Cross Currency Basis

European Rates Strategy

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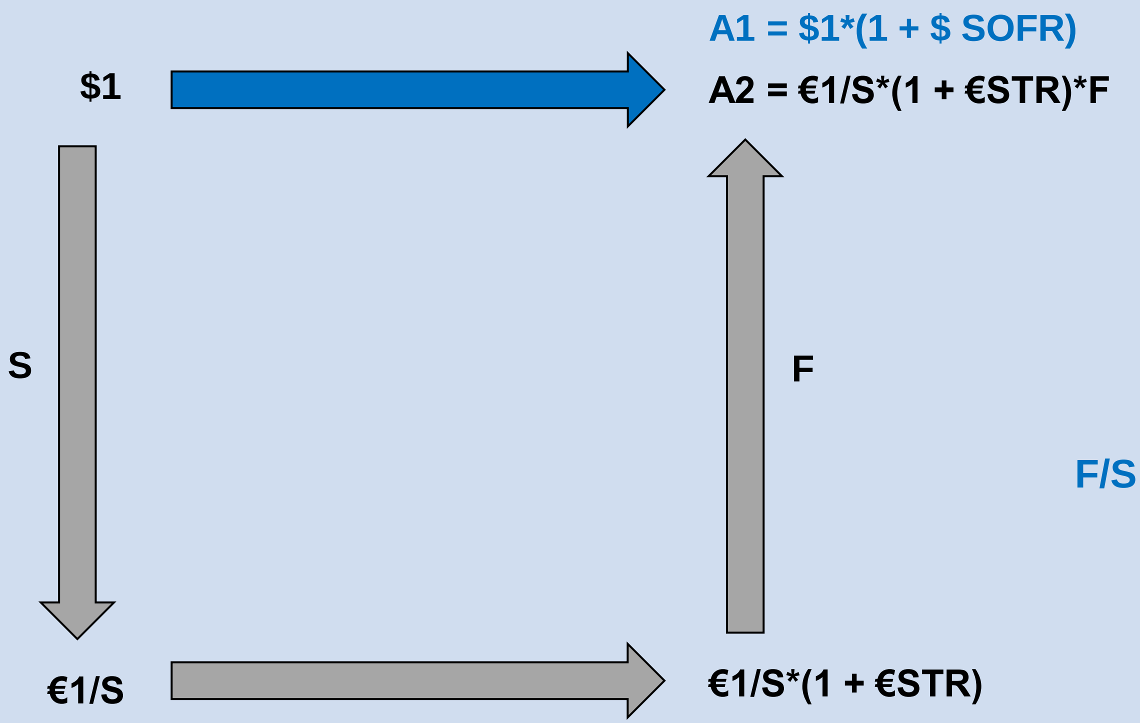
Covered interest parity: an arbitrage-able relation between spot FX rate, domestic and foreign interest rates and forward FX rate



A1 = **A2**

↓

F/S = (1 + $ SOFR) / (1 + €STR)

- No arbitrage implies **A1** = **A2**
- This means that the interest rate differential between the two currencies in the cash money market should **equal** the differential between the forward and spot exchange rates

Source: J.P. Morgan

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Terminology

We talk about the **non-USD leg** (non-USD leg is where the spread is applied)

RECEIVE XCCY means RECEIVE the non-USD floating leg
- We want XCCY spread to go MORE negative (or less positive)
- Position is a XCCY <u>WIDENER</u>

PAY XCCY means PAY non-USD leg
- We want XCCY spread to go LESS negative (or more positive)
- Position is a XCCY <u>TIGHTENER</u>

FX FWDS: We are talking about FX FWD SWAPS (a front and back leg -> no spot exposure)

FXOIS is XCCY basis with 2 OIS legs instead of 2 Libor legs
- (Can think about Libor/Libor XCCY and 2 FRA/OIS overlay trades, or FXFWD with OIS rates instead of Libor/Euribor in slide 1)

Day to day funding:
- This refers to the very front end of the FX FWDs curve
- Mainly ON (overnight – the FX swap from today to tomorrow) and TN (TomNext – The FX swap from tomorrow to the day after)
- We can back out the FXOIS using the ON rates in both currencies

Turns:
- Referring to any special day
- Most often referring to Quarter End (QE) turn or Year End (YE) turn, meaning the days over quarter end and year end

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Market participants: end user demand creates some market segmentation

Sub 2Y

- **Real money FX forward flows**
  - Funding foreign assets or spot position
- **Fast money XCCY and FX Fwds**
  - Expressing views on funding

3Y – 5Y

- **Issuances** (Corporates + SSAs)
- **Fast money XCCY**
  - Shape of curve/carry trades
  - Issuance trends

5Y – 10Y

- **Issuances** (Corporates + SSAs)
- **XCCY ASW flows** (real money)

10Y+

- **XCCY ASW flows** (real money)
- **Issuances** (less common)
- **DCU (differential discount unit) / XVA gamma hedging (x-valuation adj.)**
  - CSA related deliveries

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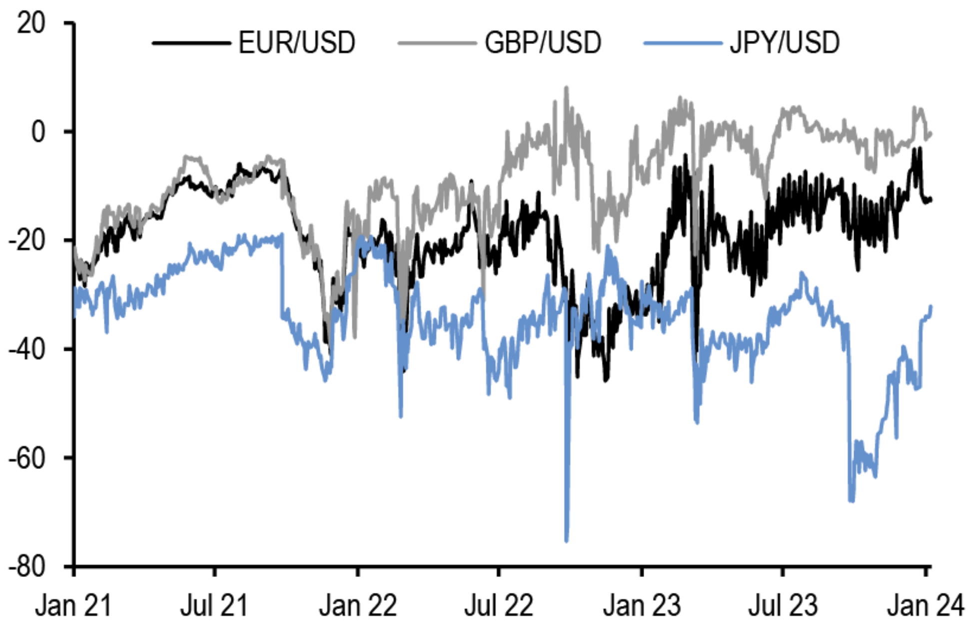
Cross currency basis: an indication of scarcity premium

3M EUR/USD, GBP/USD and USD/HPY cross currency bases; since January 2021; bp



Ranges of various 3M cross currency bases; bp

		Libor				RFR	
		Jan 2002 - Aug 2007		Sep 2007 - Dec 2019		Jan 2020 - today	
	12-Jan-24	Min	Max	Min	Max	Min	Max
EUR/USD	-12	-3	3	-275	7	-138	-3
GBP/USD	-1	-3	4.1	-250	18	-107	8
USD/JPY	-36	-8.5	3.3	-92	8	-212	-19

- Prior to the financial crisis, the small deviation from the no arbitrage condition was mostly down to transaction costs and the difference in credit risk for these "*risk-free*" rates
- Following the GFC, the deviation were seen as a reflection of strains in global interbank markets
- The basis indicates the amount by which the interest paid to borrow one currency by swapping it against another differs from the cost of directly borrowing this currency in the cash market. Hence a premium for the "*relative scarcity*" for one currency over the other
- Limits to arbitrage? **Balance sheet space is rented, not free. Increased regulation after the GFC made an additional unit of balance sheet more expensive, effectively widening the no-arbitrage band**

Source: J.P. Morgan

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Drivers of cross currency basis: fundamental and technical factors

Myriad drivers of cross currency basis

Drivers	Details
Monetary Policy	Policy rate and balance sheet: The change in relative policy rate and relative excess liquidity between the two currencies could result in a change in scarcity premium of one currency over the other
Risk Aversion	Relative high demand for one currency over the other
Technical	Cross border issuance, higher impact at the long end of the curve
T-bill issuance	Crowding out effect
Other	Year-end effects, balance sheet, regulations

To find common factors driving the global cross-currency basis market, we do the following:

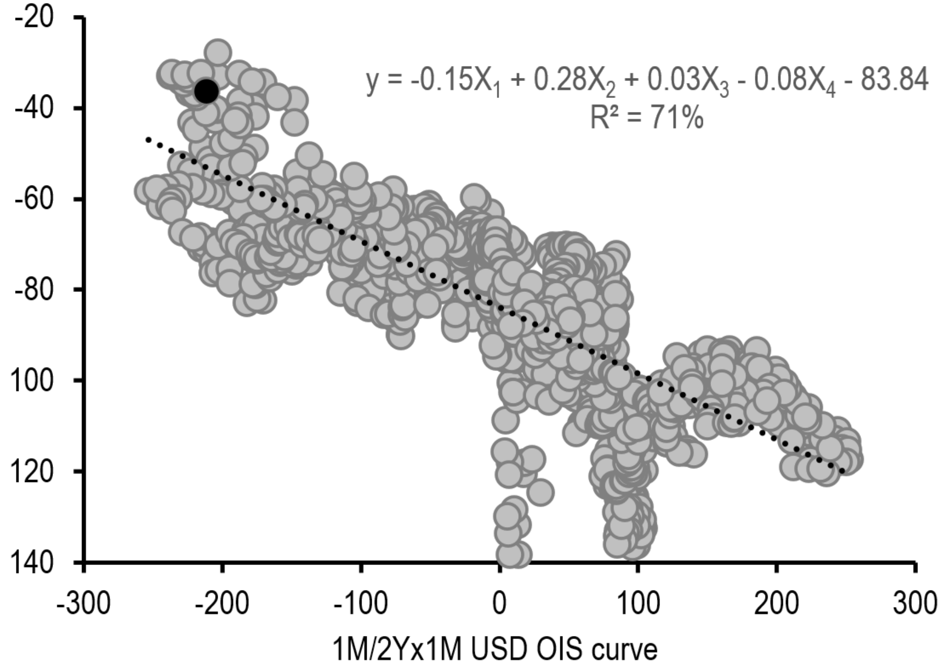
- Run a **standard PCA** of 1Y and 5Y cross currency bases across major currencies (EUR/USD, JPY/USD, GBP/USD RFR cross-currency bases) since Jan 2013
- Search for market variables which are **correlated with the dynamic of the first factor** (which typically explains around 80-90% of the total variance) and thus could be **used to forecast the evolution of the bases**.

Source: J.P. Morgan

Drivers: 1) Interest rate differential

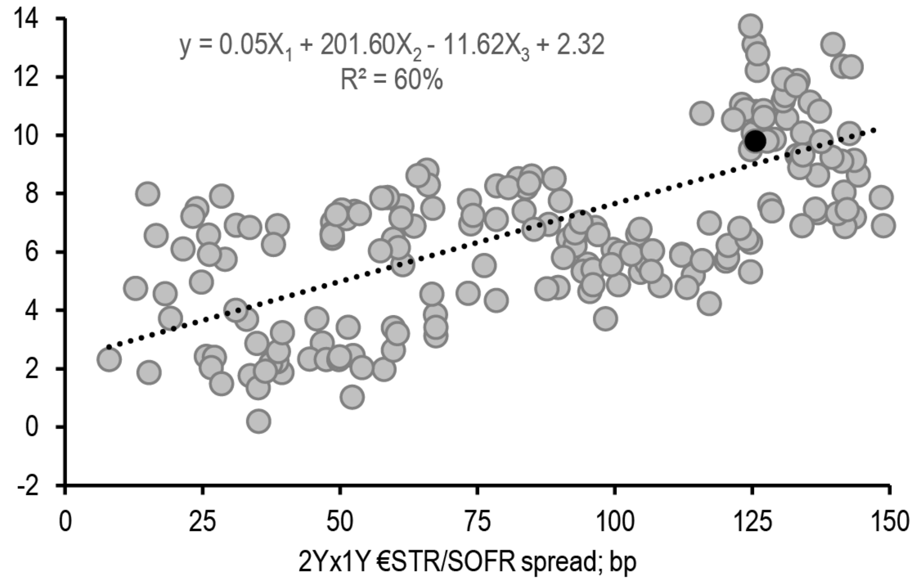
Monetary policy differential has been the most significant driver of the FX OIS bases over the past few years

Regression between the first PCA factor of 1Y FX OIS basis and 1) slope of the USD money market curve (1M/2Yx1M OIS curve) (X1); 2) average slope of the EUR, GBP and JPY money market curve (1M/2Yx1M OIS curve) (X2); 3) S&P index level (X3); and 4) average of 3Mx1Y USD, EUR, GBP and JPY swaption vol (X4); since Jan17; unitless



Source: J.P. Morgan

2Yx1Y €STR/SOFR basis regressed against 1) 2Yx1Y (€STR/SOFR) yield differential (X1); 2) Fed-ECB b/s differential (expressed as % of GDP); and 3) Rolling 2M change in US T-bills outstanding; past 9M; bp



Source: J.P. Morgan

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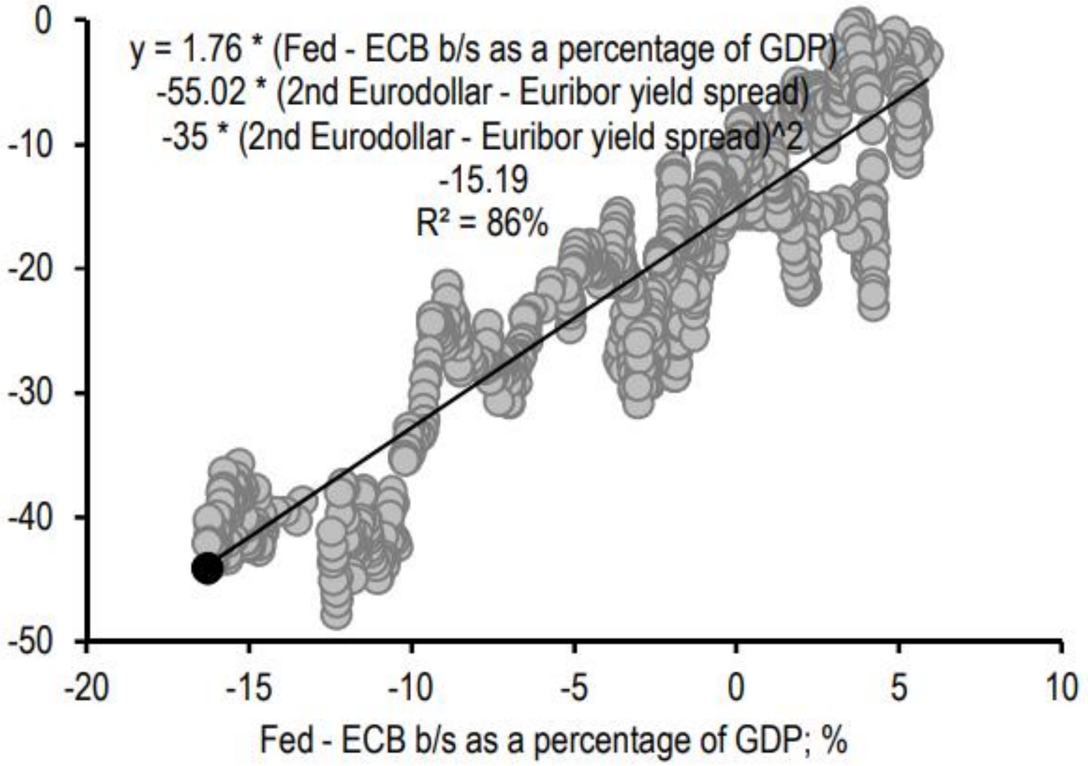
Drivers: 2) Divergence in the relative side of CBs balance sheet as monetary policy turns to large scale assets purchases (vs. Fed's QE)

Reds EUR/USD cross currency basis is broadly fair vs. fundamental drivers; we have a front end widening bias on expected balance sheet and rate dynamic with medium term support from year end considerations

Reds EUR/USD cross currency basis curve regressed against 1) spread between the Fed and the ECB balance sheets expressed as % of GDP and 2) spread between 2nd Eurodollar and 2nd Euribor yield; Aug 2014 - Aug 2017; bp



Source: J.P. Morgan

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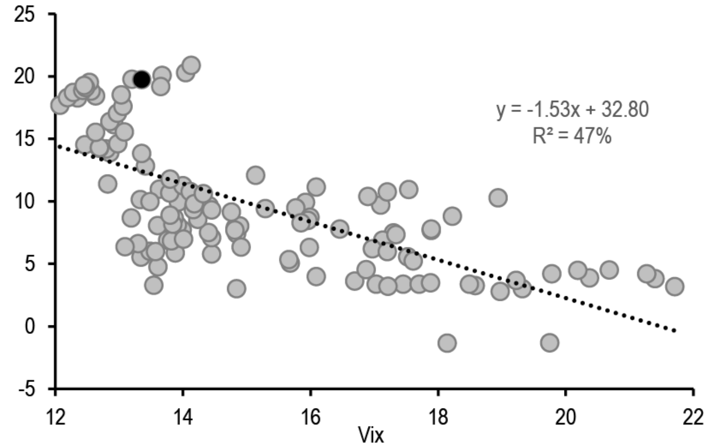
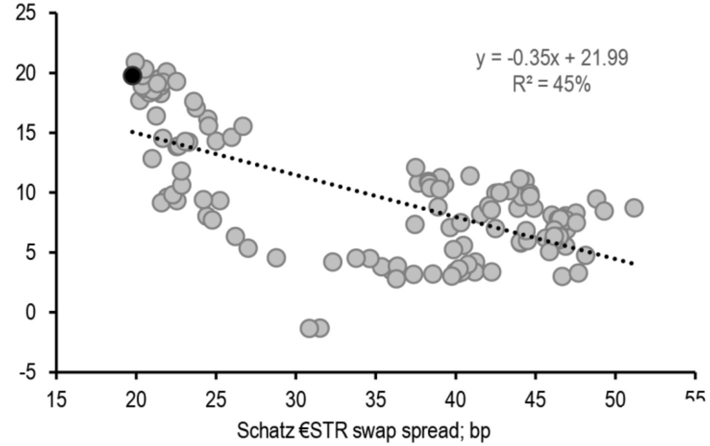
Drivers: 3) Risk aversion: even if not all episodes of flight to quality (and risk aversion) are equal (peripheral vs. COVID crisis)

Over the past few months, the negative beta of the 1Y FX OIS bases (PCA first factor) vs. VIX and Schatz €STR swap spread suggests a broad narrowing on declining risk aversion…

First PCA factor of 1Y FX OIS basis regressed against VIX; past 6M;

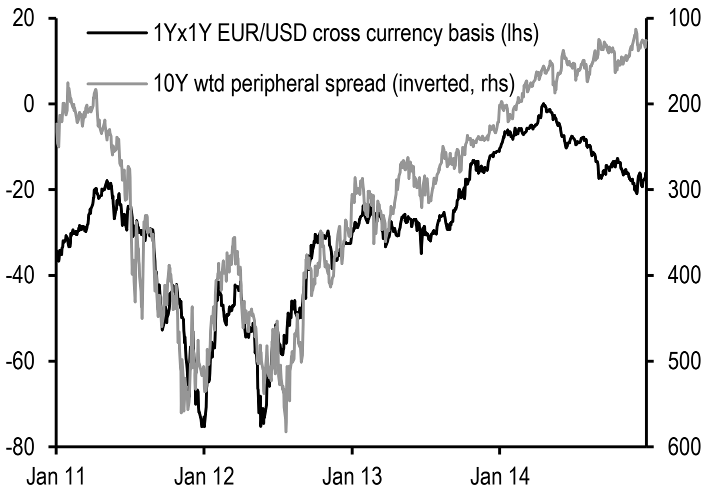


First PCA factor of 1Y FX OIS basis regressed against Schatz €STR swap spread; past 6M;



EUR/USD cross currency basis widened sharply during the peripheral crisis

1Yx1Y EUR/USD cross currency basis (lhs) and 10Y weighted peripheral spreads* (inverted axis, rhs); 2012 -2016; bp



Source: J.P. Morgan

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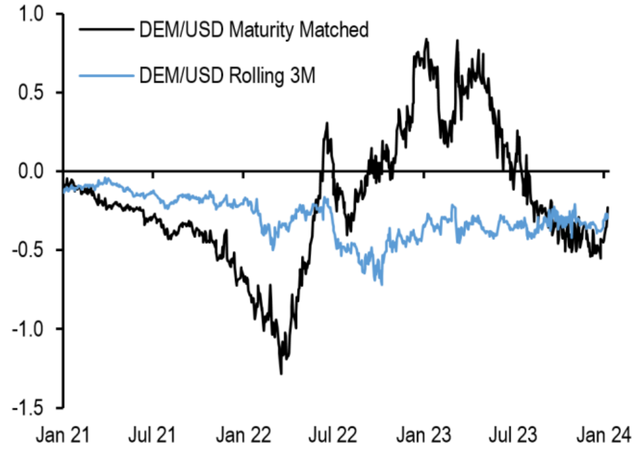
Drivers at the long-end of the curve: 4) Cross-border issuance and cross-border investments

It is attractive to issue reverse-yankee bonds across the curve and these flows should support wider basis

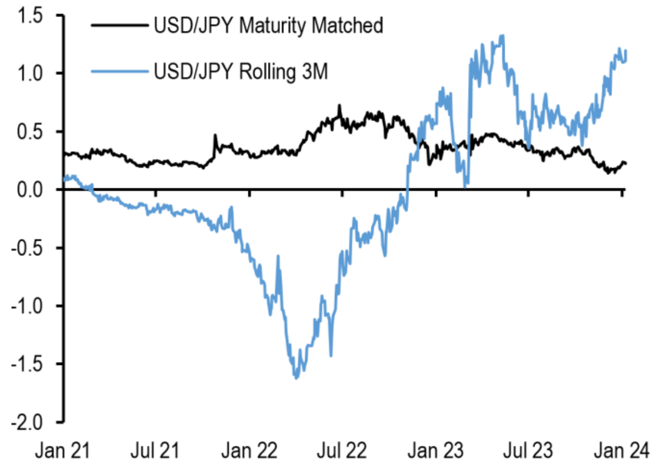
Average adjusted spread between USD and EUR issuance for different rated issuers, adjusted for EUR 3s/6s and EUR/USD cross currency basis; bp

	Maturity bucket				Ratings		
	0-3	3-6	6-10	10+	AA	A	BBB
Unadj. USD - EUR	52	48	50	62	40	46	57
Xccy	-16	-17	-17	-17	-17	-17	-17
3s/6s	-10	-7	-5	2	-5	-5	-5
Adj USD - EUR	25	24	28	47	17	23	34
Cheaper to issue in	EUR	EUR	EUR	EUR	EUR	EUR	EUR

Yield pick-up from buying 2Y German bonds versus USTs using fixed dated maturity and 3M rolling FX hedges; %



Yield pick-up from buying 2Y JGBs versus USTs using fixed dated maturity and 3M rolling FX hedges; %



Source: J.P. Morgan

Yield pick-up vs table

EUR-based	US			Japan			UK			Other Euro area^		
FX hedge:	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	France	Italy	Spain
2Y	1.69	0.23	0.30	-2.56	1.64	0.52	1.54	0.20	0.06	0.17	0.53	0.35
5Y	1.82	0.36	0.52	-1.93	2.27	0.52	1.55	0.21	0.33	0.33	1.08	0.62
10Y	1.69	0.23	0.46	-1.61	2.59	0.50	1.68	0.34	0.61	0.53	1.56	0.97
30Y	1.75	0.29	0.62	-0.82	3.37	0.67	1.96	0.62	0.92	0.81	1.88	1.39

^ Pickup relative to Germany

JPY-based	US			Germany			France			UK		
FX hedge:	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched
2Y	4.25	-1.41	-0.22	2.56	-1.64	-0.52	2.73	-1.47	-0.35	4.10	-1.44	-0.46
5Y	3.75	-1.91	-0.16	1.93	-2.27	-0.71	2.26	-1.94	-0.38	3.48	-2.06	-0.43
10Y	3.30	-2.36	-0.28	1.61	-2.59	-0.80	2.14	-2.06	-0.27	3.29	-2.25	-0.23
30Y	2.57	-3.09	-0.24	0.82	-3.37	-0.88	1.63	-2.57	-0.07	2.79	-2.76	-0.16

USD-based	Japan			Germany			France			UK		
FX hedge:	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched
2Y	-4.25	1.20	0.22	-1.69	-0.23	-0.30	-1.52	-0.06	-0.13	-0.15	0.08	-0.24
5Y	-3.75	1.70	0.16	-1.82	-0.36	-0.52	-1.48	-0.02	-0.19	-0.27	-0.04	-0.19
10Y	-3.30	2.15	0.28	-1.69	-0.23	-0.46	-1.16	0.30	0.07	0.00	0.23	0.15
30Y	-2.57	2.88	0.24	-1.75	-0.29	-0.62	-0.94	0.52	0.19	0.22	0.45	0.30

GBP-based	US			Germany			France			Japan		
FX hedge:	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched	None	Rolling	Maturity-matched
2Y	0.15	0.03	0.24	-1.54	-0.20	-0.06	-1.38	-0.03	0.11	-4.10	1.44	0.46
5Y	0.27	0.15	0.19	-1.55	-0.21	-0.33	-1.22	0.13	0.01	-3.48	2.06	0.35
10Y	0.00	-0.11	-0.15	-1.68	-0.34	-0.61	-1.15	0.19	-0.08	-3.29	2.25	0.13
30Y	-0.22	-0.33	-0.30	-1.96	-0.62	-0.92	-1.16	0.19	-0.11	-2.79	2.76	-0.06

Source: J.P. Morgan

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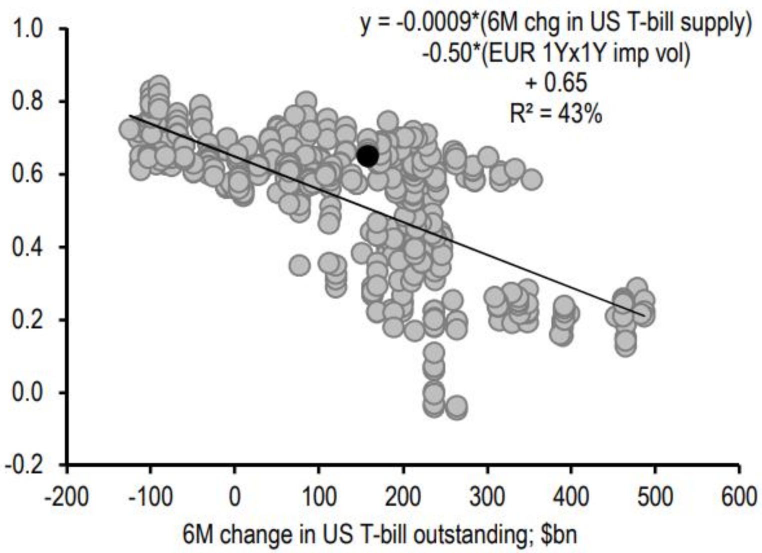
5) T-Bill supply: crowding out effect removes USD from funding market

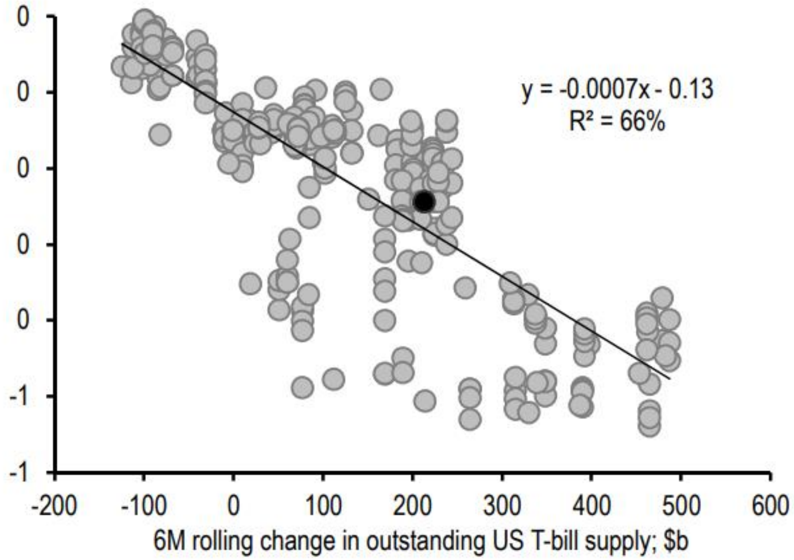
Net T-bill issuance tends to have an effect on cross currency basis mostly via the crowding out channel of USD investment from money market funds

First factor of a 5Y PCA of 1Y global cross currency bases (3 currencies, EUR, GBP and JPY) analysis regressed against the 6M rolling change in US T-bill outstanding supply and 1Yx1Y EUR swaption volatility; Jan 2017 - Jan 2019; bp



Source: J.P. Morgan

First factor of a 5Y PCA of 1Y global cross currency bases (3 currencies, EUR, GBP and JPY) analysis regressed against the 6M rolling change in US T-bill outstanding supply; Mar 2017 – May 2018; bp



Source: J.P. Morgan

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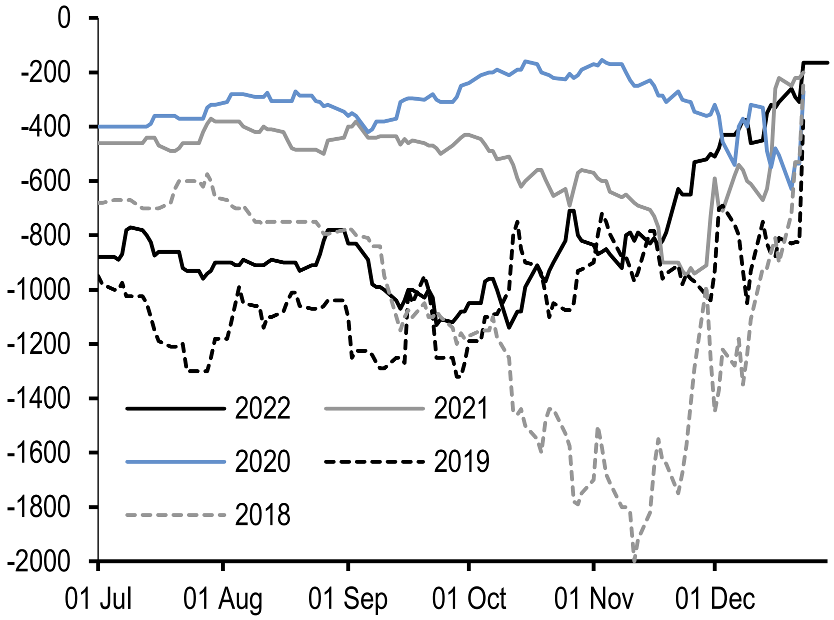
Other drivers: Year-end and quarter-end effects

Typically observe a localized funding pressure in shorter tenors as dollar funding is more expensive over year-end, which can sometimes get exaggerated

Evolution of the EUR/USD Year-end turn over the last few days; bp



Source: J.P. Morgan

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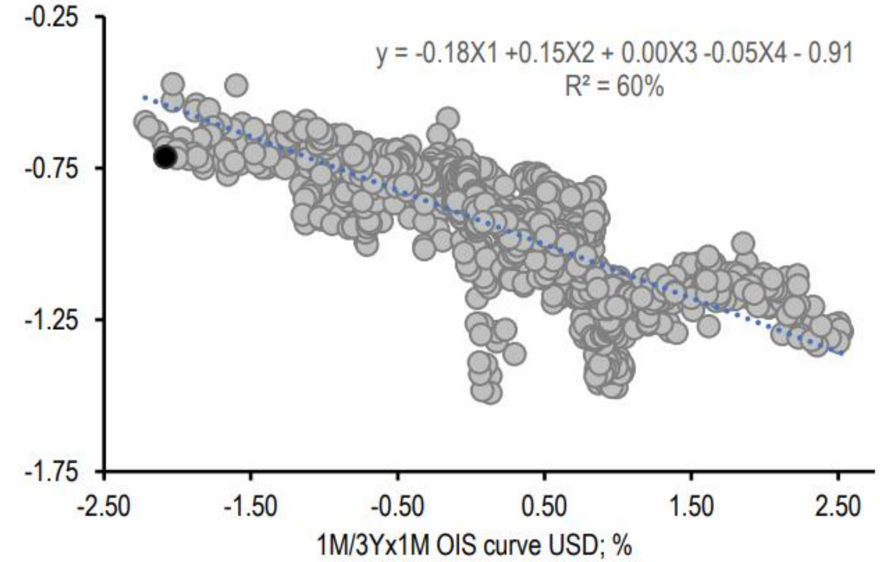
1Q24 Outlook: Biased for further narrowing on QT tapering and policy rate differentials amidst limited risk-off dynamics

Cross-currency bases appears too wide versus fundamental drivers

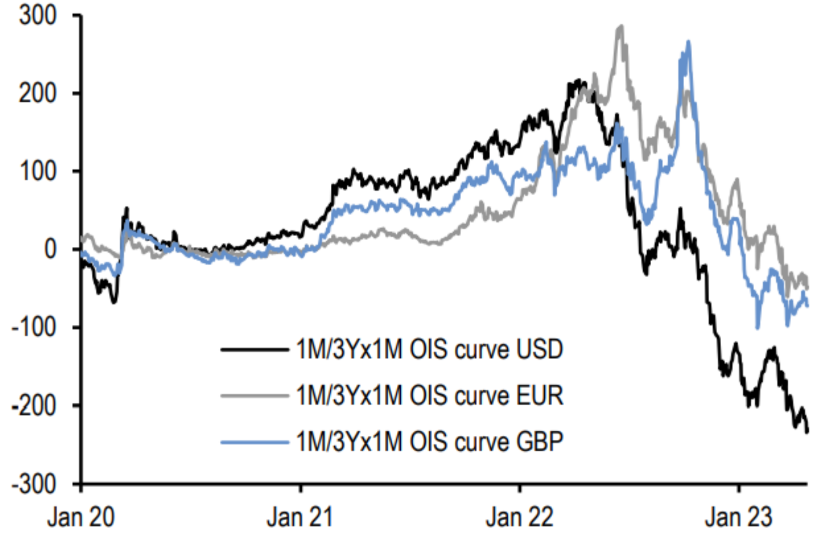
Regression between the first PCA factor of 1Y FX OIS basis and 1) slope of the USD money market curve (1M/2Yx1M OIS curve) (X1); 2) average slope of the EUR, GBP and JPY money market curve (1M/2Yx1M OIS curve) (X2); 3) S&P index level (X3); and 4) average of 3Mx1Y USD, EUR, GBP and JPY swaption vol (X4); Jan 2017 – Apr 2023; unitless



Source: J.P.Morgan

We expect some convergence on money market dynamic further out the curve on Fed limiting imminent easing but more easing to be priced further out for non-US DM central banks as the Fed cutting cycle starts in 2024

Slope of the 1M/2Yx1M OIS curve in USD, EUR and GBP; Jan 2020 – Apr 2023; bp



Source: J.P.Morgan

Expected drivers for cross-currency bases over the near-term:

- Risks are skewed towards the Fed cutting earlier and faster vs market pricing than the ECB (narrower and flatter)
- FED QT tapering biases the balance sheet differentials towards less USD scarcity (narrower and flatter)
- Further reduction in EUR excess liquidity from the TLTRO roll-off puts further narrowing pressure (narrower and flatter)

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An earlier Fed QT taper could lead to around $300bn higher balance sheet vs current projections

Under our baseline scenario, QT could continue through November, ending with O/N RRP balances around $300bn and Reserves around $3.2tn

Current* and projected total Fed balance sheet assets, RRP, TGA, Reserves, and Commercial bank deposits through 2024 under the baseline QT timeline**; $bn

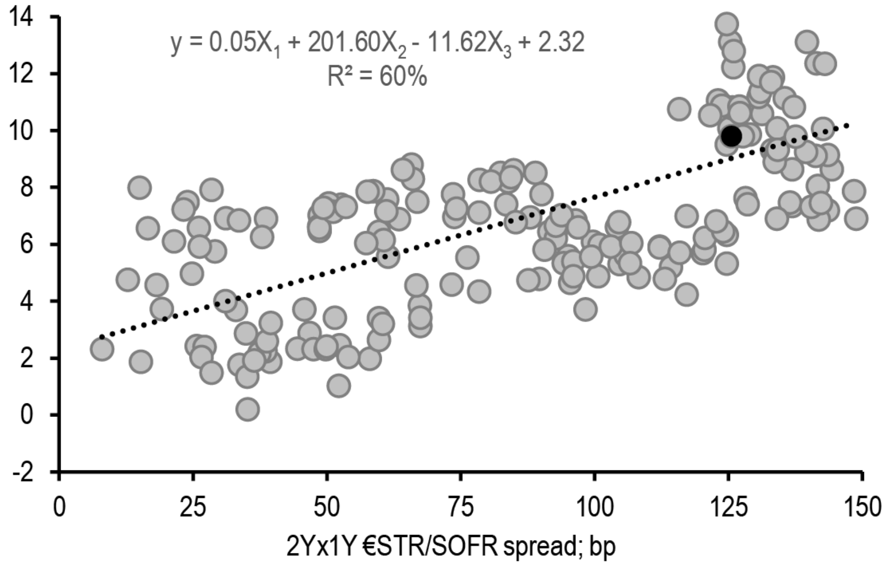
End-of-the-month	Fed Assets	RRP			TGA	Reserves	Commercial Bank Deposits
		O/N RRP	Foreign RRP	Total RRP			
01/03/2024	7731	719	367	1086	743	3459	17611
Jan-24	7653	663	360	1023	750	3437	17644
Feb-24	7577	616	350	966	750	3418	17678
Mar-24	7459	569	340	909	750	3357	17679
Apr-24	7396	533	340	873	750	3331	17709
May-24	7332	497	340	837	750	3302	17735
Jun-24	7281	445	340	785	775	3278	17766
Jul-24	7230	412	340	752	775	3260	17802
Aug-24	7179	387	340	727	775	3234	17831
Sep-24	7128	345	340	685	800	3200	17854
Oct-24	7079	321	340	661	800	3176	17884
Nov-24	7031	296	340	636	800	3151	17915
Dec-24	7031	296	340	636	800	3151	17965

* Current values as of 1/4/2024 Fed H.4.1 release and reflect 1/3/2024 levels and 1/5/2024 Fed H.8. release
**QT taper starts in April and continues through Nov 2024 until O/N RRP balances are around ~$300bn
Source: FRED, Federal Reserve H. 4. 1, Federal Reserve H.8, and J.P.Morgan

EUR/USD: Pay 2Yx1Y €STR/SOFR basis (narrowing bias)

Front-end €STR/SOFR basis appear broadly fair versus fundamental drivers; we have a narrowing bias over the coming months

2Yx1Y €STR/SOFR basis regressed against 1) 2Yx1Y (€STR/SOFR) yield differential (X1); 2) Fed-ECB b/s differential (expressed as % of GDP); and 3) Rolling 2M change in US T-bills outstanding; past 9M; bp



Source: J.P. Morgan

We expect the ECB balance sheet to decline by around 670bn in 2024, driven by ECB QT and TLTRO-III maturities

Current snap shot and projected ECB's balance sheet; €bn

	11-Jan-24	Jun-24	Dec-24
Liquidity measures (a)	404	184	110
TLTRO	392	124	0
PELTRO	0	0	0
1W MRO	7	10	10
3M LTRO	4	50	100
Asset purchases (b)	4694	4511	4315
PEPP	1666	1666	1621
New ABS/Covered	299	274	260
Public Sector Purchase Program	2403	2261	2139
Corporate bonds	324	307	292
Unsterilized SMP	2	3	3
Other (c)	1801	1801	1801
B/S size (a)+(b)+(c)	6899	6496	6227
Excess liquidity	3483	3080	2810
Cum. net increase in b/s	0	-403	-672

Source: ECB and J.P. Morgan

- Whilst the Fed is now likely to reduce the pace and potentially halt QT in 2024, the ECB announced it will start reducing the pace of PEPP reinvestment in 2H24 at 50% pace and then overall stop PEPP reinvestment by end-2024. This supports a narrower basis.
- The 2Yx1Y €STR/SOFR basis has a positive roll-up on the basis curve, which supports paying the basis.

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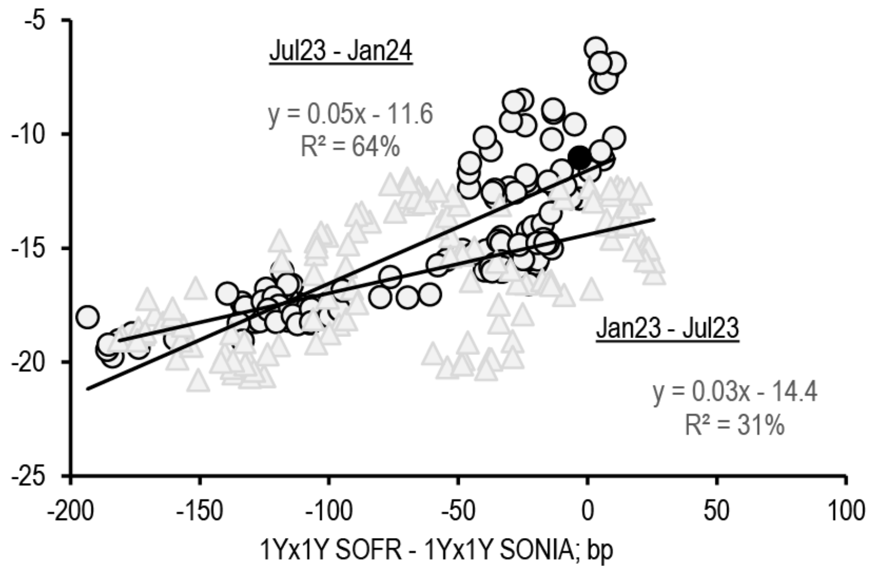
GBP/USD: Narrowing bias on 1Yx1Y SONIA/SOFR basis

1Yx1Y SONIA/SOFR basis looks fair value vs. front end GBP - USD rate differentials

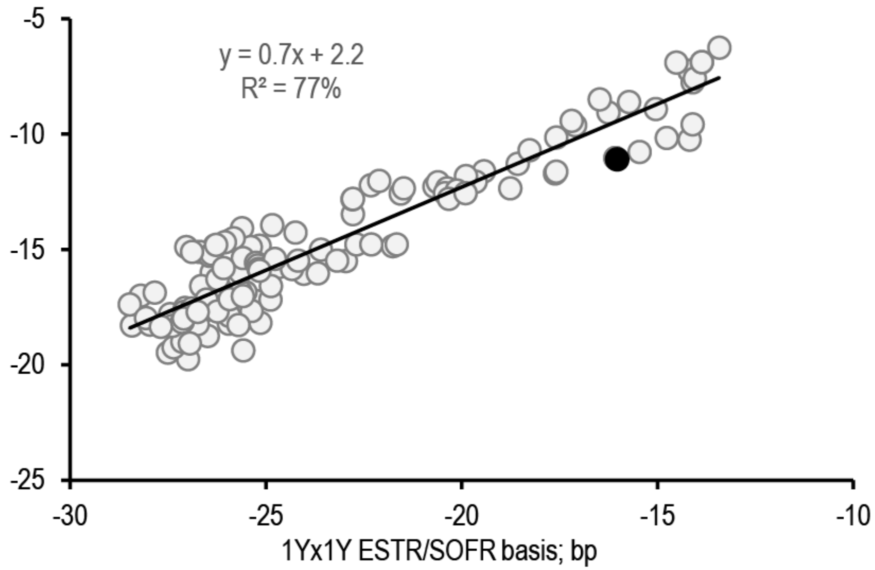
1Yx1Y SONIA/SOFR basis regressed against 1Yx1Y SOFR - 1Yx1Y SONIA spread; past 12M; bp



Source: J.P. Morgan

1Yx1Y SONIA/SOFR basis has been strongly correlated with 1Yx1Y ESTR/SOFR basis and looks marginally too wide on a relative basis; we have a narrowing bias on 1Yx1Y SONIA/SOFR basis

1Yx1Y SONIA/SOFR basis regressed against 1Yx1Y ESTR/SOFR basis; past 6M; bp



Source: J.P. Morgan

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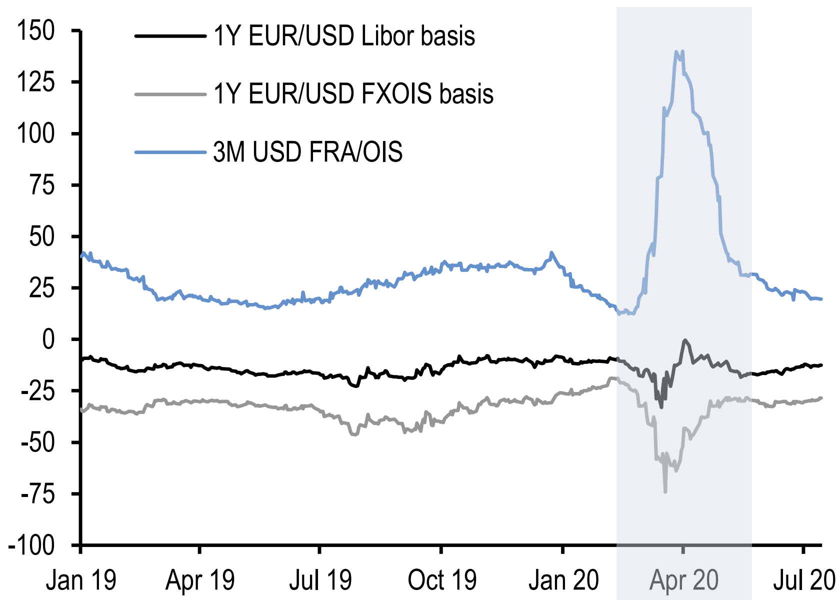
What happened to xccy basis during the COVID-19 crisis?

As the crisis erupted the dollar scarcity became more pronounced in FX OIS space whereas the Libor basis was strongly impacted by the relative widening of USD FRA/OIS

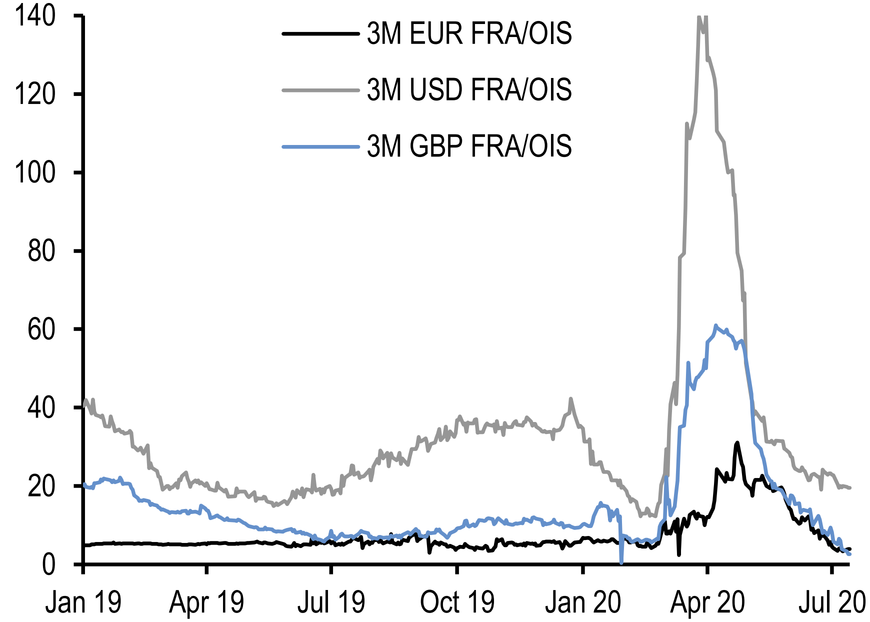
First factor of PCA analysis of short end (1Y) Libor bases (run since January 2013), first factor of PCA analysis of FX OIS bases and 3M USD FRA/OIS; Jan 2019 – Jul 2020; %



Source: J.P. Morgan

The widening in the USD FRA/OIS was of a different order of magnitude relative to the move in the EUR FRA/OIS and more than twice the move in GBP FRA/OIS

Spot 3M USD and EUR FRA/OIS; Jan 2019 – Jul 2020; bp



Source: J.P. Morgan

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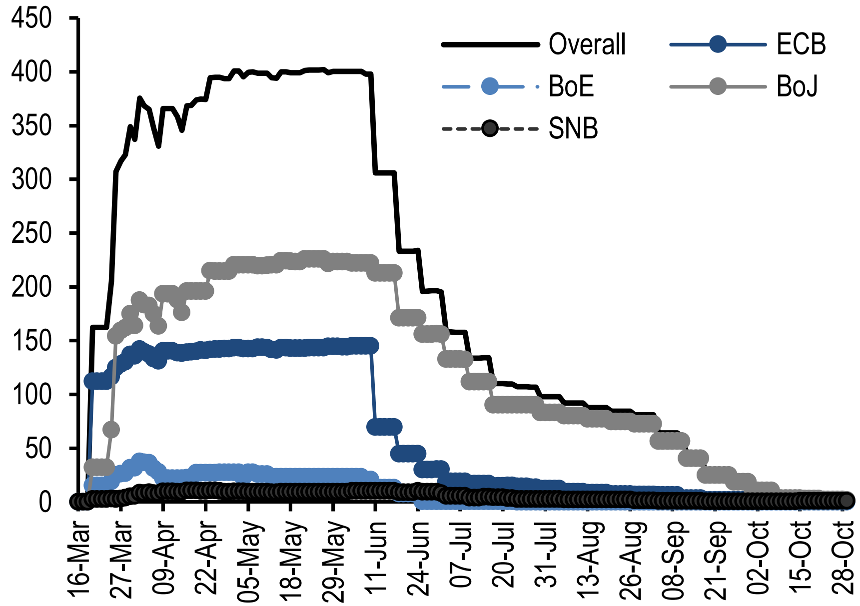
The response from the Fed: the usage of the Fed bilateral swap facility prevented further pressure in the USD funding market

The USD bilateral facility of the FED with DM central banks has strongly contributed to the reduction in short-end USD funding pressure

Overall uptake at the USD bilateral facility with the Fed; $bn



Source: J.P. Morgan

Standing swaplines	BoC, BoE, BoJ, ECB, and SNB	7-day maturity	Increased to daily from 20th March 2023 to atleast until end of April	Provided daily and longer maturity lending operations in the past as well
Other adhoc arrangements	$60bn each with RBA, Banco Central do Brasil, Bank of Korea, MAS, Riksbank	Temporary facilities available through 2020-2021		
	$30bn each with Norges Bank and Danmark Nationalbank			

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Cross currency basis – creating synthetic assets

An investor benchmarked to 2Y USTs, can create a **synthetic 2-year Treasury** note by taking advantage of large negative FX basis:

1) **Buy the JGB bond** and asset swaps it into a TONAR Yen floater (net pick up is the asset swap)
   a. Receive Yen TONAR (floating) payments on a quarterly basis

2) **Enters a cross currency basis swap** (pay the cross-currency basis; if the basis is negative, this translates into a pick-up)
   a. Paying Yen TONAR + FX OIS Basis
   b. Receiving USD SOFR

3) **Covert floating rate USD cash flows into fixed cash flows** using plain vanilla IRS (receive fixed rate)
   a) Pay USD SOFR
   b) Receive fixed coupons

Synthetic yield = JGB OIS asset swap spread – FX Basis + USD fixed swap rate =
– 14 – (-65) + 396* = 447bp

Yield pick up (Buy JGB, sell USTs) = Synthetic yield – UST bond yield = 447bp – 400bp = 47bp
= JGB ASW – FX Basis – UST ASW = – 14 – (–65) – (4) = 47bp

*USD swap rate = 2Y UST – ASW = 400bp + (-4)bp = 396bp;

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