast error variance decomposition (FEVD), the framework quantifies **how much of a country's forecast uncertainty is driven by shocks from other countries.** This captures both the strength and direction of interdependence across markets.

The result is a spillover matrix that shows how much each country transmits to and receives from others. From this, you can compute total spillovers as well as directional measures, identifying which markets are net transmitters or receivers. In practice, this helps reveal global financial linkages and how interconnectedness tends to rise during periods of market stress.

By quantifying who is driving versus reacting, it allows investors and risk managers to better understand where risk is originating and how it propagates across markets. This is important for portfolio construction, as periods of high spillover typically imply reduced diversification benefits across countries. More broadly, tracking changes in spillover over time provides a way to monitor systemic risk, since sharp increases often signal heightened financial stress and stronger global contagion effects.

VAR Model Intuition



Motivation and Research Foundation

Table 4 - Spillover Table, Global Stock Market VOLATILITY, 1/10/1992-11/23/2007

		FROM																		
		US	**UK**	**FRA**	**DEU**	**HKG**	**JPN**	**AUS**	**IDN**	**KOR**	**MYS**	**PHL**	**SGP**	**TAI**	**THA**	**ARG**	**BRA**	**CHL**	**MEX**	**TUR**	**Contribution From Others**
TO	**US**	63.9	14.9	3.9	1.9	4.9	0.2	1.8	0.3	1.6	0.9	0.4	2.6	0.3	0.1	0.1	0.0	0.1	0.2	2.0	**36**
	UK	22.9	54.5	5.0	1.3	7.4	0.5	2.1	0.3	1.0	0.8	0.1	2.4	0.2	0.2	0.4	0.2	0.1	0.1	0.7	**46**
	FRA	24.0	32.8	27.3	0.2	5.4	0.2	2.8	0.4	0.3	1.2	0.4	2.4	0.2	0.3	0.6	0.3	0.1	0.1	0.9	**73**
	DEU	26.9	29.5	13.6	13.7	4.8	0.2	3.9	0.2	0.2	1.3	0.8	2.0	0.2	0.4	0.6	0.3	0.1	0.2	1.0	**86**
	HKG	2.0	0.5	0.7	0.0	87.7	0.1	0.1	0.4	1.4	0.5	1.5	3.4	0.6	0.4	0.0	0.1	0.0	0.1	0.3	**12**
	JPN	2.7	3.3	0.4	0.7	1.6	82.9	0.1	0.1	0.9	1.1	0.1	1.6	0.3	0.0	0.6	0.3	0.3	0.2	2.8	**17**
	AUS	8.9	2.2	0.3	0.6	43.9	0.2	34.7	1.2	1.7	1.3	0.1	2.8	0.1	1.0	0.1	0.2	0.2	0.3	0.1	**65**
	IDN	2.8	0.9	0.3	1.0	6.1	0.3	0.6	71.4	6.9	2.3	2.5	2.8	0.7	0.0	0.0	0.3	0.2	0.2	0.9	**29**
	KOR	2.5	0.6	0.4	0.4	9.1	1.0	1.0	10.3	67.5	1.3	0.9	2.5	0.8	0.2	0.1	0.1	0.2	0.3	0.8	**32**
	MYS	1.3	0.6	0.3	0.6	7.2	1.0	0.9	0.8	1.7	70.7	3.1	6.1	0.3	0.5	0.9	0.6	0.1	1.5	1.9	**29**
	PHL	2.1	0.3	0.3	0.4	8.9	0.3	0.4	8.8	3.0	6.1	66.7	1.5	0.2	0.2	0.2	0.2	0.1	0.2	0.3	**33**
	SGP	12.5	4.1	0.6	0.1	12.2	0.8	0.8	7.6	7.2	2.8	1.5	45.8	0.5	0.1	0.7	0.7	0.0	0.7	1.2	**54**
	TAI	8.5	0.4	0.4	0.2	2.8	0.7	1.3	0.5	9.5	0.7	1.7	0.6	69.0	0.2	0.4	0.8	0.2	0.7	1.3	**31**
	THA	0.5	0.7	0.4	0.3	9.0	0.2	0.3	3.6	2.9	0.4	0.8	5.3	0.2	73.9	0.1	0.5	0.1	0.7	0.2	**26**
	ARG	3.5	1.5	1.6	0.4	2.7	0.5	1.2	0.3	0.1	2.1	0.2	0.8	0.4	0.3	81.0	0.9	0.8	0.6	1.0	**19**
	BRA	4.5	2.3	1.4	0.3	12.6	0.4	3.3	1.0	0.3	10.0	0.7	3.4	0.5	0.3	11.7	45.2	0.3	0.9	0.8	**55**
	CHL	3.5	0.7	0.7	0.3	2.7	0.1	3.6	1.1	0.2	1.8	0.3	1.8	0.3	0.4	3.6	5.0	73.7	0.2	0.1	**26**
	MEX	6.5	1.3	0.7	0.3	25.0	0.2	4.8	0.3	0.5	2.4	0.3	2.1	0.2	0.5	6.3	3.0	0.3	44.1	1.1	**56**
	TUR	2.8	1.7	0.8	0.7	3.9	0.3	1.2	0.3	1.1	2.7	0.5	0.9	4.0	0.1	0.7	0.3	0.2	1.1	76.8	**23**
Contribution To Others		**138**	**98**	**32**	**10**	**170**	**7**	**30**	**38**	**41**	**40**	**16**	**45**	**10**	**5**	**27**	**14**	**3**	**8**	**17**	**749.6**
Contribution Including Own		**202**	**153**	**59**	**23**	**258**	**90**	**65**	**109**	**108**	**111**	**83**	**91**	**79**	**79**	**108**	**59**	**77**	**52**	**94**	**Spillover Index = 39.5%**

The **Diebold–Yilmaz Spillover Index** measures the share of total forecast error variance that comes from cross-country shocks (off-diagonal entries) rather than domestic ones, capturing overall market interconnectedness.

Shocks originating in the "FROM" country explain n% of the uncertainty (forecast error variance) in the "TO" country's future volatility.

In this table, the 39.5% spillover index indicates that about 40% of global equity market volatility is driven by international spillovers, with the rows and columns showing how much each country receives from and transmits to others.

Table of Contents

Analysis Framework and Construction

Difference in Methodology

While the Diebold–Yilmaz Spillover Index is originally applied to equity return volatilities, our implementation focuses on cross-country government bond yields (or yield changes). This shifts the interpretation from equity market uncertainty to interest rate dynamics, which are more directly tied to macroeconomic conditions, central bank policy, and inflation expectations. As a result, the spillovers we measure capture how shocks to one country's yield curve transmit across global fixed income markets, rather than how equity volatility propagates.

Our implementation focuses on government bond yields across multiple maturities (1Y, 2Y, 3Y, and 5Y). This shifts the interpretation toward macro-driven interest rate dynamics, where spillovers reflect how shocks to one country's yield curve transmit across others, capturing linkages driven by monetary policy, inflation expectations, and global fixed income flows. We also work with a specific set of countries—US, UK, FRA,GER, AUS, INDO, INDIA, JAPAN, SWITZ, BRAZIL, and MEXICO—rather than the broader global equity universe typically used in the original paper.

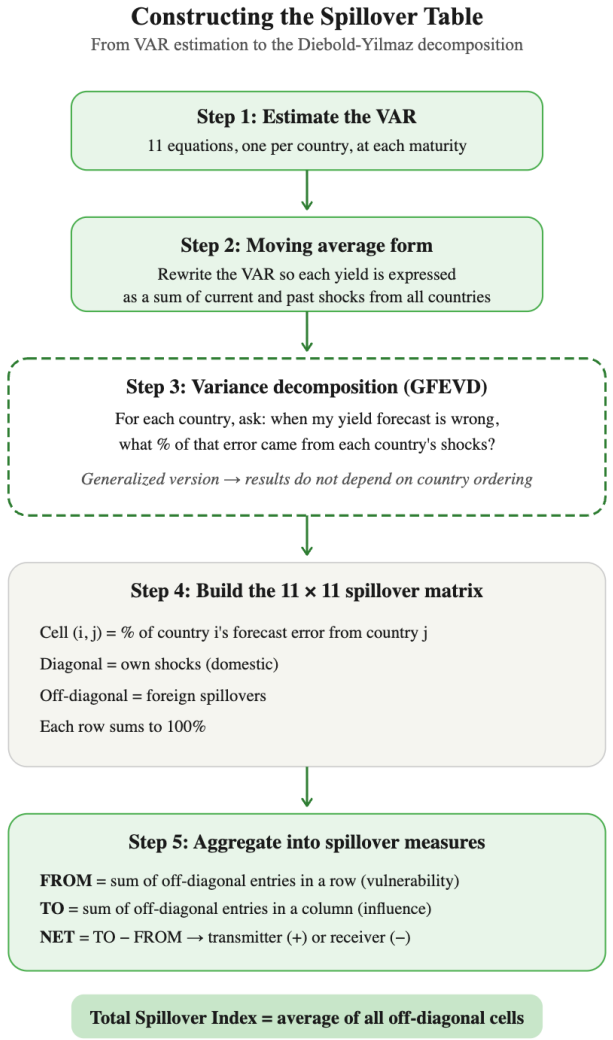
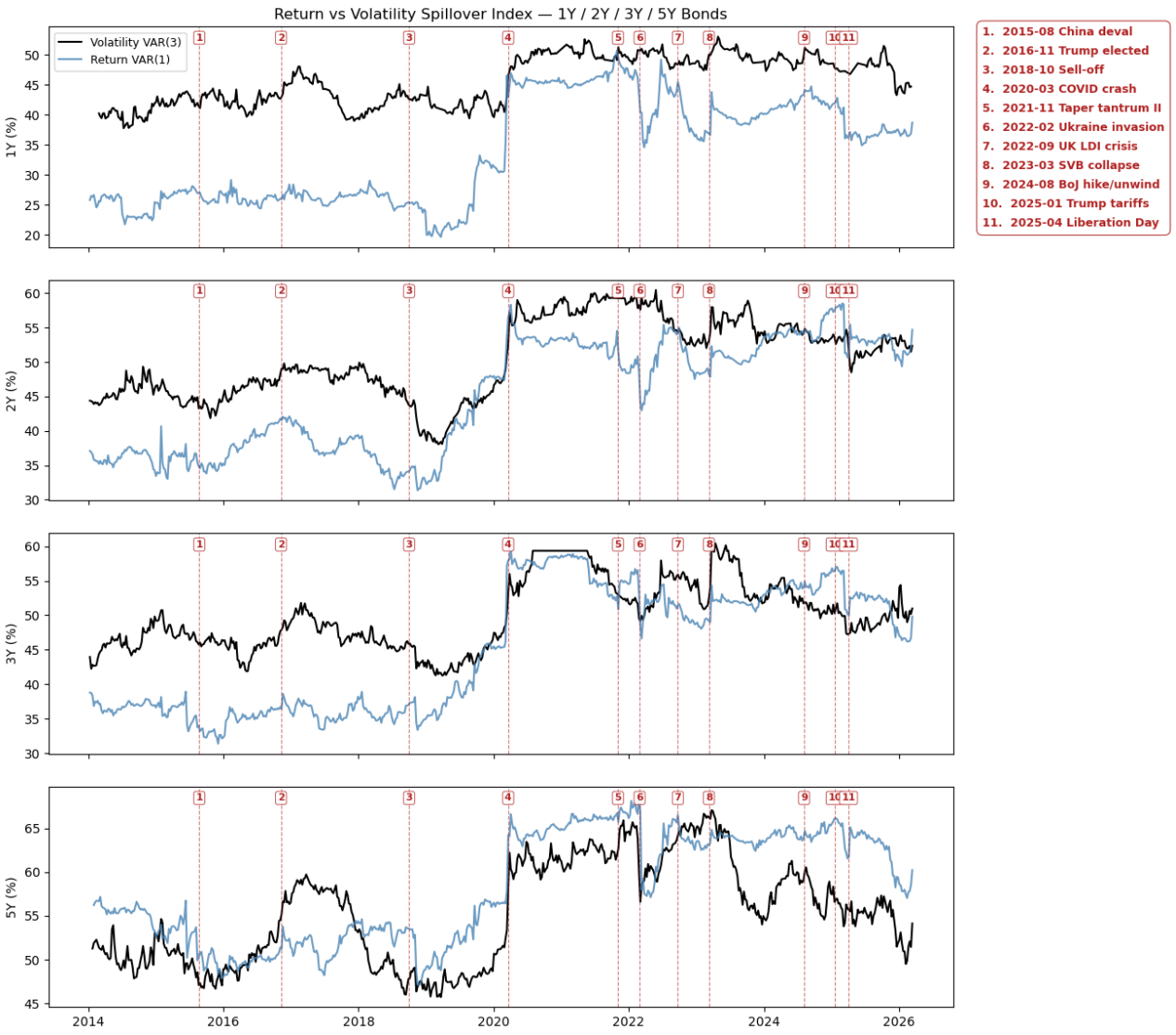


Table of Contents

Results and Findings



This chart plots rolling spillover indices over time for each maturity, comparing return-based and volatility-based spillovers, with major global events annotated.

Spillovers spike during crises. COVID (event 4) produces the sharpest and most sustained jump across all four maturities — the return spillover index at the 2-year maturity nearly doubles from ~35% to ~55% almost overnight. The Ukraine invasion (6), UK LDI crisis (7), and SVB collapse (8) all trigger visible but shorter-lived spikes, confirming that global interconnectedness is regime-dependent.

Longer maturities are permanently more connected. The 5-year panel sits 15–20 percentage points above the 1-year panel throughout the entire sample, not just during crises. This reinforces the full-sample finding that spillover intensity is structurally higher at longer durations.

Post-COVID return spillovers remain elevated. Unlike earlier episodes where the index reverted to pre-crisis levels, the 1Y–5Y spillover indices settle at a permanently higher plateau after 2020, suggesting a structural increase in global yield interconnectedness through the hiking cycle.

Results and Findings

Table 5d: Diebold-Yilmaz Volatility Spillover Table — 5-Year Maturity

Generalized FEVD of volatility, 10-week forecast horizon. Entries in percent.

	US	UK	FRA	GER	AUS	INDO	IND	JPN	SWI	BRA	MEX	FROM
US	**43.5**	10.4	6.1	7.0	10.0	1.5	1.1	4.5	6.5	1.2	8.1	**56.5**
UK	10.5	**41.6**	10.0	12.6	9.8	0.7	0.5	1.1	6.5	0.7	6.0	**58.4**
FRA	5.3	8.9	**37.3**	25.4	5.8	0.5	0.2	2.4	7.5	1.6	5.1	**62.7**
GER	5.8	10.6	24.9	**35.8**	4.8	0.3	0.3	2.5	9.0	0.9	5.2	**64.2**
AUS	7.6	10.7	6.4	6.5	**57.9**	1.1	0.9	2.1	3.2	0.8	2.8	**42.1**
INDO	3.1	2.5	1.0	0.7	1.5	**81.9**	0.6	1.7	0.6	1.6	4.8	**18.1**
IND	3.1	0.5	1.1	1.1	1.7	0.2	**81.2**	1.3	1.4	3.7	4.8	**18.8**
JPN	5.6	1.4	3.7	3.7	3.1	0.4	1.9	**73.5**	0.5	2.0	4.0	**26.5**
SWI	9.3	8.0	11.5	12.9	4.1	0.6	0.6	1.7	**42.7**	0.8	7.8	**57.3**
BRA	3.2	2.0	4.5	2.5	1.7	5.0	0.8	3.3	2.3	**72.2**	2.5	**27.8**
MEX	10.4	5.2	5.7	6.3	3.8	0.1	0.5	5.1	4.7	4.7	**53.5**	**46.5**
TO	**63.8**	**60.2**	**75.0**	**78.7**	**46.3**	**10.6**	**7.3**	**25.7**	**42.7**	**18.1**	**51.0**	
NET	+7.3	+1.9	+12.3	+14.5	+4.2	−7.5	−11.5	−0.8	−14.6	−9.7	+4.0	

Total Volatility Spillover Index: 39.8%

Maturity	Total Spillover Index (%)
1-Year	25.8
2-Year	32.9
3-Year	33.4
5-Year	39.8

Table 3d: Diebold-Yilmaz Spillover Table — 5-Year Maturity

Generalized FEVD, 10-week forecast horizon. Entries in percent.

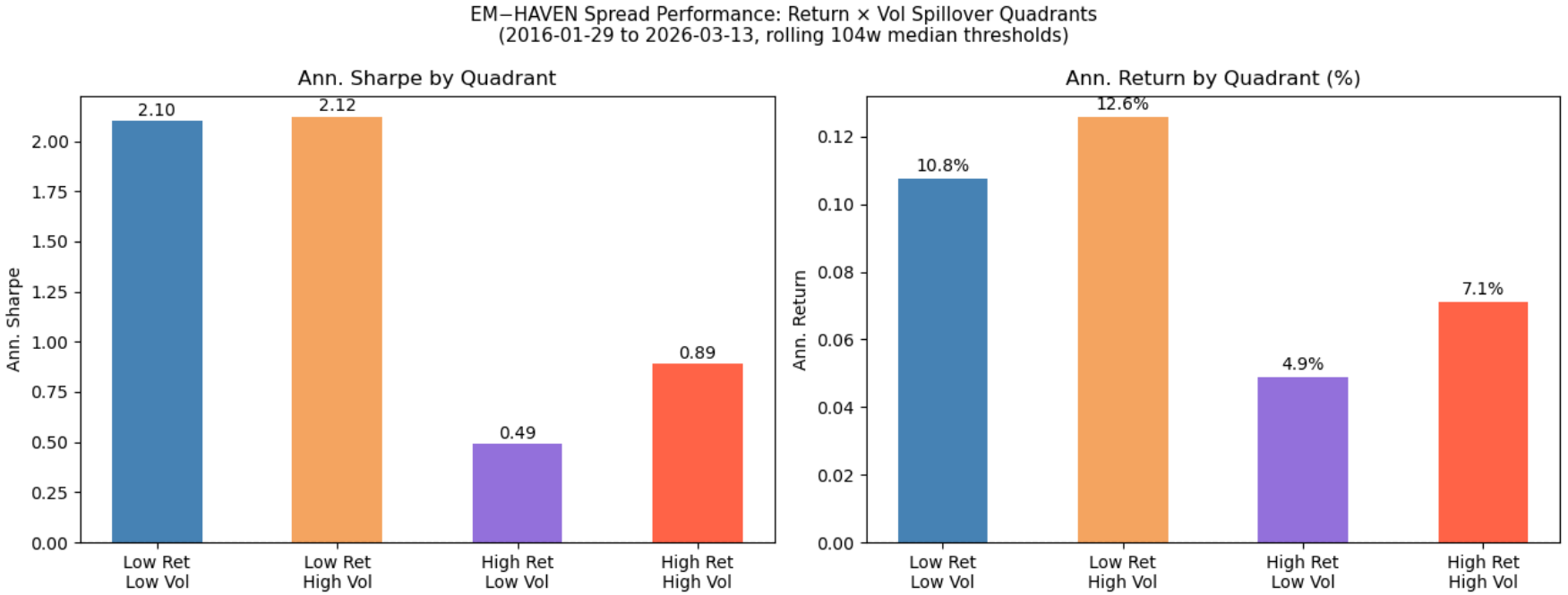
	US	UK	FRA	GER	AUS	INDO	BRA	IND	JPN	SWI	MEX	FROM
US	**30.2**	14.2	10.0	13.0	10.4	0.6	0.2	1.3	5.3	8.0	6.8	**69.8**
UK	14.8	**32.0**	12.5	15.9	8.4	0.1	0.1	0.7	3.0	9.3	3.1	**68.0**
FRA	9.8	11.7	**29.6**	21.5	6.8	0.4	0.2	1.2	3.3	12.4	3.0	**70.4**
GER	11.6	13.5	19.8	**27.1**	8.4	0.1	0.2	1.1	3.2	12.6	2.4	**72.9**
AUS	13.2	10.1	8.9	11.9	**37.3**	0.5	0.4	0.7	5.0	8.1	3.9	**62.7**
INDO	4.4	1.6	2.4	1.0	1.1	**72.0**	4.1	3.7	1.1	2.1	6.4	**28.0**
BRA	1.0	0.4	1.3	0.8	1.1	2.6	**80.3**	2.6	1.4	1.9	6.7	**19.7**
IND	3.6	1.6	2.7	2.5	1.4	2.4	2.4	**76.3**	0.2	3.9	3.0	**23.7**
JPN	9.4	5.8	6.2	6.5	6.8	0.7	0.9	0.2	**54.5**	5.4	3.7	**45.5**
SWI	9.0	9.8	14.4	16.1	7.3	0.7	0.3	1.7	3.1	**34.5**	3.1	**65.5**
MEX	11.6	5.0	5.1	4.3	5.4	2.6	3.8	2.0	4.6	3.8	**51.7**	**48.3**
TO	88.5	73.9	83.3	93.5	57.0	10.7	12.7	15.3	29.2	68.4	41.9	
NET	+18.7	+5.8	+13.0	+20.6	−5.7	−17.3	−7.0	−8.4	−16.3	+2.9	−6.4	

Total Spillover Index: 52.2%

Maturity	Total Spillover Index (%)
1-Year	23.9
2-Year	37.0
3-Year	37.1
5-Year	52.2

Results and Findings

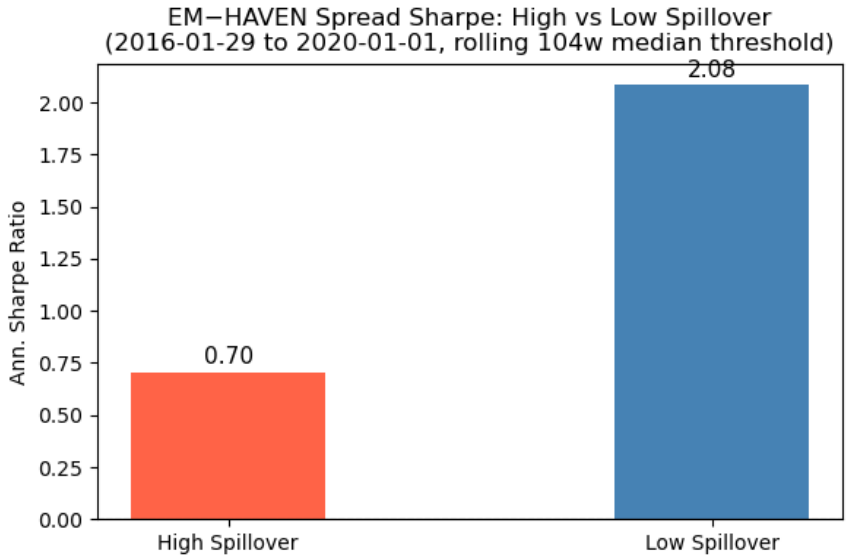
Utilizing Spillover as a Signal for HY Bonds

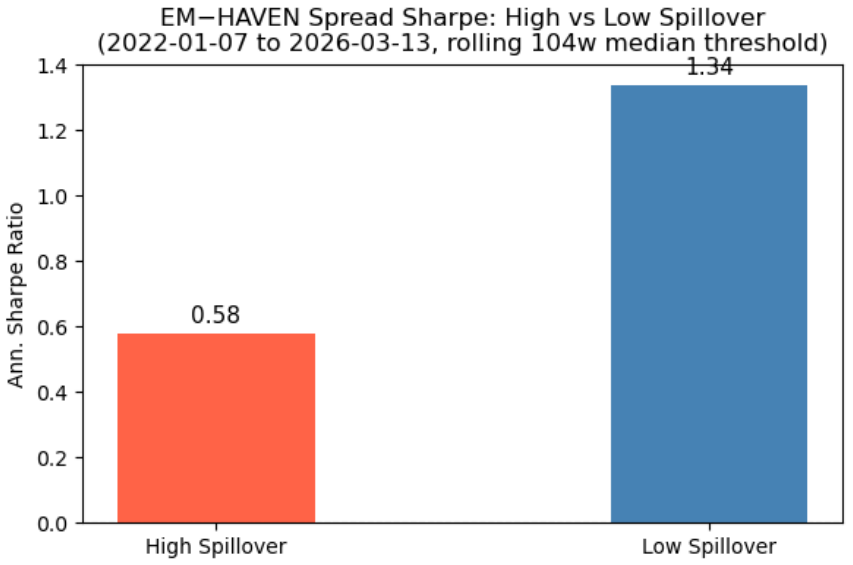


The EM-haven spread trade performs dramatically better when return spillovers are low. Both low-return-spillover quadrants deliver Sharpe ratios above 2.0 and annualized returns of 10–13%, regardless of whether volatility spillovers are high or low. When return spillovers are elevated, performance drops sharply — Sharpes fall to 0.49–0.89 and returns to 5–7%. This suggests that the return spillover regime is the dominant conditioning variable: when advanced and emerging market yields are moving independently (low return spillover), the EM-haven spread captures a meaningful carry and diversification premium. When return spillovers spike — typically during global risk events that drive all yields together — that premium compresses and the trade underperforms. Volatility spillovers, by contrast, appear to matter less: within each return spillover regime, the high-vol and low-vol columns produce similar outcomes.

Results and Findings

Utilizing Spillover as a Signal for HY Bonds





The cumulative return chart may suggest the strategy's edge is concentrated around the COVID period. However, splitting the sample into pre-2020 and post-2022 subperiods shows the signal is consistent across both regimes — Sharpe ratios are roughly 2× higher in low-spillover environments in each subperiod, confirming the result is not driven by a single episode.

Table of Contents

Conclusion

Key Findings

1. Cross-country **sovereign yield spillovers** are economically significant and maturity-dependent
2. Rolling spillover indices spike sharply during global stress events (COVID, Ukraine, SVB) and remain elevated post-2020, suggesting a structural increase in sovereign yield interconnectedness through the hiking cycle.
3. The return spillover regime serves as a **strong factor** for EM-haven spread performance — low-spillover environments consistently produce Sharpe ratios above 2.0 versus below 0.9 in high-spillover environments, holding across both pre-2020 and post-2022 subperiods.

Key Limitations

1. The VAR captures predictive relationships but not structural causality — without global controls like the VIX or oil prices, we may be victim for omitted variable bias
2. The sample didn't include all of HY countries. There is also an inherent selection bias against countries which defaulted.

Future Scope

1. Daily data were tested but time zone differences across markets (Tokyo closes before London opens, London before New York) created misalignment that distorted the VAR estimates — however, early results at the daily frequency showed richer spillover dynamics, and with proper time zone alignment this higher-frequency data could strengthen both the analysis and the trading signal in future work
2. Extending the framework to incorporate cross-asset spillovers — such as transmission between sovereign yields, equity indices, and currency markets — could capture additional channels of global financial contagion that a rates-only model misses.