BANK FOR INTERNATIONAL SETTLEMENTS

Searching for Yield Abroad: Risk-Taking through Foreign Investment in US Bonds

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Preview of approach and results

- Study foreign investment in US corporate bonds 2003–2016:
  - Security-level data: accurately characterise shifts in portfolio composition
  - Empirical identification: use cross-sectional differences in investor-country interest rates; since not closely related to US debt market conditions, largely avoiding simultaneity/omitted variables concerns – rates low, risks vary for other reasons
  - Endogeneity: net shifts in foreign holdings typically not large enough to drive access or financing conditions for US corporate borrowers

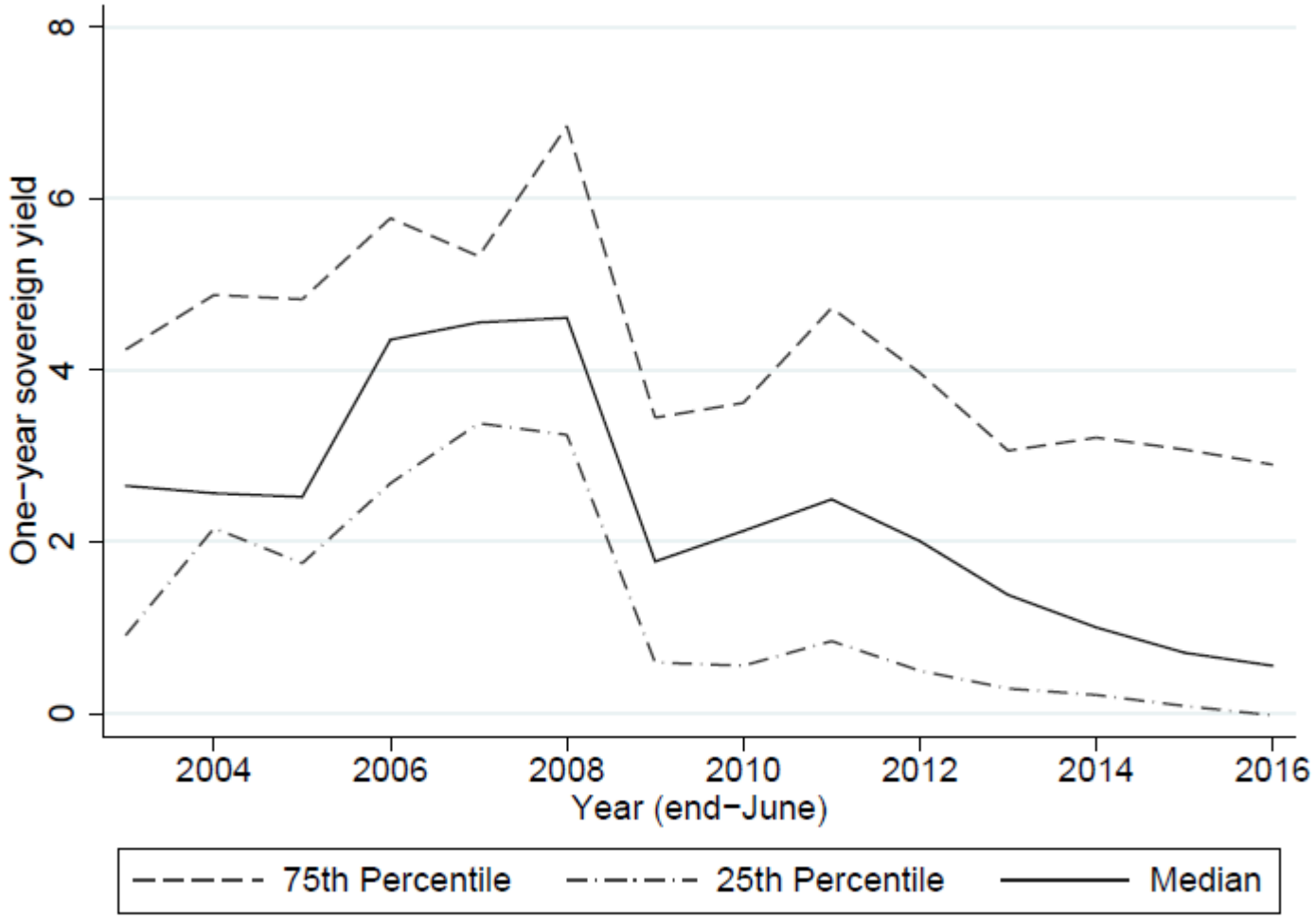
- Find statistically/economically significant risk-increasing shifts in the composition of bond holdings in response to lower safe rates in home economy
  - Shifts in US corporate bonds economically significant within foreign portfolios

Low rates can pressure profits and capital of financial institutions

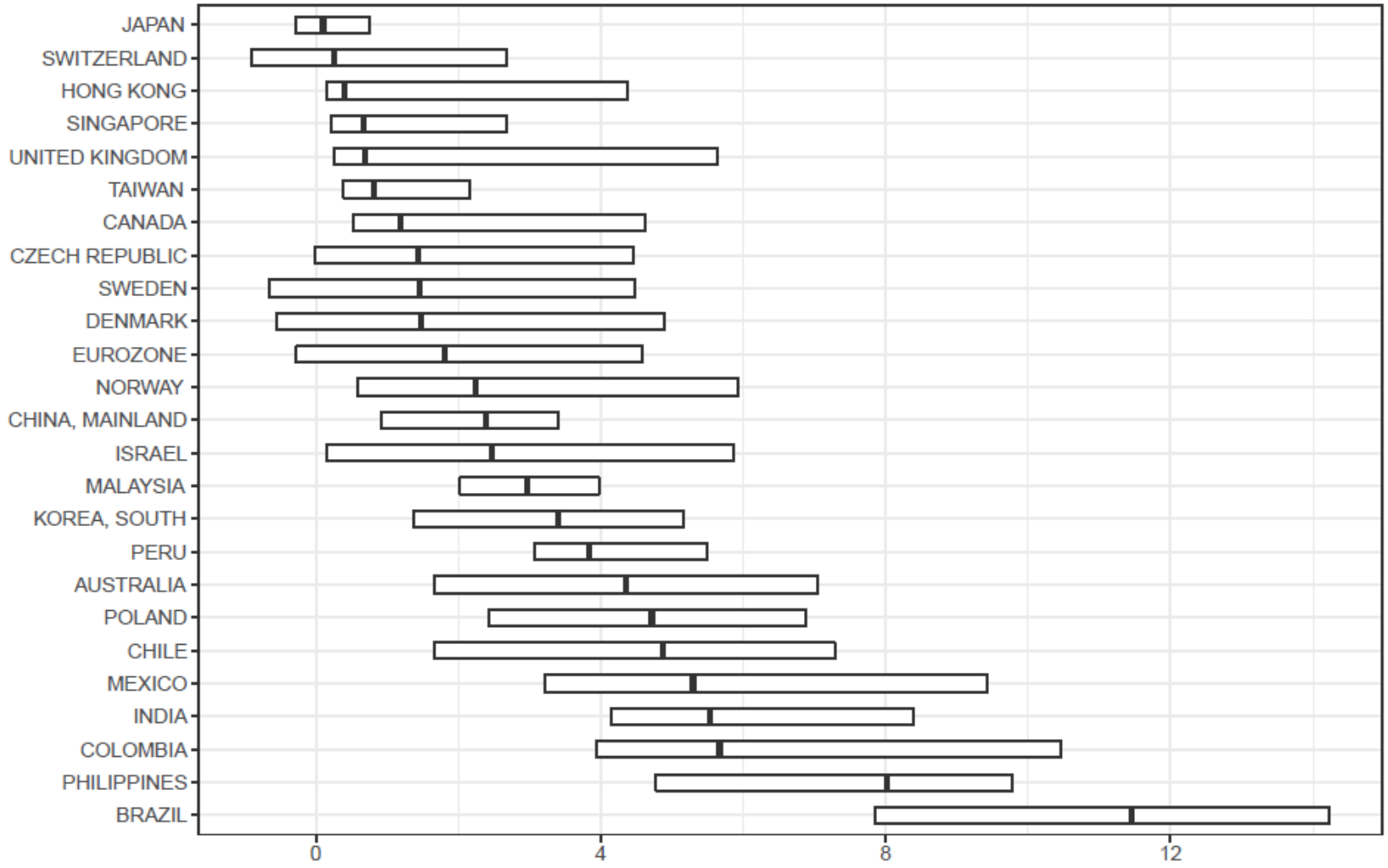
- Low interest rates can put pressure on profitability, capital positions
  - **Banks**: pressure on profitability through lower net interest margins
  - **Life Insurers**: often have minimum return guarantee for policyholders; exposed to rate declines when assets mature before liabilities ("duration mismatches")
  - **Pension Funds**: defined benefit guarantees can entail a de facto minimum required long-term rate of return that can also involve duration mismatches
  - **(US) Money Market Mutual Funds**: need enough yield to cover fund expenses, especially those that need to avoid "breaking the buck"

- Low profitability and capitalisation can increase "rational" incentives for search-for-yield, and search-for-duration to make up profits, restore capital, etc., esp. over time

Sovereign yields over time: general declining trend, but large variations



1-year Sovereign yields by economy (2003–2016)

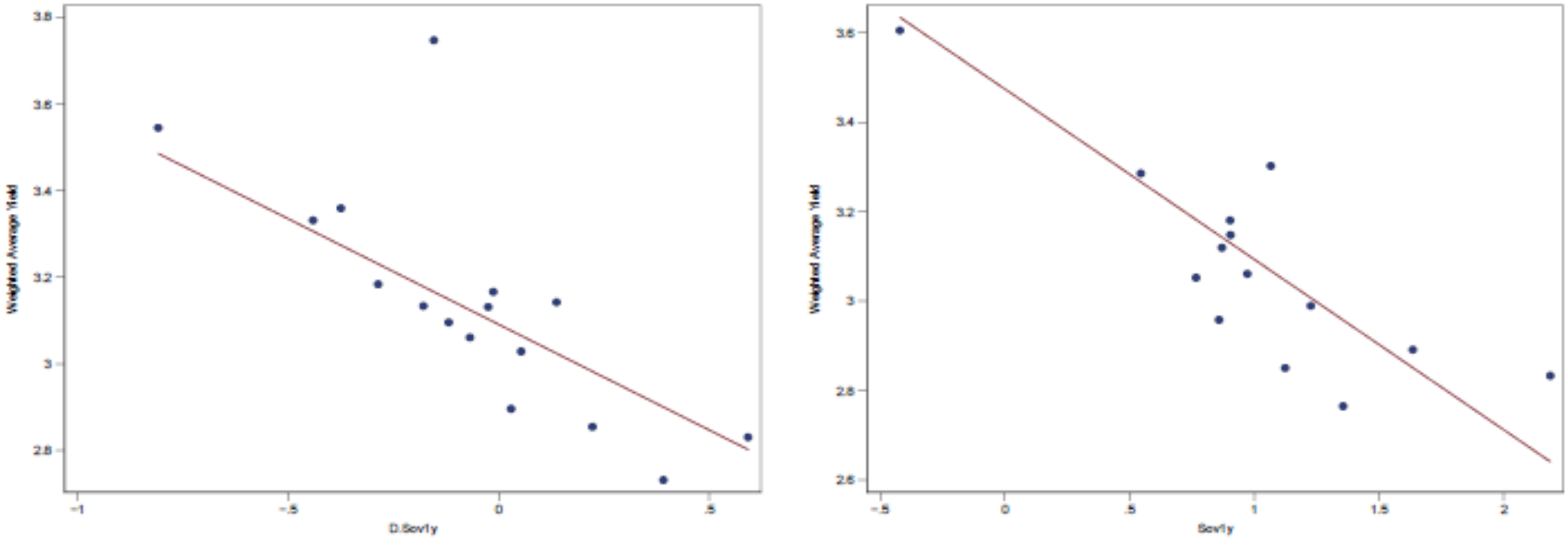


US share in foreign countries' bond portfolios

	U.S. bonds % of Fgn portf.	U.S. corp bonds % of Outst.
AFE	21.5	11.2
EME	42.8	0.2
Canada	68.3	0.8
Germany	10.4	0.5
Japan	43.7	0.8
Mexico	94.2	0.03

Calculations for Tables based on CPIS, BIS, TIC (2015)

Yield on countries' portfolios of U.S. corporate bonds negatively relates to their domestic sovereign yield



The figure presents binned scatterplots of individual countries weighted average yield of their portfolios of U.S. corporate bonds and the change in (panel 1) or level of their domestic sovereign yield (panel 2). The sample period excludes the crises years 2008-2012. The linear fit line is from an OLS regression of the weighted portfolio yield on the domestic sovereign yield using time and country fixed effects. D.Sov1y is the change in countries' domestic sovereign 1-year yield, Sov1y is the level of the 1-year domestic sovereign yield.

Empirical approach and hypotheses considered

- Panel regressions, with year×country fixed effects (equivalent of *diff-in-diff* approach):
  - The more the safe interest rate at home **declines**, do (more) investors **change** their holdings **relative** to outstanding (and other investors) **towards** US bonds with:
    - **higher** yields (ie, taking **more** credit **and** interest rate risks)?
      - **higher** yield spreads (ie, taking **more** credit risk)?
      - **longer** duration (ie, taking **more** interest rate risk)?

- Do effects appear in purchases of newly issued securities and in portfolio rebalancing?
- Are effects stronger in some periods? At low level of rates?
- Omitted variables? Other robustness tests

Empirical setup: regression specification

$$\Delta \mathrm{H}_{i,j,t}/\mathrm{Outstanding}_{i,t} = \kappa + \alpha \mathrm{Risk}_{i,t} + \beta \mathrm{Risk}_{i,t} \Delta \mathrm{Sov}_{j,t} + \\ + \gamma \Delta \mathrm{CDS}_t^{\mathrm{US}} \mathrm{Risk}_{i,t} + \theta \mathrm{Liquidity}_{i,t} + c_{j,t} + \epsilon_{i,j,t}$$

- $\Delta H_{i,j,t} / Out_{i,t}$: change in holdings relative to bond *i* outstanding amount
- $Risk_{i,t}$: yield (or yield spread and duration)
- $SOV_{j,t}$: home sovereign yield
- CDS^{US}_t : general market price of US corporate credit risk
- $Liquidity_{i,t}$: bond trading volume as a ratio to bond outstanding
- $c_{j,t}$: country*time fixed-effects to absorb all home country conditions
  - Allow country fixed effect to vary by newly issued or seasoned
  - Also use time-varying variables; bilateral trade, financial linkages, exchange rate
- In some specifications, also issuer fixed-effects.
- Weighted using the bonds' outstanding amounts. And error: $\varepsilon_{i.j.t.}$

Baseline: Δhome yield and U.S. yield choice. Dependent variable: $\Delta H_{i,j,t} / Out_{i,t}$

Change in country-level bond-holding (2003-2016)
percent of outstanding face value

	all years	ex 2008-2012	
Bond yield	0.049***	-0.013*	-0.025***
	(0.005)	(0.007)	(0.008)
D.Sov1y × Bond yield	-0.041***	-0.222***	-0.261***
	(0.005)	(0.018)	(0.022)
D.CDS (US) × Bond yield	-0.045***	-0.077***	-0.087***
	(0.002)	(0.007)	(0.008)
Trading volume / outstanding			0.162***
			(0.012)
Country-bond-year sample	215,274	134,715	107,831
R-squared	0.34	0.37	0.40

Includes year × country fixed effects. Standard errors in parentheses.

Control variables: US, bond-specific, and investor country

- Important to control for overall riskiness of corporate sector
  - ΔCDS*Bond Yield negative: less "inflows" as corporate risks overall increase
  - "Flight home"
- More-liquid bonds disproportionately preferred by foreign investors
- Bond yield coefficient:
  - Sign/interpretation less obvious, w/ interactions and also time and country fixed effects

Economic significance: effects on yield, spread, duration differentials

- Scenario: sovereign rate declines by 200 bp (cumulative difference between euro-area and Japan over sample)
- Compute the predicted changes to portfolio weights from fitted values
- Compare aggregate statistics for actual and scenario portfolios averaged over country-years
- Results for the non-crises sample:
  - Yield differential: 43 bp
  - Worse average credit rating: about 0.5 notches

Baseline: spread and duration (all countries). Dependent variable: $\Delta H_{i,j,t} / Out_{i,t}$

Change in country-level bond-holding (2003-2016)
percent of outstanding face value

	all years	ex 2008-2012	
Bond spread	0.077***	-0.002	-0.011
	(0.005)	(0.007)	(0.009)
Duration	-0.015***	-0.016***	-0.021***
	(0.002)	(0.003)	(0.003)
D.Sov1y × Bond spread	-0.045***	-0.302***	-0.350***
	(0.006)	(0.021)	(0.026)
D.Sov1y × Duration	-0.000	0.005	0.002
	(0.003)	(0.007)	(0.009)
D.CDS (US) × Bond spread	-0.052***	-0.113***	-0.132***
	(0.003)	(0.008)	(0.010)
Trading volume / outstanding			0.156***
			(0.012)
Country-bond-year sample	215,274	134,715	107,831
R-squared	0.34	0.37	0.40

Includes year × country fixed effects. Standard errors in parentheses.

Spread and duration: seasoned vs. new bonds. Dependent variable: $\Delta H_{i,j,t} / Out_{i,t}$

	Secondary market		Primary market
	(1)	(2)	(3)
Bond spread	-0.011	-0.027***	0.034
	(0.007)	(0.009)	(0.023)
Duration	0.006***	0.010***	-0.144***
	(0.002)	(0.003)	(0.013)
D.Sov1y × Bond spread	-0.167***	-0.183***	-0.554***
	(0.019)	(0.024)	(0.066)
D.Sov1y × Duration	-0.010*	-0.019***	0.216***
	(0.006)	(0.007)	(0.032)
D.CDS (US) × Bond spread	-0.088***	-0.107***	-0.196***
	(0.008)	(0.010)	(0.025)
Traded share		0.127***	
		(0.010)	
Observations	113137	86253	21577
R-squared	0.06	0.07	0.56

Sub-periods: spread and duration. Dependent variable: $\Delta H_{i,j,t} / Out_{i,t}$

Change in country-level bond-holding (2003-2016)
percent of outstanding face value

	2003-2007	2008-2012	2013-2016
Bond spread	-0.042**	-0.147***	-0.029***
	(0.019)	(0.009)	(0.011)
Duration	-0.010	-0.008*	-0.011***
	(0.009)	(0.004)	(0.004)
D.Sov1y × Bond spread	-0.177***	-0.004	-0.448***
	(0.029)	(0.006)	(0.051)
D.Sov1y × Duration	-0.047***	0.008**	0.162***
	(0.010)	(0.004)	(0.017)
D.CDS (US) × Bond spread	-0.121***	-0.041***	-0.125***
	(0.042)	(0.003)	(0.010)
Trading volume / outstanding	0.112***	0.070***	0.133***
	(0.024)	(0.017)	(0.013)
Country-bond-year sample	31,145	66,014	76,686
R-squared	0.22	0.32	0.48

Includes year × country fixed effects. Standard errors in parentheses.

Low vs high home yield: spread and duration. Dependent variable: $\Delta H_{i,j,t} / Out_{i,t}$

	Equal sample	
	(1) Low	(2) High
Bond spread	-0.070***	0.034***
	(0.012)	(0.012)
Duration	0.027***	-0.034***
	(0.004)	(0.005)
D.Sov1y × Bond spread	-0.518***	-0.329***
	(0.072)	(0.026)
D.Sov1y × Duration	0.237***	-0.011
	(0.020)	(0.009)
D.CDS (US) × Bond spread	-0.118***	-0.163***
	(0.014)	(0.015)
Traded share	0.115***	0.158***
	(0.015)	(0.019)
Observations	55186	52645
R-sq	0.48	0.33

Robustness and additional results

- Results robust to:
  - Home sovereign yield in levels instead of changes
  - Inclusion of alternative home-country drivers
    - bank CDS premiums
    - expected corporate earnings growth
    - expected currency appreciation (unadjusted home yield wins "horse race" against synthetic dollar yield constructed from currency swap rates)
  - Excluding emerging markets, using individual euro countries
  - Other sovereign bond maturities (5 years)
  - Using alternative (weights for) home-country yields within euro area

Contribution: risk-taking by institutional investors internationally

- Changes in local interest rates affect investors' portfolio composition through changes in cross-border portfolio investment into US
  - Adds to literature on risk-taking related to interest rates as largely focused on bank lending or mutual fund flows
  - Granular security-level data allows for studying the primary and secondary market/portfolio effects and for controlling for bond characteristics
- Overcome many identification challenges plaguing other studies
  - Single country studies in literature have challenges in identifying relationship between interest rates and risk-taking
  - Use cross-section of countries with variety of changes in home interest rates …
  - … yet each representing very small fraction of investment in the US

Conclusion

- Unique security-level data on foreign countries' holdings of US corporate bonds
- Explore the variety of changes in countries' home interest rates
  - Provides less concern about reverse causality or omitted variables biasing results
- Evidence of a "search-for-yield" as changes in interest rates affect risk-taking
  - Shift to riskier US bonds in response to lower home interest rates
    - The larger the decline in home interest rates, the larger the shift towards higher yielding bonds as well as towards longer duration in portfolio
- Extrapolating the (small) part of behaviour observed, can conjecture that:
  - Investors likely made risk-increasing shifts elsewhere too that could pose financial stability risks, particularly if low-interest rate environment persists