Dollar Asset Holding and Hedging Around the Globe

Wenxin Du[1] Amy Wang Huber[2]

November 7, 2023

Bank of Canada Annual Economic Conference

[1]Columbia Business School, CPER, NBER

[2]The Wharton School

Research question

- US dollar has been the dominant currency in the past century.
- Studies of international finance often take stance on agents' FX activities:
  - Exchange rate determination, e.g., Koijen and Yogo (2020), Liao and Zhang (2020), Camanho et al. (2022), Bräuer and Hau (2022).
  - Dollar dominance, e.g., He et al. (2016), Coppola et al. (2023).
  - US monetary policy spillover, e.g. Gourinchas et al. (2019), Jiang et al. (2021), Giovanni et al. (2021).
- Yet data on dollar asset holdings and hedging behaviors are scattered.
- This paper: **Which foreign investors hold USD securities and how do they manage their FX exposure?**

Approach

- Data challenge: to analyze USD holding and hedging relative to investor's portfolio.
  - Typical sources (TIC, CPIS) track only aggregate holdings of securities issued by US residents.
  - **Our approach:** hand-collect company filings and industry statistics to track, by country and sector, overall portfolio size and USD holdings and hedging.

Data coverage

- Complete portfolio, including holding and hedging of USD debt vs. equity:
  - **Insurance: 31 countries.**
  - **Pension: 19 countries.**
  - **Mutual funds: 64 countries.**
  - Banks: 48 countries.
- Total USD holding by debt vs. equity:
  - Hedge funds: 53 countries.
  - The official sector: 237 countries and regions.
  - The non-financial sector: 56 countries

Details

Approach

- Data challenge: to analyze USD holding and hedging relative to investor's portfolio.
  - Typical sources (TIC, CPIS) track only aggregate holdings of securities issued by US residents.
  - **Our approach:** hand-collect company filings and industry statistics to track, by country and sector, overall portfolio size and USD holdings and hedging.
- Modeling challenge: to rationalize investors' behavior in an economic framework.
  - No existing framework on allocation when facing joint decision of domestic asset vs. USD asset vs. hedging.
  - **Our approach:** construct mean-variance optimal portfolio with three types of returns, and take model predictions to data.

Key results

- Three stylized facts:
  - Foreign investors show increasing preference for USD securities.
  - There is substantial amount of hedging in actively-managed industries post-GFC despite rising hedging cost.
  - Hedging behaviors exhibit heterogeneity across geographies.

Key results

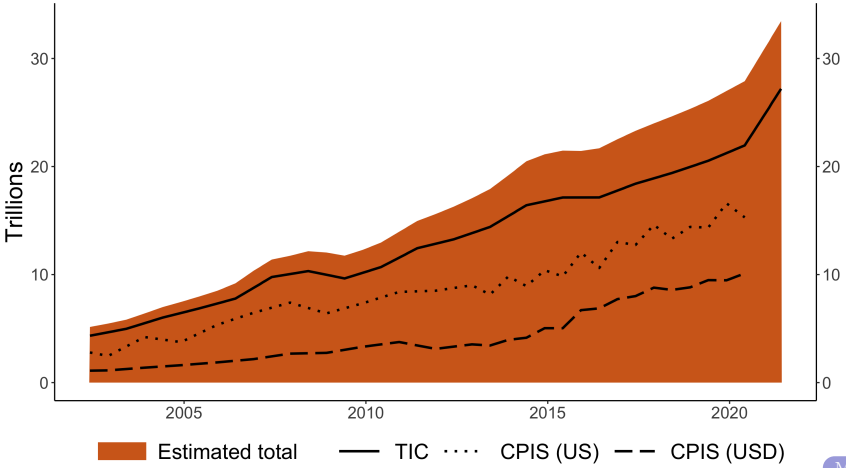
- Three stylized facts:
  - Foreign investors show increasing preference for USD securities.
  - There is substantial amount of hedging in actively-managed industries post-GFC despite rising hedging cost.
  - Hedging behaviors exhibit heterogeneity across geographies.
- Mean-variance preference fits hedging patterns in the time-series but not the cross-section:
  - Hedging trades off FX return with portfolio variance reduction, which depends on relative covariance and allocation to domestic vs. USD assets.
  - Time-series: investors' post-GFC USD holding and hedging broadly consistent with model predictions w.r.t. higher expected USD asset returns.
  - Cross-section: investors in low interest rate countries hedge more, opposite to model predictions w.r.t. expected FX returns.

Key results

- Three stylized facts:
  - Foreign investors show increasing preference for USD securities.
  - There is substantial amount of hedging in actively-managed industries post-GFC despite rising hedging cost.
  - Hedging behaviors exhibit heterogeneity across geographies.
- Mean-variance preference fits hedging patterns in the time-series but not the cross-section:
  - Hedging trades off FX return with portfolio variance reduction, which depends on relative covariance and allocation to domestic vs. USD assets.
  - Time-series: investors' post-GFC USD holding and hedging broadly consistent with model predictions w.r.t. higher expected USD asset returns.
  - Cross-section: investors in low interest rate countries hedge more, opposite to model predictions w.r.t. expected FX returns.
- To fully rationalize data, need (1) hedging demand shocks that vary across countries and (2) segmented and upward-sloping hedging supply.
  - Cross-country hedging contributes to the cross-section of CIP deviations.

Fact 1: Foreign investors show increasing preference for USD securities

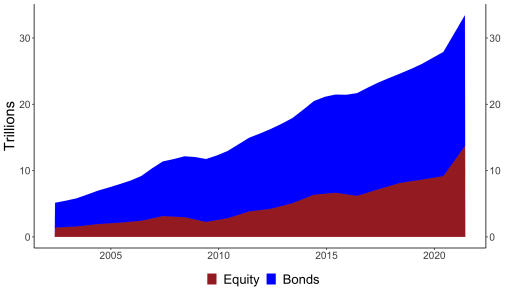
Foreign holding of USD securities



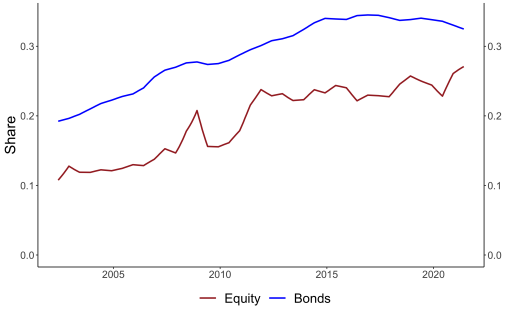
Methodology

Fact 1 cont.: similar growth in bond vs. equity

Foreign USD holding by security type



Foreign-held USD bonds and equity as share of total outstanding



Foreign-issued bond

Fact 1 cont.: USD allocation is up

12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

	Share: USD in Portfolio		Share: USD in Foreign	
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.69**		2.8*	
	(0.31)		(1.4)	
Indicator: Post-Crisis	7.7***		6.6***	
	(0.85)		(1.1)	
Counter by Quarter		0.23***		0.18***
		(0.01)		(0.02)
Currency X Industry	Yes	Yes	Yes	Yes
Observations	1,449	1,449	1,082	1,082
R^2	0.78	0.84	0.70	0.71

Global share of USD

Fact 1 cont.: USD allocation is up

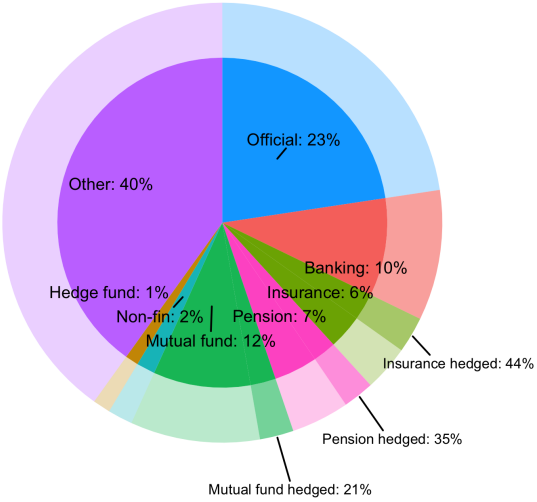
12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

	Share: USD in Portfolio		Share: USD in Foreign	
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.69**		2.8*	
	(0.31)		(1.4)	
Indicator: Post-Crisis	7.7***		6.6***	
	(0.85)		(1.1)	
Counter by Quarter		0.23***		0.18***
		(0.01)		(0.02)
Currency X Industry	Yes	Yes	Yes	Yes
Observations	1,449	1,449	1,082	1,082
R^2	0.78	0.84	0.70	0.71

Global share of USD

Fact 2: There is substantial amount of hedging in actively-managed industries post-GFC

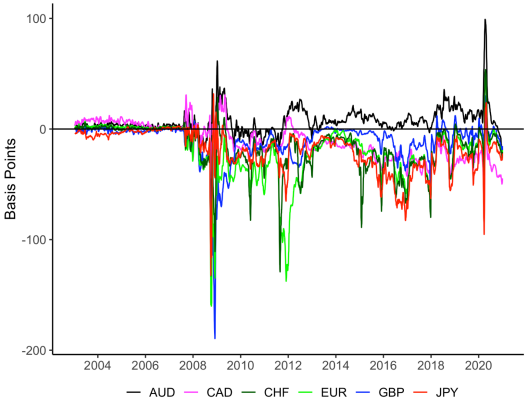
Foreign holding of USD by industry and hedging status, June 2020



Quick aside: cost of hedging

- CIP: $r^{\$}_{t,\tau} = r^{c}_{t,\tau} - (f_{t,\tau} - s_t)$.
- CIP basis: $x^{c,\$}_{t,\tau} = r^{\$}_{t,\tau} - [r^{c}_{t,\tau} - (f_{t,\tau} - s_t)]$.
- Or $f_{t,\tau} - s_t = (r^{c}_{t,\tau} - r^{\$}_{t,\tau}) + x^{c,\$}_{t,\tau}$.
- Exchange rates: unit of local currency per USD.
- A more negative x:
  - Increases the cost of hedging from dollars into local currency.
  - Decreases the cost of hedging from local currencies back to dollars.

Three-month IBOR-based CIP basis



Fact 2 cont.: hedging despite rising hedging cost

12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

	Hedge Ratio		Unhedged USD alloc	Hedge Ratio
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.052***	0.079***	0.026*	
	(0.016)	(0.022)	(0.014)	
Indicator: Post-Crisis	0.160***	0.147***	0.066***	
	(0.016)	(0.017)	(0.011)	
CIP 3M Basis Qtr Avg				-0.041**
				(0.015)
Currency X Industry	No	Yes	Yes	Yes
Observations	1,229	1,229	1,060	893
R^2	0.07	0.86	0.70	0.91

Fact 2 cont.: hedging despite rising hedging cost

12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

	Hedge Ratio		Unhedged USD alloc	Hedge Ratio
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.052***	0.079***	0.026*	
	(0.016)	(0.022)	(0.014)	
Indicator: Post-Crisis	0.160***	0.147***	0.066***	
	(0.016)	(0.017)	(0.011)	
CIP 3M Basis Qtr Avg				-0.041**
				(0.015)
Currency X Industry	No	Yes	Yes	Yes
Observations	1,229	1,229	1,060	893
R^2	0.07	0.86	0.70	0.91

Fact 2 cont.: hedging despite rising hedging cost

12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

	Hedge Ratio		Unhedged USD alloc	Hedge Ratio
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.052***	0.079***	0.026*	
	(0.016)	(0.022)	(0.014)	
Indicator: Post-Crisis	0.160***	0.147***	0.066***	
	(0.016)	(0.017)	(0.011)	
CIP 3M Basis Qtr Avg				-0.041**
				(0.015)
Currency X Industry	No	Yes	Yes	Yes
Observations	1,229	1,229	1,060	893
R^2	0.07	0.86	0.70	0.91

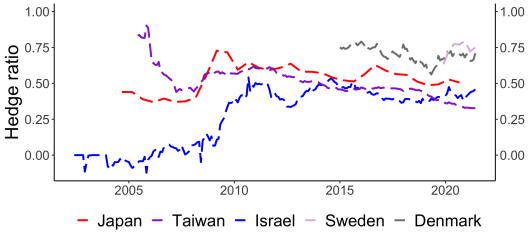
Fact 2 cont.: hedging despite rising hedging cost

12 currencies: AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, CLP, ILS, TWD.

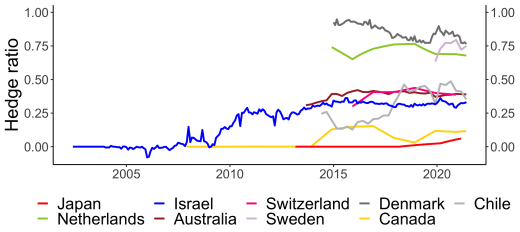
	Hedge Ratio		Unhedged USD alloc	Hedge Ratio
	(1)	(2)	(3)	(4)
Indicator: Crisis	0.052***	0.079***	0.026*	
	(0.016)	(0.022)	(0.014)	
Indicator: Post-Crisis	0.160***	0.147***	0.066***	
	(0.016)	(0.017)	(0.011)	
CIP 3M Basis Qtr Avg				-0.041**
				(0.015)
Currency X Industry	No	Yes	Yes	Yes
Observations	1,229	1,229	1,060	893
R^2	0.07	0.86	0.70	0.91

2017-2020 average annual hedging cost across insurers and pensions: **$2.7B**.

Fact 3: Hedging behaviors exhibit heterogeneity across geographies



(A) **Insurance**



(B) **Pensions**

Model environment

- Two assets: local-currency asset (lb) and USD asset ($\$b$).
  - $rx_{t+1}^{lb} = r_{t+1}^{lb} - rf_t$.
  - $rx_{t+1}^{\$b} = r_{t+1}^{\$b} - rf_t^{\$}$.

Model environment

- Two assets: local-currency asset (lb) and USD asset ($\$b$).
  - $rx_{t+1}^{lb} = r_{t+1}^{lb} - rf_t$.
  - $rx_{t+1}^{\$b} = r_{t+1}^{\$b} - rf_t^{\$}$.
- Foreign investor cannot earn $rx_{t+1}^{\$b}$ without buying the USD asset; the local-currency return on holding USD asset depends on currency hedging.
  - $rx_{t+1}^{\$b,NH} = r_{t+1}^{\$b} + \Delta s_{t+1} - rf_t \equiv rx_{t+1}^{\$b} + rx_{t+1}^{FX}$.
  - $rx_{t+1}^{\$b,H} = r_{t+1}^{\$b} + (f_t - s_t) - rf_t = rx_{t+1}^{\$b} + x_t$.

Model environment

- Two assets: local-currency asset (lb) and USD asset ($\$b$).
  - $rx_{t+1}^{lb} = r_{t+1}^{lb} - rf_t$.
  - $rx_{t+1}^{\$b} = r_{t+1}^{\$b} - rf_t^{\$}$.
- Foreign investor cannot earn $rx_{t+1}^{\$b}$ without buying the USD asset; the local-currency return on holding USD asset depends on currency hedging.
  - $rx_{t+1}^{\$b,NH} = r_{t+1}^{\$b} + \Delta s_{t+1} - rf_t \equiv rx_{t+1}^{\$b} + rx_{t+1}^{FX}$.
  - $rx_{t+1}^{\$b,H} = r_{t+1}^{\$b} + (f_t - s_t) - rf_t = rx_{t+1}^{\$b} + x_t$.
- Foreign investor therefore faces three types of returns:
  - rx_{t+1}^{lb}.
  - $rx_{t+1}^{\$b}$.
  - rx_{t+1}^{FX}.
  - x_t is not a return but determined at time t.

Investor's problem

The investor chooses w_{US} and w_{NH} to maximize his utility:

$$\max_{w_{US}, w_{NH}} \mathbb{E} rx_{t+1}^{P} - \frac{\gamma}{2} \mathbb{V}(rx_{t+1}^{p}),$$

where rx_{t+1}^{P} is the log excess return of the entire portfolio given by:

$$rx_{t+1}^{P} = (1 - w_{US}) rx_{t+1}^{lb} + w_{US} rx_{t+1}^{\$b} + w_{NH} rx_{t+1}^{FX} + (w_{US} - w_{NH}) x_t.$$

Investor's problem

The investor chooses w_{US} and w_{NH} to maximize his utility:

$$\max_{w_{US},w_{NH}} \mathbb{E}rx^P_{t+1} - \frac{\gamma}{2}\mathbb{V}(rx^p_{t+1}),$$

where rx^P_{t+1} is the log excess return of the entire portfolio given by:

$$rx^P_{t+1} = (1-w_{US})rx^{lb}_{t+1} + w_{US}rx^{\$b}_{t+1} + w_{NH}rx^{FX}_{t+1} + (w_{US}-w_{NH})x_t.$$

From FOC:

$$w^*_{US} = \frac{(\sigma_{\$b,FX}-\sigma_{lb,FX})(\overline{rx}^{FX} - x - \gamma\sigma_{lb,FX}) + \sigma^2_{FX}(\overline{rx}^{lb} - \overline{rx}^{\$b} - x + \gamma\sigma_{lb,\$b} - \gamma\sigma^2_{lb})}{\gamma(\sigma_{lb,FX}-\sigma_{\$b,FX})^2 - \gamma\sigma^2_{FX}\sigma^2_{lb-\$b}},$$

$$w^*_{NH} = \frac{\gamma\sigma_{lb,FX}(\sigma^2_{\$b}-\sigma_{lb,\$b}) + \gamma\sigma_{\$b,FX}(\sigma^2_{lb}-\sigma_{lb,\$b}) + (\sigma_{lb,FX}-\sigma_{\$b,FX})(\overline{rx}^{lb} - \overline{rx}^{\$b} - x) - (\overline{rx}^{FX} - x)\sigma^2_{lb-\$b}}{\gamma(\sigma_{lb,FX}-\sigma_{\$b,FX})^2 - \gamma\sigma^2_{FX}\sigma^2_{lb-\$b}}$$

Intuition on hedging holding w_{US} constant

- Holding w^*_{US} constant, changing w^*_{NH} changes hedge ratio (HR): $1 - \frac{w^*_{NH}}{w^*_{US}}$.
  - In general, variance of returns >> covariance of returns.
  - $\frac{\partial HR}{\partial \overline{rx}^{FX}} < 0$.
  - $\frac{\partial HR}{\partial \sigma_{lb,FX}} > 0$.
  - $\frac{\partial HR}{\partial \sigma_{\$b,FX}} > 0$.
- Hedging trades-off $\overline{rx}^{FX}$ with effect on portfolio variance.
  - Low $\overline{rx}^{FX}$, highly positive $\sigma_{lb,FX}$ or $\sigma_{\$b,FX} \Rightarrow$ hedge.
  - High $\overline{rx}^{FX}$, highly negative $\sigma_{lb,FX}$ or $\sigma_{\$b,FX} \Rightarrow$ don't.

Deriving model predictions

- Objective: how does hedging change as investment opportunities change?
- Complication: w^*_{US}, w^*_{NH} are functions of the same expected returns and covariance.
  - $\frac{\partial HedgeRatio}{\partial rx} \propto -\frac{\partial w_{NH}}{\partial rx} \cdot w_{US} + \frac{\partial w_{US}}{\partial rx} \cdot w_{NH}$.
    - Optimal HR can depend on w_{US}.
  - $\frac{\partial w^*_{US}}{\partial rx^{FX}} = f(\sigma_{lb,FX} - \sigma_{\$b,FX})$.
    - Relative strength of covariance is what matters.

Deriving model predictions

- Objective: how does hedging change as investment opportunities change?
- Complication: w^*_{US}, w^*_{NH} are functions of the same expected returns and covariance.
  - $\frac{\partial HedgeRatio}{\partial rx} \propto -\frac{\partial w_{NH}}{\partial rx} \cdot w_{US} + \frac{\partial w_{US}}{\partial rx} \cdot w_{NH}$.
    - Optimal HR can depend on w_{US}.
  - $\frac{\partial w^*_{US}}{\partial rx^{FX}} = f(\sigma_{lb,FX} - \sigma_{\$b,FX})$.
    - Relative strength of covariance is what matters.
- We estimate $\frac{\partial w_{NH}}{\partial rx}, \frac{\partial w_{US}}{\partial rx}$:
  - Functions of covariance.
  - Assuming stationarity, estimate using realized returns from 2002/06 to 2021/06.
  - Bond: 1M holding excess returns on 10Y sovereign.
  - Equity: 1M holding excess return on major stock index.
  - 12 currencies: 9 AE, 3 EM; for whom we have good hedging data.

Comparative statics on USD hedge ratio (HR)

	Bond	Equity
$\overline{rx}^{\$b} - \overline{rx}^{lb} \uparrow$	HR $\uparrow$*	HR $\uparrow$*
$\overline{rx}^{FX} \uparrow$	HR $\downarrow$	HR $\downarrow$
$x \uparrow$	HR $\uparrow$	HR $\uparrow$

- Effect of $\overline{rx}^{\$b} - \overline{rx}^{lb} \uparrow$:
  - AE: $w_{US} \uparrow$, w_{NH} also $\uparrow$ but not as fast.
    - * True up until a threshold HR, which is about 80% in bond and 50% in equity.
  - EM: $w_{US} \uparrow$, $w_{NH} \downarrow$.
- Effect of $\overline{rx}^{FX} \uparrow$:
  - AE: $w_{NH} \uparrow$, w_{US} also $\uparrow$ but not as fast.
  - EM: $w_{NH} \uparrow$, $w_{US} \downarrow$.

Threshold HR Relative covariance

Model predictions

- In the time-series, $\overline{rx}^{\$b}$ changes for all:
  - Post-crisis, expected returns in USD bond and USD stocks are more favorable.

    $\Rightarrow$ All countries increase total USD allocation, increase USD hedge ratio.
- In the cross-section, $\overline{rx}^{FX}$ differs:
  - Deviation from UIP: currencies where $rf^{\$} > rf$ are expected to have high $\overline{rx}^{FX}$, vice versa.

    $\Rightarrow$ Negative correlation between $rf^{\$} - rf$ and HR.
- CIP basis, x, varies in the time-series and the cross-section:

  $\Rightarrow$ Positive correlation between x and HR.

Expected relative returns

In the data

- In the time series:
  - Total USD allocation ↑, USD hedge ratio ↑, $corr(x, HR) < 0$.

- In the cross-section:

	USD hedge ratio			
	(1)	(2)	(3)	(4)
Diff USD vs. local 3M ibor	0.068***	0.056***	0.071***	0.063***
	(0.006)	(0.007)	(0.011)	(0.013)
CIP basis 3M				-0.060**
				(0.026)
Time	Yes	Yes	Yes	Yes
Industry	No	Yes	Yes	Yes
$\text{Cov}(rx^{FX}, rx^{asset})$	No	No	Yes	Yes
Observations	952	952	952	952
R^2	0.16	0.41	0.48	0.48

Reconciling data with mean-variance

- Time series:
  - Total USD allocation ↑, USD hedge ratio ↑: consistent with mean-variance optimization when $E[\overline{rx}^{\$b} - \overline{rx}^{lb}] \uparrow$.
  - $corr(x, HR) < 0$: FX hedging supply not perfectly elastic.
- Cross section:
  - $corr(\overline{rx}^{FX}, HR) > 0$: missing hedging demand shocks that vary across country.
    - VAR considerations, e.g., liability matching.
    - Agency frictions, e.g., mandate.
    - Risk aversion.
  - $corr(x, HR) < 0$: FX hedging supply segmented across country.

$\Rightarrow$ mean-variance is good starting point but insufficient.

- We conjecture on the nature of missing demand drivers: vary in the cross-section.
- We include supply side and derive further predictions.

Intermediary's problem

The intermediary offers FX derivatives, H_l, to maximize risk-adjusted total return:

$$\max_{H_l} \mathbb{E}[x_l H_l + f(I_l)],$$
$$\text{s.t. } |H_l| + I_l = W_l,$$
$$H_l = A_l \cdot (w_{US} - w_{NH}),$$
$$\sum_l W_l = W$$

- I is all other investments.
- $f(I)$ denotes its risk-adjusted return, net of all regulatory costs other than balance sheet size, e.g., risk-weighted capital requirements.
- x_l is compensation for offering balance-sheet intensive FX derivatives.
- x_l follows the same sign as the net FX derivative position, H_l.

Intermediary's optimum

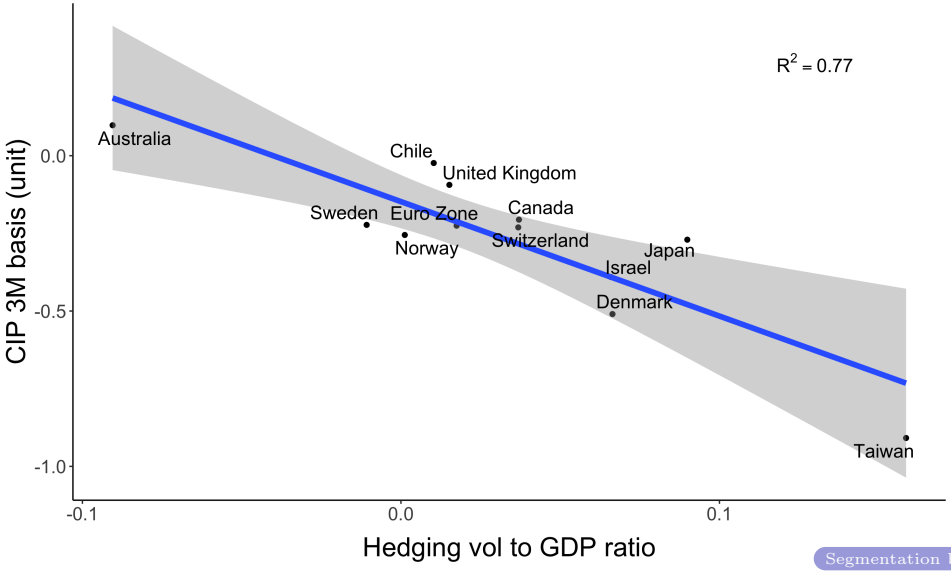
$$|x_l^*| = f'(I_l^*)$$

Assume $f(I) = \theta \log(I) - I$ and $\theta = W$:

$$x_l^* = \frac{H_l^*}{W_l - |H_l^*|}$$

- Time-series: x_l^* increases as H_l increases, as seen in the data.
- Cross-section: CIP basis is not uniform.
  - **Prediction:** The more net FX derivative a country demands relative to the intermediary's balance sheet available for that country, the larger CIP basis is in absolute terms.

Cross-section of hedging and CIP basis



Segmentation by GDP

Conclusions

- Foreign investors hold increasingly more USD securities and they hedge a substantial amount of their USD FX exposure.
- Understanding investors' hedging is important:
  - Hedging incurs substantial financial cost, especially post-GFC.
  - Hedging potentially explains CIP deviations in the cross-section.
- Mean-variance optimization with three-assets emphasizes that hedging depends on relative covariance and on total dollar allocation.
- Investors' hedging is broadly consistent with mean-variance trade-off in the time-series, but not the cross section.
  - Examination of drivers of these deviations invites future research.

Appendix

Data detail 1

Industry	Region / Country	Company filings	Industry or national statistics providers	Start	End	Hedging info start
Insurance	Asia: Japan	11		2004	2020	2004
	Asia: Taiwan	6	Central Bank of the Republic of China	2005	2021	2005
	Europe: Denmark		Danmarks Nationalbank	2015	2021	2015
	Europe: Sweden		Sveriges Riksbank	2014	2021	2019
	Europe: UK		EIOPA	2017	2020	2017
	Europe: Euro 19 countries		EIOPA	2017	2021	–
			SHS	2013	2017	–
	Europe: 9 other EU countries		EIOPA	2017	2021	–
	ROW: Israel		Bank of Israel	2002	2021	2002

Data detail 2

Industry	Region / Country	Company filings	Industry or national statistics providers	Start	End	Hedging info start
Pensions	Asia: Japan	1		2013	2021	2013
	Asia: Australia		APRA, Australian Bureau of Statistics	2004	2021	2013
	Europe: Netherlands	2		2014	2021	2014
	Europe: Denmark		Danmarks Nationalbank	2015	2021	2015
	Europe: Sweden		Sveriges Riksbank	2014	2021	2019
	Europe: Switzerland		Federal Statistical Office	2004	2020	2015
	Europe: UK		Office for National Statistics	2002	2021	–
	NA: Canada	2		2007	2021	2010
	ROW: Israel		Bank of Israel	2002	2021	2002
	ROW: Chile		Superintendencia de Pensiones	2014	2023	2014
	ROW: 13 Latam countries		FIAP	2002	2021	–

Data detail 3

Industry	Region / Country	Company filings	Industry or national statistics providers	Start	End	Hedging info start
Mutual funds	64 countries		Morningstar	2002	2021	2002
Banking	48 countries		BIS Locational Banking Statistics	2002	2021	–
Hedge funds	53 countries		13F, Factset	2002	2021	–
Non-financial	56 countries		CPIS	2002	2020	–
Official sector	237 countries		TIC	2002	2021	–

Data: aggregate USD holdings

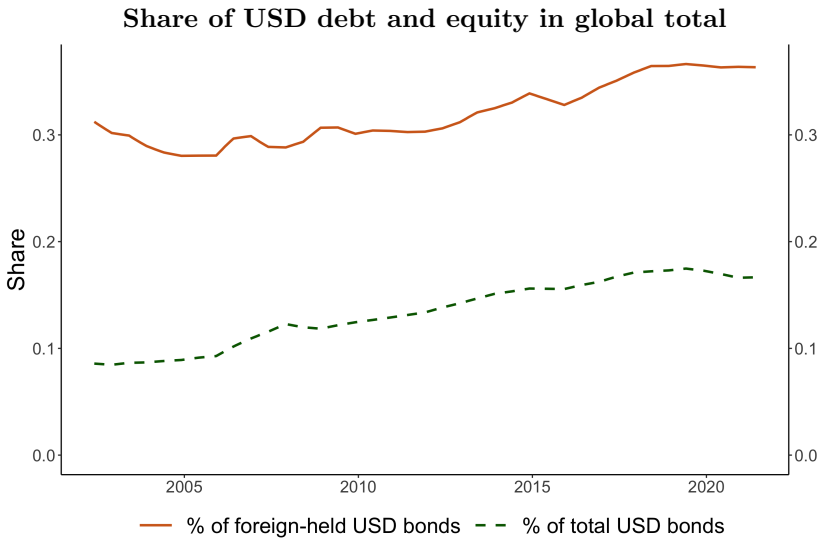
Total Foreign Holding of USD Securities

=Foreign USD Holding of U.S. Issuers + Foreign USD Holding of Non-U.S. Issuers

=(TIC Foreign Holding of U.S. Securities
−TIC Foreign Holdings of Non-USD Securities)
+ (USD Securities Outstanding Outside the U.S.
−U.S. Investors' Cross-border USD Holdings).

Back

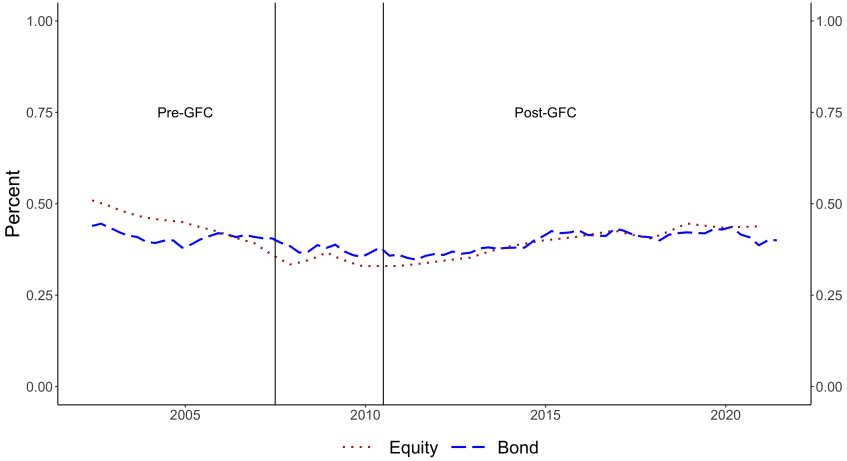
Investors disproportionately hold foreign-issued bond



Back

Global share of USD security remains stable

Share of USD debt and equity in global total



Back

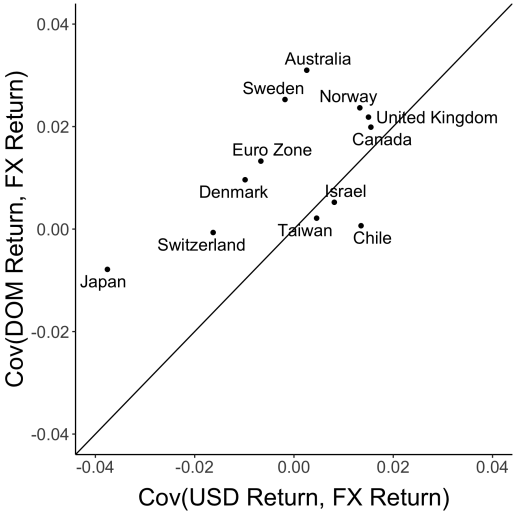
Correlation between GDP and banks' cross-country trading assets

	Trading Assets			
	(1)	(2)	(3)	(4)
	Citi All	Citi Ex China	JPM All	JPM Ex China
GDP	0.073***	0.764***	0.419**	1.29***
	(0.013)	(0.110)	(0.091)	(0.230)
Year	Yes	Yes	Yes	Yes
Observations	120	115	100	95
R^2	0.03	0.27	0.20	0.28

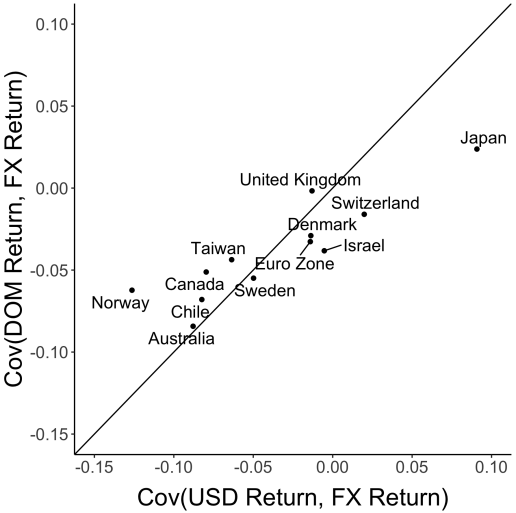
Back

Covariance between rx^{FX} and asset returns

Bond



Equity



Back

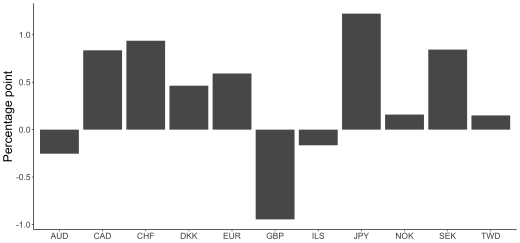
Threshold HR for reversing $\frac{\partial HR}{\partial \overline{rx}^{\$b} - \overline{rx}^{lb}}$

Currency	Bond	Equity
AUD	84%	-
CAD	96%	-
CHF	87%	70%
DKK	81%	85%
EUR	81%	83%
GBP	93%	-
JPY	68%	27%
NOK	94%	-
SEK	82%	97%
CLP	-	-
ILS	-	51%
TWD	-	-

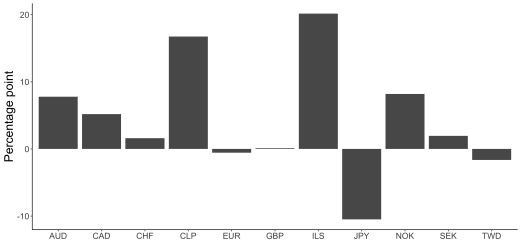
Back

Post-GFC and pre-GFC differential in relative returns between USD and domestic assets

Yield curve slope



Realized equity return



Back

Bräuer, L. and Hau, H. (2022). Can time-varying currency risk hedging explain exchange rates?

Camanho, N., Hau, H., and Rey, H. (2022). Global portfolio rebalancing and exchange rates. *The Review of Financial Studies*, 35(11):5228–5274.

Coppola, A., Krishnamurthy, A., and Xu, C. (2023). Liquidity, debt denomination, and currency dominance. Technical report.

Giovanni, J., Kalemli-Ozcan, S., Ulu, M., and Baskaya, Y. (2021). International spillovers and local credit cycles. *The Review of Economic Studies*.

Gourinchas, P.-O., Rey, H., and Sauzet, M. (2019). The international monetary and financial system. *Annual Review of Economics*, 11:859–893.

He, Z., Krishnamurthy, A., and Milbradt, K. (2016). What makes us government bonds safe assets? *American Economic Review*, 106(5):519–23.

Jiang, Z., Krishnamurthy, A., and Lustig, H. (2021). Foreign safe asset demand and the dollar exchange rate. *The Journal of Finance*, 76(3):1049–1089.

Koijen, R. S. and Yogo, M. (2020). Exchange rates and asset prices in a global demand system. Technical report, National Bureau of Economic Research.

Liao, G. and Zhang, T. (2020). The hedging channel of exchange rate determination. *International finance discussion paper*, (1283).