



BIS Quarterly Review

International banking and financial
market developments

September 2024

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Monetary and Economic Department

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Notations used in this Review

billion	thousand million
e	estimated
lhs, rhs	left-hand scale, right-hand scale
\$	US dollar unless specified otherwise
...	not available
.	not applicable
-	nil or negligible

Differences in totals are due to rounding.

The term "country" as used in this publication also covers territorial entities that are not states as understood by international law and practice but for which data are separately and independently maintained.

Abbreviations

Currencies

AED	United Arab Emirates dirham	MXN	Mexican peso
ALL	Albanian lek	MXV	Mexican unidad de inversión (UDI)
ARS	Argentine peso	MYR	Malaysian ringgit
AUD	Australian dollar	NAD	Namibian dollar
BGN	Bulgarian lev	NGN	Nigerian naira
BHD	Bahraini dinar	NOK	Norwegian krone
BRL	Brazilian real	NZD	New Zealand dollar
CAD	Canadian dollar	OTH	All other currencies
CHF	Swiss franc	PEN	Peruvian sol
CLP	Chilean peso	PHP	Philippine peso
CNY (RMB)	Chinese yuan (renminbi)	PLN	Polish zloty
COP	Colombian peso	RON	Romanian leu
CZK	Czech koruna	RUB	Russian rouble
DKK	Danish krone	SAR	Saudi riyal
EUR	euro	SEK	Swedish krona
GBP	pound sterling	SGD	Singapore dollar
HKD	Hong Kong dollar	THB	Thai baht
HUF	Hungarian forint	TRY	Turkish lira
IDR	Indonesian rupiah	TWD	New Taiwan dollar
ILS	Israeli new shekel	USD	US dollar
INR	Indian rupee	VES	bolívar soberano
ISK	Icelandic króna	VND	Vietnamese dong
JPY	Japanese yen	XOF	CFA franc (BCEAO)
KRW	Korean won	ZAR	South African rand
MAD	Moroccan dirham		

Countries

AE	United Arab Emirates	CZ	Czechia
AF	Afghanistan	DE	Germany
AL	Albania	DJ	Djibouti
AM	Armenia	DK	Denmark
AO	Angola	DM	Dominica
AR	Argentina	DO	Dominican Republic
AT	Austria	DZ	Algeria
AU	Australia	EA	euro area
AZ	Azerbaijan	EC	Ecuador
BA	Bosnia and Herzegovina	EE	Estonia
BD	Bangladesh	EG	Egypt
BE	Belgium	ER	Eritrea
BF	Burkina Faso	ES	Spain
BG	Bulgaria	ET	Ethiopia
BH	Bahrain	FI	Finland
BI	Burundi	FJ	Fiji
BJ	Benin	FO	Faeroe Islands
BM	Bermuda	FR	France
BN	Brunei	GA	Gabon
BO	Bolivia	GB	United Kingdom
BR	Brazil	GD	Grenada
BS	The Bahamas	GE	Georgia
BT	Bhutan	GG	Guernsey
BW	British West Indies	GH	Ghana
BY	Belarus	GI	Gibraltar
BZ	Belize	GN	Guinea
CA	Canada	GQ	Equatorial Guinea
CD	Democratic Republic of the Congo	GR	Greece
CF	Central African Republic	GT	Guatemala
CG	Republic of Congo	GW	Guinea-Bissau
CH	Switzerland	GY	Guyana
CI	Côte d'Ivoire	HN	Honduras
CL	Chile	HK	Hong Kong SAR
CM	Cameroon	HR	Croatia
CN	China	HT	Haiti
CO	Colombia	HU	Hungary
CR	Costa Rica	ID	Indonesia
CV	Cabo Verde	IE	Ireland
CW	Curaçao	IL	Israel
CY	Cyprus	IM	Isle of Man

Countries (cont)

IN	India	MX	Mexico
IO	International organisations	MY	Malaysia
IQ	Iraq	MZ	Mozambique
IR	Iran	NA	Namibia
IS	Iceland	NC	New Caledonia
IT	Italy	NG	Nigeria
JE	Jersey	NL	Netherlands
JM	Jamaica	NO	Norway
JO	Jordan	NR	Nauru
JP	Japan	NZ	New Zealand
KE	Kenya	OM	Oman
KG	Kyrgyz Republic	PA	Panama
KH	Cambodia	PE	Peru
KR	Korea	PG	Papua New Guinea
KW	Kuwait	PH	Philippines
KY	Cayman Islands	PK	Pakistan
KZ	Kazakhstan	PL	Poland
LA	Laos	PT	Portugal
LB	Lebanon	PY	Paraguay
LC	St Lucia	QA	Qatar
LK	Sri Lanka	RO	Romania
LR	Liberia	RS	Serbia
LS	Lesotho	RU	Russia
LT	Lithuania	RW	Rwanda
LU	Luxembourg	SA	Saudi Arabia
LV	Latvia	SC	Seychelles
LY	Libya	SD	Sudan
MA	Morocco	SE	Sweden
MD	Moldova	SG	Singapore
ME	Montenegro	SK	Slovakia
MH	Marshall Islands	SI	Slovenia
MK	North Macedonia	SM	San Marino
ML	Mali	SR	Suriname
MM	Myanmar	SS	South Sudan
MN	Mongolia	ST	São Tomé and Príncipe
MO	Macao SAR	SV	El Salvador
MR	Mauritania	SZ	Eswatini
MT	Malta	TD	Chad
MU	Mauritius	TG	Togo
MV	Maldives	TH	Thailand
MW	Malawi	TJ	Tajikistan

Countries (cont)

TL	East Timor	UY	Uruguay
TM	Turkmenistan	UZ	Uzbekistan
TO	Tonga	VC	St Vincent and the Grenadines
TR	Türkiye	VE	Venezuela
TT	Trinidad and Tobago	VG	British Virgin Islands
TW	Chinese Taipei	VN	Vietnam
TZ	Tanzania	ZA	South Africa
UA	Ukraine	ZM	Zambia
US	United States		

Carry off, carry on

De-risking began to stir financial markets over the review period but the stresses proved short-lived.¹ While markets experienced sharp bouts of volatility, investors quickly reverted to the risk-on mode that had prevailed for several months. Financial conditions thus remained loose. Yet the turbulence illustrates how markets have become vulnerable to swift mood shifts, especially related to current growth jitters.

Although de-risking pressures had been brewing since the beginning of July, the cusp of the stress occurred at the beginning of August. In July, markets had already experienced some corrections, especially in tech stocks that had previously surged in valuations. Volatility had picked up, with early signs of deleveraging and a reversal of trades predicated on past trends and low volatility. In early August, following Federal Reserve and Bank of Japan policy meetings perceived as somewhat hawkish, markets overreacted to a disappointing US labour market release. While the equity market correction began in the United States on Friday 2 August, Japan emerged as a locus of turbulence the following Monday. Leveraged positions, above all carry trades, came under pressure, with the yen appreciating sharply and the stock market selling off. The equity slump and the currency repricing reverberated globally, and the VIX spiked. That said, markets stabilised remarkably quickly and erased losses within days, partly thanks to more benign incoming data and central bank communication. In early September, volatility resurfaced again when negative US macro releases led to another correction in equity markets.

During the August sell-off, currency carry trades unwound amid changing expectations of interest rate paths and heightened volatility. Since carry trades borrow in low interest currencies to invest in higher-yielding ones, the unwinding caused a sharp, if short-lived, appreciation of the funding currencies, predominantly the yen, and a depreciation of the investment currencies, such as the Mexican peso and other emerging market economy (EME) currencies. These fluctuations were large but not outsize compared with past carry trade crashes, and foreign exchange (FX) volatility did not rise nearly as much as that of equity markets. Moreover, even though EMEs were exposed to the unwinding of carry trades and spillovers of the risk-off mood, they withstood the bouts of volatility quite well.

Fixed income markets in major economies mostly reflected shifts in policy expectations and the growth outlook, even amid the turbulence. From July onwards, market participants began reassessing the odds of a soft landing. As signs of an intensification of the slowdown surfaced in early August, government bond yields fell markedly, as investors priced in more aggressive rate cuts. Concerns over a global slowdown led to more internationally synchronised movements across bond markets. This halted the divergence that had sustained US dollar appreciation since 2021.

Credit markets were the least affected by the bouts of volatility and de-risking. Corporate bond spreads did widen across advanced economies, but only marginally, and overall credit conditions remained benign by historical standards. Similarly, bank credit supply terms no longer tightened. Against this background, broad measures of financial conditions loosened. Towards the end of the review period, the risk-on mode was again in full swing but still vulnerable to sudden changes in mood.

¹ The review period covers 1 June to 6 September.

Key takeaways

- The unwinding of leveraged positions, including carry trades, amplified short-lived bouts of extreme equity market volatility and exchange rate movements in early August.*
- Equity markets underwent some drawdowns but overall managed to pull ahead fairly unscathed. Credit markets were even less affected, amid an overall environment of loose financing conditions.*
- Markets remained hypersensitive to macro news, especially news that lowered the odds of a soft landing. Bond yields declined on any signs of slowdown, particularly at the short end.*

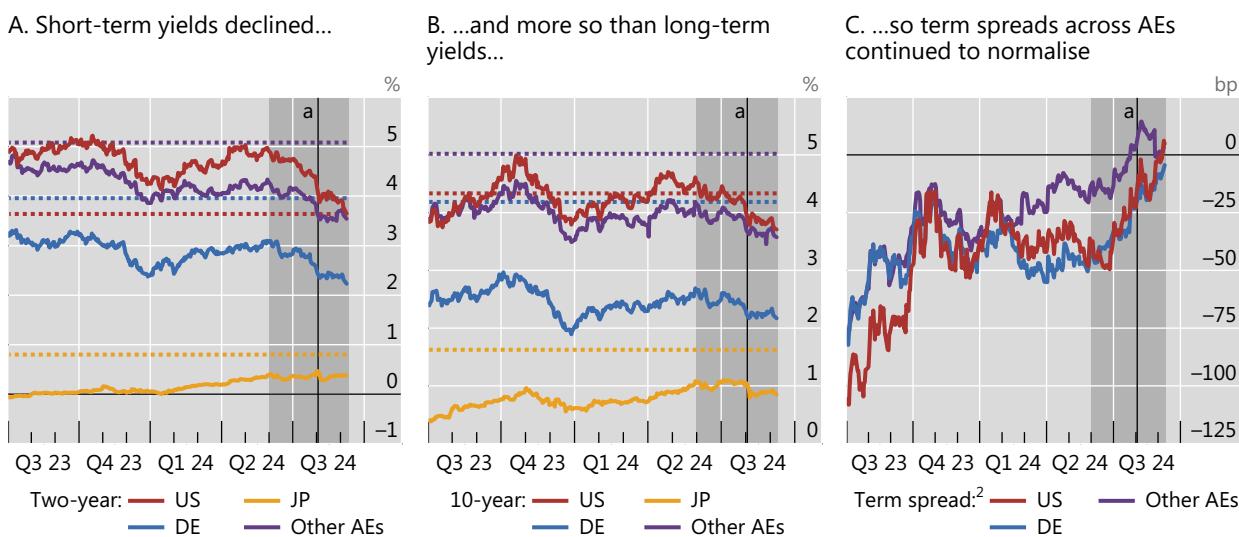
Global bond markets price in easier monetary policy

Global bond markets moved in tune with expectations of an easier policy stance. Inflation continued its course towards targets, while macroeconomic readings indicated that growth momentum might be faltering. Hence, fixed income markets started pricing in earlier and larger rate cuts in most advanced economies, causing a rather synchronised decline in short-term yields globally (Graph 1.A). This macro backdrop also exerted downward pressure on long-term yields, albeit a more moderate one (Graph 1.B). As a result, the negative term spreads in advanced economies continued to narrow, even turning positive in some economies (Graph 1.C).

A major reassessment of policy expectations occurred in early August. Investors coalesced around somewhat negative labour market readings, interpreted as worrisome given the Federal Reserve's cautious approach to rate cuts. Fears that the

Policy expectations set the tone for global bond markets¹

Graph 1



The shaded area indicates 1 June 2024–6 September 2024 (period under review). The dotted horizontal lines in panel A and B indicate the January 2007–June 2008 average.

^a Release of disappointing employment readings in the US (2 August 2024).

¹ Other AEs based on simple average of AU, CA and GB. ² 10-year minus two-year.

Sources: Bloomberg; BIS.

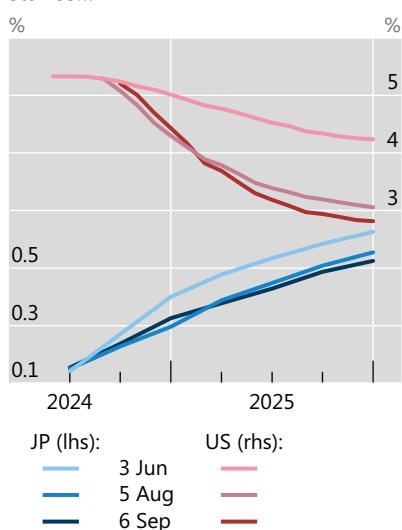
odds of a sharp downturn were rising ignited the early August turbulence and led investors to price in a faster pace of rate cuts (Graph 2.A). A sharp decline in yields followed, including at the long end, possibly exacerbated by the unwinding of short positions and flight-to-safety flows.² The macroeconomic releases of the following days, however, painted a rosier picture and, together with central bank communication, they briefly nudged up policy rate expectations. That said, these expectations eventually settled at a lower level at the end of the review period.

Overall, yield movements were increasingly driven by market participants' greater focus on growth-related news (Box A). This reflected inflation being seemingly on track towards targets and more prominent negative surprises about activity (Graph 2.B). Policy expectations were shaped by the evolving odds of a full-fledged recession versus a soft landing. Expectations of a more synchronous policy cycle ahead also led to more correlated movements in short- and long-term yields across core bond markets, in marked contrast to the divergence that had characterised the previous months. In turn, this likely contributed to halting the US dollar's appreciation trend, which had persisted since the initial policy rate lift-off in the United States.

Changing monetary policy expectations drove fluctuations in long-term yields

Graph 2

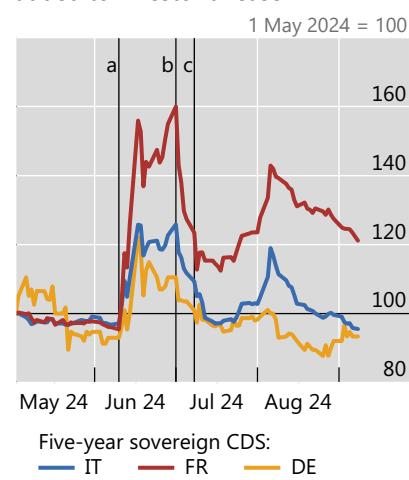
A. Markets priced in a looser policy stance...¹



B. ...as negative macroeconomic surprises forebode a slowdown



C. Political uncertainty in Europe added to investor unease



^a European Parliament elections (9 June 2024). ^b First round of French elections (30 June 2024). ^c Second round of French elections (7 July 2024)

¹ Futures curve of policy rates.

Sources: Bloomberg; Macrobond; S&P Global Market Intelligence; BIS.

² In line with this, various estimates of term premia in the United States point to a sharp decline in correspondence with the early August spike in volatility.

Markets' increasing response to labour market conditions in the United States

Dora Xia and Sonya Zhu^①

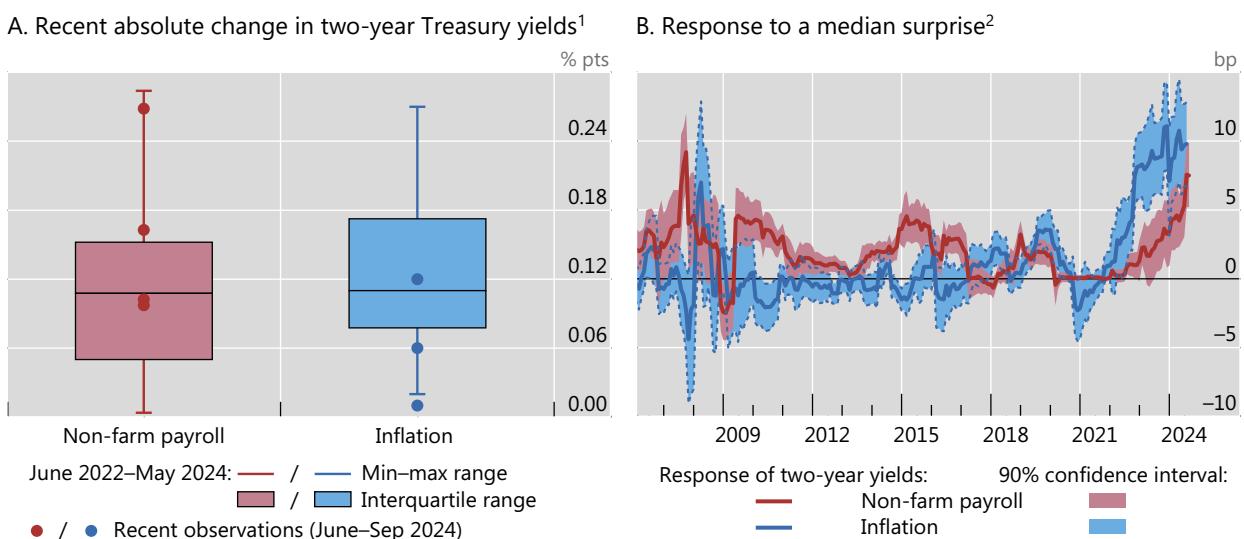
Macroeconomic news triggers the repricing of financial assets, partly due to revised expectations of monetary policy.^② The extent to which asset prices respond to macroeconomic news depends on the perceived importance of the economic variable for central banks' monetary policy decisions. This box examines the influence of two key economic indicators in the United States – non-farm payrolls and core consumer price index (CPI) inflation – on the yield of US Treasury bonds with two years to maturity (a yield curve segment that is fairly sensitive to shifts in policy expectations). We find that macroeconomic news has had a growing impact on asset prices in recent years, indicating that the Federal Reserve is becoming more data dependent. This was already the case amid the post-pandemic inflation surge, when inflation-related news came into the spotlight. In the more recent period, financial markets have shown an increasing sensitivity to labour market news.

Recent labour market news has elicited large responses in asset prices despite the moderate size of the economic surprise. For instance, on 2 August, when the July non-farm payroll report was released, the two-year US Treasury yield declined by 26 basis points, representing a more than four standard deviation change for that month. More broadly, during the latest three job report release days, the absolute change in the two-year US Treasury yield was close to, or higher than, the median observed in the past two years (Graph A1.A, red dots). Meanwhile, the size of the data surprise, defined as the difference between the actual data and the median forecast by analysts polled by Bloomberg, was only close to or below the median.

The substantial movements in the two-year yield on recent job release days align with a trend of rising sensitivity of asset prices to labour market news. To illustrate this, we estimate the time-varying sensitivity of the two-year yield to the non-farm payroll surprise using rolling regressions with 24 months of data. Specifically, we employ a weighted least squares regression approach with higher weights assigned to more recent observations.^③ Our estimates reveal that this sensitivity has been rapidly increasing since 2023 (Graph A1.B, red line). In fact, the magnitude of the latest estimate is near its two-decade peak.^④

The response of US two-year Treasury yields to economic surprises

Graph A1



¹ Absolute change on days with either non-farm payroll or core CPI inflation data release. ² Non-farm payroll and inflation surprises are the difference between the actual release and the Bloomberg median forecast. Panel B shows the coefficients estimated from regressing two-year yield changes on these surprises using a 24-month rolling window. The sample period spans from January 2004 to September 2024.

Sources: Bloomberg; authors' calculations.

The two-year yield has also exhibited high sensitivity to inflation surprises (Graph A1.B, blue line). Amid heightened inflation pressures, the sensitivity of two-year Treasury yields to core CPI inflation surprises surged during 2022. As inflation decelerated from post-pandemic peaks, the increase became more gradual and has currently plateaued at an elevated level.^⑤ And as the magnitude of inflation surprises has diminished, the corresponding changes in the two-year yield have been limited in recent months (Graph A1.A, blue dots).

What explains the increasing importance of labour market surprises in recent months? The jury is still out. One possibility is that, with inflation seemingly on track towards the target, markets anticipate that the Federal Reserve will place a greater emphasis on labour market news when making policy decisions. Indeed, in a recent assessment of the economic outlook, the Federal Market Open Committee chair acknowledged diminishing upside risks to inflation and highlighted increasing downside risks to employment.^⑥ Communication of this type could prompt market participants to update their perceptions about the central bank's reaction function and place more weight on employment conditions. The perceived evolution in the monetary policy reaction function could be an important driver of the increasing sensitivity of asset prices to labour market news.^⑦

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. ② See, for example, J Faust, J Rogers, S-Y Wang and J Wright, "The high-frequency response of exchange rates and interest rates to macroeconomic announcements", *Journal of Monetary Economics*, vol 54, no 4, May 2007, pp 1051–68. ③ We weight observations with an exponential decay function, with 0.85 being the decay constant. ④ Labour market news has been found to be the most important data release in terms of influencing asset prices and trading activity. See M Fleming and E Remolona, "What moves the bond market?", *Economic Policy Review*, vol 3, no 4, December 1997, pp 31–50. ⑤ Also documented in Z Arnaut and M Bauer, "Monetary policy and financial conditions", *FRBSF Economic Letter*, no 07, 4 March 2024. ⑥ See J Powell, "Review and outlook", speech at the Federal Reserve Bank of Kansas City Jackson Hole Economic Symposium: Reassessing the Effectiveness and Transmission of Monetary Policy, 23 August 2024. ⑦ See M Bauer, C Pflueger and A Sunderam, "Perceptions about monetary policy", *Federal Reserve Bank of San Francisco Working Papers*, no 31, 2023.

In Japan, policy expectations not only reflected the gradual tightening phase under way but also reacted to evolving central bank communication. As the Bank of Japan embarked on a monetary tightening in the spring for the first time in almost two decades, investors started pricing in higher policy rates ahead. Tighter funding conditions in Japanese yen were one of the triggers of the early August turbulence. As a result, in its aftermath, the Bank of Japan adjusted its communication to telegraph a cautious approach to further rate hikes. This led to an immediate downward shift in anticipated policy rates (Graph 2.A), as investors adjusted their expectations.

European fixed income markets were less affected by a reassessment of the policy path but experienced jitters for different reasons. The jitters came on the back of political developments and uncertainty related to elections in the United Kingdom, France and Germany. Notably, French credit default swap (CDS) spreads widened following the first round of parliamentary elections in June, with the associated geopolitical uncertainty affecting other euro area countries more broadly (Graph 2.C). Italian CDS spreads also widened, albeit less than the French ones. The CDS on German bunds, typically viewed as a safe asset in the euro area, ticked up unusually not only following the French elections but also after the elections in Saxony and Thuringia in early September. This possibly reflects increasing challenges in the political sphere. CDS spreads eventually narrowed for Italian and German bonds but remained wider for French bonds.

De-leveraging and carry trade unwind amplify volatility

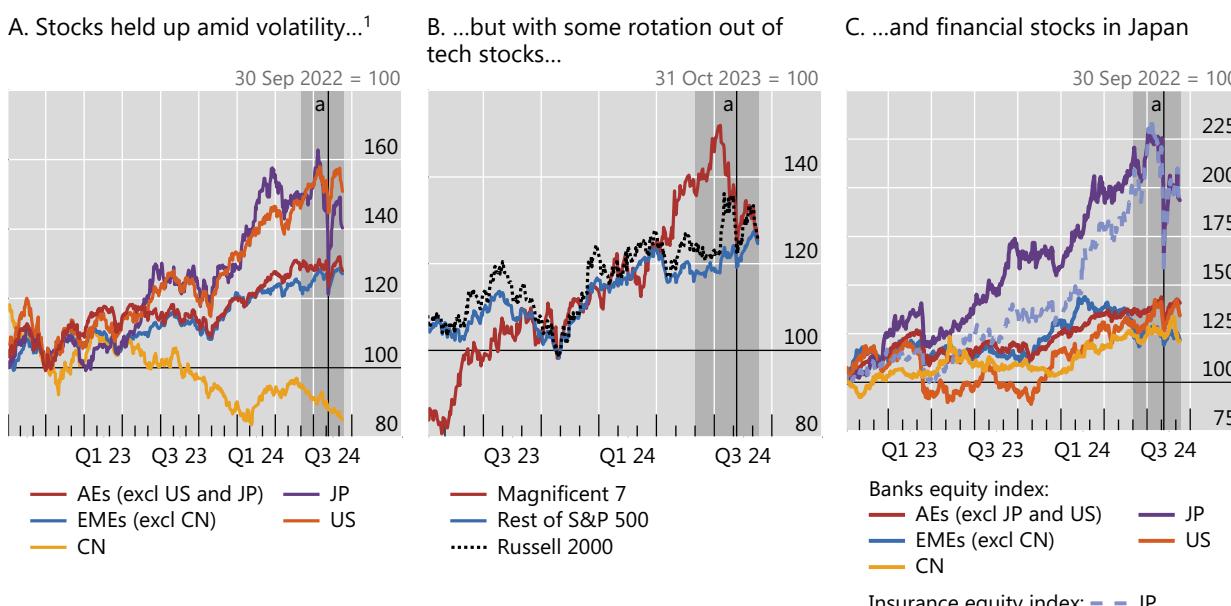
Risky assets, already vulnerable given seeping concerns about stretched valuations, were those most shaken in July and early August. Still, flare-ups of volatility subsided quickly each time, equity markets largely recovered the losses, and credit spreads re-compressed. In the end, markets eventually reverted to the risk-on mode as investors became increasingly convinced of policy easing ahead.

Throughout July, equities were highly responsive to any signs casting doubts on the sustainability of earnings, especially in segments that had previously seen a surge in valuations (Box B). Indeed, these lofty valuations were the first to suffer in the light of indications of possibly fading growth momentum. Those of tech stocks, mostly those of the so-called "Magnificent 7",³ began to drop rapidly in July (Graphs 3.A and 3.B). By contrast, the "rest" of the S&P 500 index was left relatively unscathed, and small caps were even boosted by some investment rotation.

A larger bout of volatility followed in the first days of August. US equities resumed losses. Once again, the Magnificent 7, but this time also the riskier small caps (Graph 3.B), saw the largest drops. The trigger was investors' outsize reaction to a somewhat disappointing US labour market release on Friday 2 August. On the following Monday, the epicentre of the turbulence shifted to Japan, with the yen appreciating further and the TOPIX index posting double-digit losses. The sell-off broadened, with the TOPIX banks index suffering the worst one-day loss in its 40-year history (Graph 3.C). The Nikkei implied volatility spiked to crises-like highs (Graph 4.A). The volatility spike appeared to spill over to the VIX, which briefly exceeded 60 in pre-market trading before closing under 40, still an elevated level.

Global equity markets fell but quickly rebounded

Graph 3



³ The Magnificent 7 companies are Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla.

The valuations of tech stocks: dotcom redux?

Marco Lombardi and Gabor Pinter^①

Over the past few years, equity prices have risen steadily, driven largely by the “Magnificent 7” (M7) tech giants. While their earnings growth has been strong, the rapid rise in their stock prices raises concerns about whether these valuations are driven by excessive optimism about future earnings, potentially echoing the dotcom bubble of the late 1990s.

The parallel with the dotcom bubble might seem fitting, as both periods saw a surge in the tech sector’s share of the S&P 500 market capitalisation (Graph B1.A). In 2000, at the cusp of the dotcom bubble, the share of tech firms in the S&P 500 index reached 47%, doubling from 23% in less than two years. By end-August 2024, the share of tech firms had reached 49%, but the increase was more gradual, taking nearly a decade to double. These patterns reflect the overall dynamics of equity prices, with the S&P 500 tripling in real terms from 1995 to 1999, compared with a more gradual tripling over the past decade.

Similarities with the dotcom boom?

Graph B1

A. Rising share of tech¹ market cap in the S&P 500 index



B. Valuations of M7 higher than rest of the market, reflecting high expected earnings growth²



¹ Telecommunications and IT. ² For Magnificent 7 (M7) price-to-earnings (P/E) ratios, market capitalisation weighted average. M7 companies are Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla. For the rest of S&P 500 firms P/E ratio, median.

Sources: LSEG Datastream; LSEG Workspace; authors’ calculations.

A common way to relate price dynamics to fundamentals is to look at price-to-earnings (P/E) ratios. They reflect how much investors are willing to pay for each dollar of earnings.^② P/E ratios can be calculated in a backward-looking (trailing) way, typically based on the past year’s realised earnings, or in a forward-looking way, based on analysts’ earnings forecasts. Trailing P/E ratios are grounded in actual results but may fail to react swiftly to changes in the outlook. Forward P/E ratios instead reflect expectations of growth, but they risk being biased by waves of over-optimism (or pessimism).

Since July, M7 stocks fell by around 25% and have not yet recovered. As a result, their valuations, as measured by the trailing P/E ratio, have not returned to levels seen at the beginning of June (Graph B1.B, blue line). However, these valuations remain over 45% higher than the median S&P 500 firm. This lingering optimism is also reflected in forward P/E ratios, which are, on average, 30% lower than their trailing counterpart.

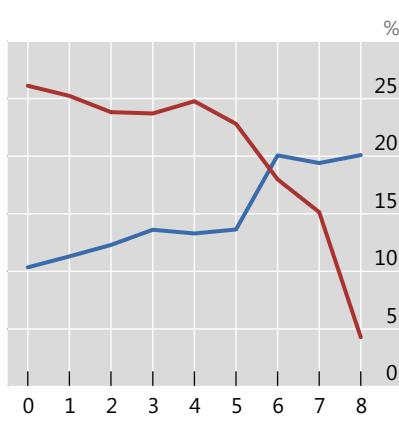
The rising profitability of tech firms in the current bull market has helped propel their valuations, while during the dotcom bubble (1993 to 2001), the average return on assets (ROA) of tech firms steadily declined (Graph B2.A). To be sure, profitability levels also differed initially: in the early 1990s, profit margins of certain tech firms were sizeable, arguably thanks to still fairly immature markets and little competition. By 2015, the tech industry was more mature, with lower but growing profitability.

Despite the increasing profitability of the M7, their valuations may still be stretched. If markets are overly optimistic about future earnings, they may eventually be disappointed. One way to assess, ex post, whether forward-looking P/E ratios accurately reflect expectations is to compare forecasted and realised earnings.^③ If earnings expectations are unbiased, the forecast and realised earnings would be aligned. For the M7, realised earnings actually tended to exceed analysts' predictions from 2011 to 2019; this is reflected in a slope steeper than one (Graph B2.B, red dots). This contrasts with the rest of the S&P 500, which shows a flatter slope and hence an optimistic bias in earnings expectations (Graph B2.C, purple dots).^④ In recent years, however, the relationship between realised and forecasted earnings has changed for the M7: realised earnings during 2020–24 no longer exceeded expectations as much as before, and forecast errors also started to become more dispersed. This reflects both early signs of increased optimistic bias and higher uncertainty around M7 earnings (Graph B2.B, blue dots).

Profitability and the accuracy of earnings expectations

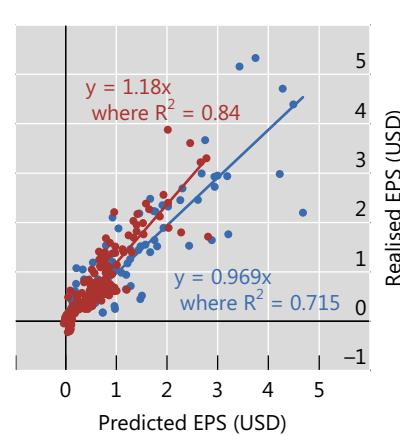
Graph B2

A. Tech firms' ROA declined during dotcom and rose in recent years



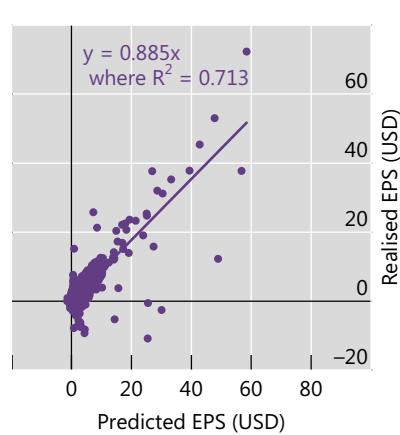
Average ROA:¹ — 1993–2001
— 2015–23

B. M7 earnings exceeded forecasts in the past, but recent years show more dispersion in outcomes²



Magnificent 7: ● 2011–19
● 2020–24

C. Realised earnings of the rest of S&P 500 do not meet expectations²



Rest of S&P 500: ● 2011–24

¹ Market capitalisation weighted average of selected firms. For 1993–2001, Adobe, Amazon, Apple, Cisco, Micro, Microsoft and Qualcomm; for 2015–23, Magnificent 7 (Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia and Tesla). ² Predicted EPS is eight-quarters-ahead average forecasts of earnings per share (EPS) and realised EPS is the realised outcome.

Sources: LSEG Datastream; LSEG Workspace; authors' calculations.

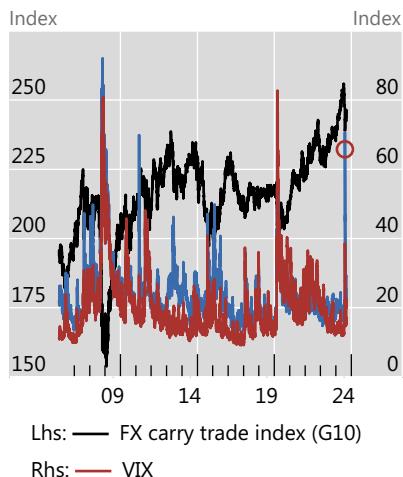
To sum up, until 2019, the M7's realised earnings tended to exceed expectations. But with loftier valuations, the likelihood of disappointments has been increasing. A reassuring aspect of the current M7 boom, compared with the dotcom bubble, is that price increases and the build-up of optimistic expectations have been more gradual and more rooted in rising profitability. That said, the streak of past positive surprises has been fuelling increasingly optimistic expectations, which may have become harder and harder to meet.

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. ② P/E ratios mechanically rise when the growth of stock prices outpaces that of earnings, indicating optimism about future earnings growth. Higher P/E ratios may also reflect lower future discount rates, which this box does not address. See J Cochrane, "Discount rates", *Journal of Finance*, vol 66, no 4, August 2011, pp 1047–108. ③ The literature documented the tendency for earnings expectations to be overly optimistic. See R La Porta, "Expectations and the cross-section of stock returns", *Journal of Finance*, vol 51, no 5, December 1996, pp 1715–42. ④ P Bordalo, N Gennaioli, R La Porta and A Shleifer, "Diagnostic expectations and stock returns", *Journal of Finance*, vol 74, no 6, December 2019, pp 2839–74.

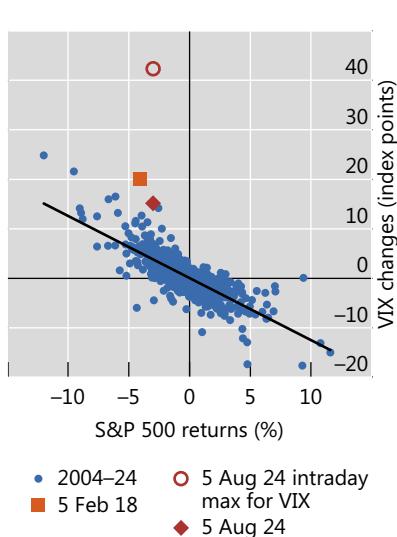
The outsize rise in equity market volatility pointed at amplifiers¹

Graph 4

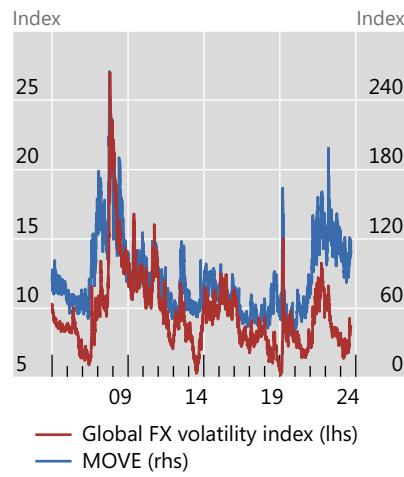
A. Intraday VIX spike was extreme but short-lived...



B. ...and greater than expected based on the stock market drop



C. Volatility in fixed income and FX markets remained more subdued



¹ See technical annex for details.

Sources: Bloomberg; BIS.

The large equity market drops, the extreme volatility spike and the apparent international spillovers pointed to amplification factors.⁴ The US news by itself could not be taken as an unequivocal sign of a deteriorating outlook, let alone a looming global recession, and did not warrant such a market reaction. Indeed, the jump in the VIX far exceeded what would have been expected based on the historical relationship with S&P 500 returns (Graph 4.B). The spike in the VIX appears to have been amplified by purchases of equity index options by traders exposed to volatility. For example, various structured products, including those funded in yen, were reportedly being hedged using equity options. And some specialised funds established short VIX positions while purchasing options on individual S&P 500 company stocks; these positions had to be reversed.⁵ More broadly, the spike in volatility coincided with strong deleveraging pressures and margin calls in a number of other asset classes, especially speculative ones such as crypto.

The risk-off episode saw large international spillovers. In fact, Japanese financial indices had already begun turning south in early July (Graphs 3.A and 3.C), when the yen's appreciation trend had reversed amid rumours of Bank of Japan FX interventions. This had altered the incentives for many leveraged speculators. Likewise, the equity market volatility spikes in late July and August went hand in hand with signs of an unwinding of currency carry trades. This is confirmed by data on speculative yen short positions in currency futures. Various hedge fund strategies, which had become crowded and more exposed to carry trades for at least a year, faced pressures and contributed to cross-asset spillovers (Box C).

⁴ For a detailed discussion of the market turbulence and carry trade unwind, see M Aquilina, M Lombardi, A Schrimpf and V Sushko, "The market turbulence and carry trade unwind of August 2024", *BIS Bulletin*, no 90, August 2024.

⁵ See also K Todorov and G Vilkov, "What could explain the recent drop in VIX?", *BIS Quarterly Review*, March 2024, pp 6–7. Other possible drivers include the aforementioned spillovers of the equity market volatility in Japan as well as a momentum reversal.

Hedge fund exposure to the carry trade

Frank Packer, Andreas Schrimpf, Vladyslav Sushko, Nicholas Zarra^①

The unwinding of carry trades on 5 August coincided with a widespread sell-off across global asset classes, particularly those with more concentrated hedge fund positions. Carry trades are leveraged cross-currency positions exploiting interest rate differentials and low volatility. Since many funds actively trade across asset classes, gaining an understanding of their exposure to the carry trade can provide some evidence about spillover mechanisms. We find that the hedge fund sector had become increasingly exposed to the markets that were at the epicentre of the 5 August turbulence. Though our data do not cover early August and thus cannot be used to directly assess the episode, they allow us to shed light on how vulnerabilities were building up.

We focus on the sensitivity of the returns of various hedge fund strategies to the returns on currency carry trades. This is a useful, albeit indirect, indicator of the portfolio strategy of the fund. The higher the sensitivity, the higher the likelihood that the fund is actually engaged in carry trades. And even if the fund is not engaged in a carry trade itself but some related strategy that shares similar risk characteristics, a higher sensitivity implies a higher exposure to losses should carry trade returns suddenly evaporate.

We estimate the shifting sensitivities of various hedge fund strategies to the performance of a long-short carry trade portfolio. We proxy the latter with returns to the S&P Risk Premia FX Carry G10 Index. For the performance of different hedge fund strategies, we draw on the Credit Suisse Hedge Fund Indices. Derived from a comprehensive sample of over 9,000 distinct funds, these indices report the monthly performance of hedge funds grouped by various trading strategies and are calculated as the asset-weighted averages of the returns of constituent funds.^② The sensitivities (betas) of hedge fund returns to carry trade returns are obtained using a rolling regression on monthly data and controlling for the overall "market beta". Our findings are as follows.

First, ahead of the August turbulence, hedge fund returns on the whole had become more sensitive to the proxies for returns on currency carry trades. Following the pandemic and the rapid yen depreciation that started in early 2022, the sensitivity of the aggregate index of hedge fund returns to carry trade returns had turned positive and continued to increase through this July (Graph C1.A, red line). This is consistent with a pre-turbulence build-up in hedge fund exposure to the risks of a reversal in carry trade returns.

Second, returns to hedge fund strategies most prone to engage in carry trades exhibited the greatest increase in sensitivity to carry trade returns. The returns of global macro and managed futures funds, both traditionally recognised as key players in carry trades, exhibited the most significant shifts in sensitivity from 2022 onwards (Graph C1.A, blue and yellow lines). This supports the notion that the increased sensitivity estimated by our methodology indeed reflected an increase in carry trades in the hedge fund community.

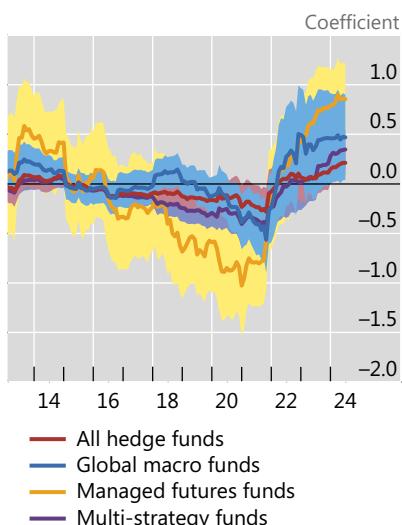
Third, at the same time, hedge funds with greater potential for spillovers across instruments outside of currency markets also became increasingly sensitive to the carry trade. The sensitivity to carry returns of managed futures funds, which often pursue momentum-based trading strategies and are active across a variety of derivatives markets such as equity options and VIX futures, exceeded that of global macro funds from 2023.

Fourth, hedge funds employing some of the most diversified strategies, and hence in theory less subject to the vagaries of any single strategy, increased their sensitivity to the very markets that were subsequently disrupted. We find that so-called multi-strategy funds did not just become significantly more exposed to the risks associated with FX carry trades (Graph C1.A, purple line), they also appear to have significantly increased their exposure to Japanese equities. Accordingly, the sensitivity of multi-strategy funds' returns to the Nikkei 300 index returns surged over the past year (Graph C1.B, red line), even when controlling for carry trade returns (Graph C1.B, blue line). Moreover, one popular strategy pursued by multi-strategy funds over the period profited from the discrepancy in option prices on an equity index compared with its constituents. Some specialised funds reportedly found it profitable to establish VIX short positions while purchasing options on individual S&P 500 company stocks.^③ Our results thus suggest that the shadow of the carry trade risk factor was cast on seemingly distinct long-short equity volatility strategies.

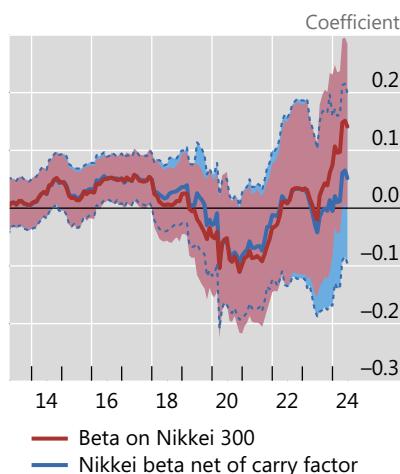
Hedge funds' sensitivity to carry trade returns and their "crowdedness"

Graph C1

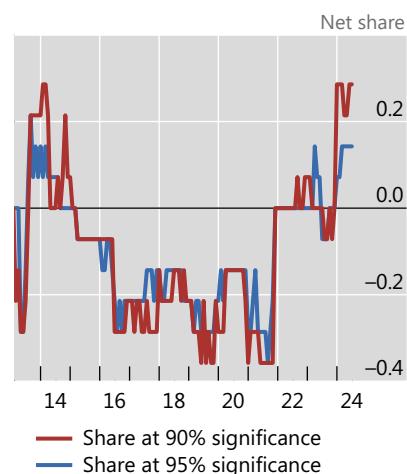
A. Hedge fund strategies exhibited a rising exposure to the carry trade¹



B. Multi-strategy hedge funds have become more exposed to the Nikkei¹



C. Hedge fund crowdedness in FX carry trades has risen²



¹ Time varying betas, 36-month rolling window. All strategies controlling for market beta when calculating sensitivity to the carry trade and Nikkei index. See Credit Suisse for documentation on the calculation of hedge fund indices. S&P Risk Premia Carry G10 Index used for return to the carry trade. Shaded areas show 90% confidence intervals. ² Number of hedge fund strategies with returns exhibiting statistically significant positive coefficients on the carry factor minus the number with statistically significant negative coefficients. Estimates of crowdedness broadly follow the methodology of M Pojarliev and R Levich, "Detecting crowded trades in currency funds", *Financial Analysts Journal*, vol 67, no 1, 2011, pp 26–39.

Sources: Bloomberg; Fama/French Data Library; authors' calculations.

Fifth, the finding that the hedge fund sector may have been crowding into a common exposure to the carry trade is supported by other measures as well. In particular, in the lead-up to the recent volatility episode, the number of distinct hedge fund strategy classes positively exposed to the carry trade had exceeded the number with negative exposure. Specifically, the (net) number of strategies with statistically significant positive carry trade exposure turned positive and increased as a share of all strategy classes (Graph C1.C).

Crowdedness, combined with high leverage, set the stage for the amplification of stress and cross-asset spillovers. According to the SEC Private Fund Statistics, multi-strategy hedge funds entered the episode with high leverage. Their leverage ratio was 4:1 by traditional measures and 14:1 when accounting for synthetic leverage via derivatives.^④ A jump in common risk management metrics at the fund level, notably value at risk, likely compelled these funds to reduce exposure, not just in a single affected asset class but across a broader range of assets. And when multiple strategies are effectively heavily exposed to the same risk factor, such as that underlying carry trade returns, such crowdedness can amplify the tail risk as funds scramble to exit similar positions at the same time.^⑤ During the August event, no major fund failures were reported, as hedge funds appeared to have buffers to meet margin calls and had other positions that were "in the money."

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. ② The index measures the performance of a long-short carry strategy consisting of G10 currencies (USD, EUR, GBP, JPY, AUD, NZD, CAD, CHF, NOK, SEK). The strategy maintains long exposure in the three currencies with the highest carry rankings and short exposure in those with the lowest carry rankings, while keeping the FX risk unhedged. ③ See, for example, J Lee, "A hedge-fund volatility trade risks getting crushed by the crowd", Bloomberg, 24 May 2024. ④ Synthetic leverage refers to the ratio of the total exposure in a derivative contract to the costs of putting on the position. A common measure is the ratio of gross notional value to the initial margin. ⑤ See, for example, G Brown, P Howard and C Lundblad, "Crowded trades and tail risk", *Review of Financial Studies*, vol 35, no 7, July 2022, pp 3231–71.

All in all, the August turbulence proved short-lived. Possibly, less-constrained and cash-rich investors took advantage of the sell-off, while larger and more slow-moving positions funded in the yen, proxied with BIS statistics (Box D), may have been only partially shed. In less than a week, prices recovered lost ground and investors were once again eyeing a soft landing. And, despite the sizeable shock to leveraged currency positions, the impact on FX market volatility was not on par with any past episodes of market turmoil (Graph 4.C).

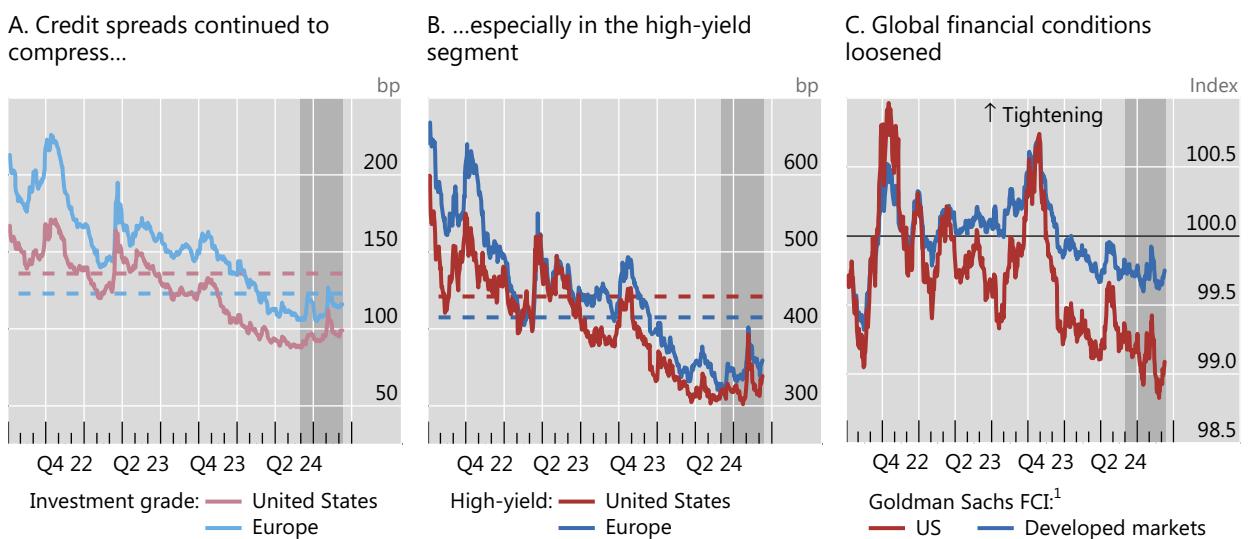
Yet another volatility flare-up, albeit on a much smaller scale, occurred at the beginning of September. Again, the repricing was triggered by disappointing macro releases, painting a gloomier outlook for the US economy. This underscores just how hypersensitive markets have become to growth-related news surprises and the associated revisions to expectations of the policy stance ahead.

In contrast to equity markets, volatility in credit markets remained subdued and conditions generally benign. Credit spreads on both investment grade and high-yield corporate bonds did widen somewhat in both the United States and Europe, but from quite compressed levels, and remained tight by historical standards (Graphs 5.A and 5.B). At the same time, broad measures of financial conditions remained in easy territory in advanced economies (Graph 5.C).

Relatively benign borrowing conditions and tight credit spreads encouraged firms to tap primary bond markets. Not least, issuance in the junk segment rose to pre-pandemic levels (Graph 6.A). In parallel, the tightening cycle of bank lending standards appeared to be nearing an end (Graph 6.B). Corporate default rates continued to decline, underpinning a broader easing of borrowing conditions (Graph 6.C). That said, in some segments of the US consumer credit market, such as credit cards and auto loans, delinquency rates rose further, raising questions about late cycle risks.

Credit markets pulled ahead

Graph 5



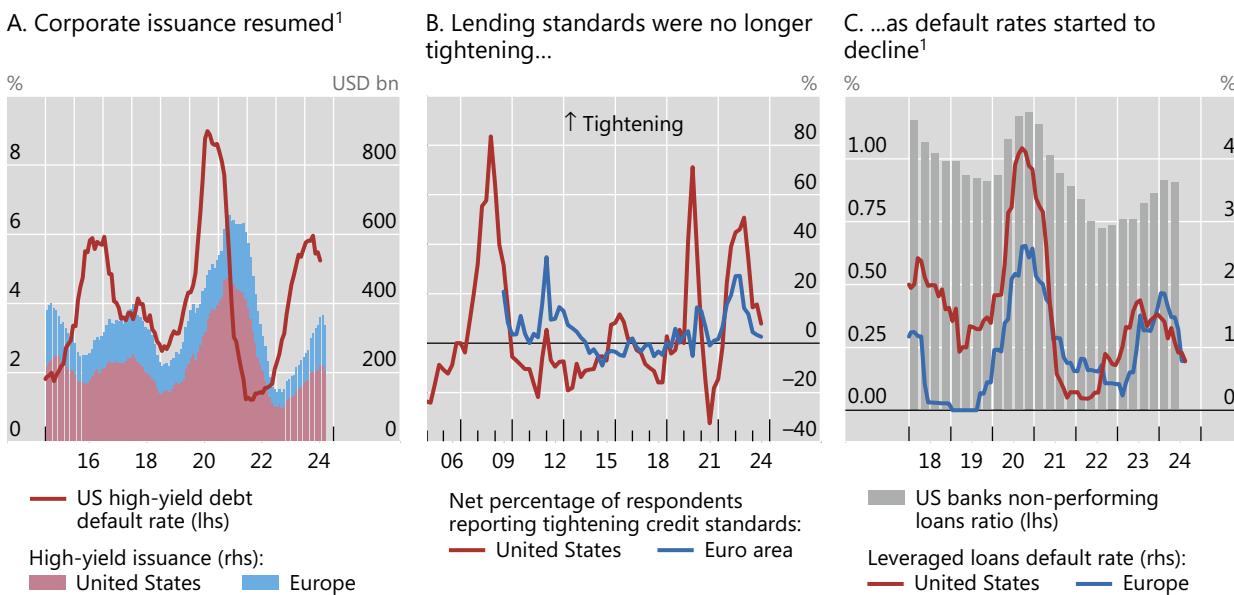
The shaded area indicates 1 June 2024–6 September 2024 (period under review). The horizontal dotted lines indicate 2005–current medians.

¹ A value of 100 indicates average conditions. A higher (lower) value indicates tighter (looser) conditions.

Sources: Goldman Sachs Global Investment Research; ICE Data Indices; BIS.

Corporate issuance resumed and bank lending no longer tightened

Graph 6



¹ See technical annex for details.

Sources: Board of Governors of the Federal Reserve System; BankRegData; Dealogic; LSEG Datastream; Moody's; PitchBook | LCD; BIS.

EMEs withstand spillovers but face macro headwinds

EME financial markets were also tested by the bouts of volatility and carry trade unwinding. A number of higher-yielding EME currencies depreciated, especially in Latin America, and the contagion reverberated through Asian currency and equity markets. Overall, EME financial markets managed to withstand the turbulence. At the same time, a weakening growth outlook and political uncertainty in some countries also gave rise to headwinds, prompting some central banks to ease their policy stance. This was also facilitated by an easier policy stance expected in major advanced economies. Chinese financial markets remained depressed, continuing to reflect domestic macroeconomic and financial woes.

Investment currencies popular with carry traders, such as the Mexican peso and Brazilian real, underwent bouts of depreciation amid de-risking episodes in late July and early August (Graph 7.A). The peso also fell steeply in June amid political uncertainties (see below). On a risk-adjusted basis, with a narrowing interest rate differential and a rise in volatility, Latin American currencies largely lost their appeal to currency speculators, as can be gleaned by falling carry-to-risk ratios (Graph 7.B).

In contrast with Latin American currencies, some emerging market Asian currencies appreciated noticeably during the August event. Most notably, the appreciation of the offshore yuan (CNH) was similar to that exhibited by the more traditional carry-trade funding currencies (eg the yen and the Swiss franc). For speculators, CNH had become a popular currency to short vis-à-vis higher-yielding regional currencies such as the Indonesia rupia and the New Taiwan dollar. As many Asian EME currencies have limited convertibility and are traded using non-deliverable instruments, the associated speculative bets mainly involved instruments such as currency options: CNH options-trading volumes ballooned in the run-up to the carry unwind (Graph 7.C).

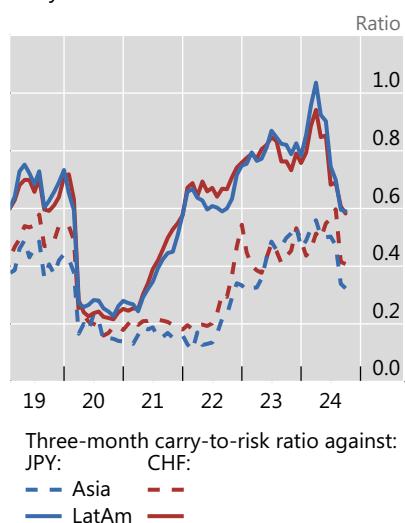
EME currency markets were hit by bouts of carry trade unwinding

Graph 7

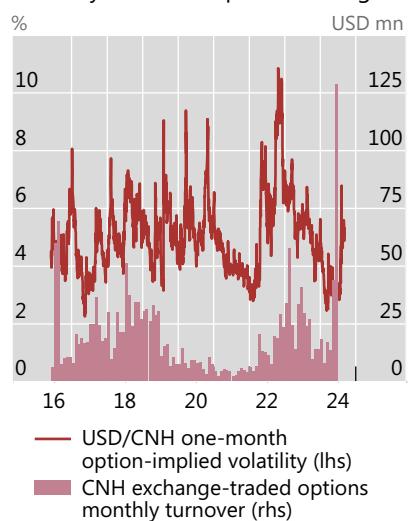
A. Higher-yield EME currencies went through bouts of depreciation...



B. ...and became less attractive for carry trades¹



C. Offshore yuan was used in currency bets with options strategies



The shaded area indicates 1 June 2024–6 September 2024 (period under review).

¹ See technical annex for details.

Sources: Bloomberg; JPMorgan Chase; LSEG Datastream; Macrobond; BIS.

EME equity markets were also tested by volatility spillovers originating from advanced economies. Asian markets were particularly exposed to the Japanese equities-led contagion on 5 August. The MSCI AC Asia Pacific Index saw its worst drop since 2023 (Graph 8.A). Stock indices of tech-heavy Asian economies were most affected, with the Taiex of Chinese Taipei seeing the biggest drop in over 30 years and Korean Kospi experiencing the worst decline since the 2008 Great Financial Crisis.

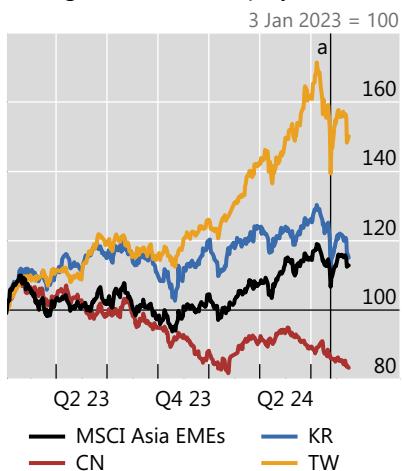
On top of the spillovers of the early August turbulence, EME financial market developments reflected ongoing macroeconomic challenges. Key sources of tensions were the mounting risks of a global slowdown. Slowing domestic growth also weighed on financial markets in some economies, such as China and Mexico. And in some countries, macroeconomic challenges were compounded by domestic political woes. For instance, the Mexican peso depreciated in June, following the surprisingly large victory margin of the ruling party, and further in August, with the scale of the announced potential constitutional and legal reforms. The Thai baht, in turn, dropped amid fiscal woes ignited by a change in government.

An easier expected policy stance in major advanced economies facilitated a turn towards policy easing across EMEs. Falling US government bond yields relative to local currency yields, as evidenced by the rise in five-year yield spreads (Graph 8.B), led to receding risks of depreciation and capital outflows. In countries where disinflation had progressed, central banks had already entered an easing cycle or were eyeing it. As a notable exception, investors increasingly expected the Central Bank of Brazil to hike rates, amid robust output and a challenging “last mile” in the fight against inflation.

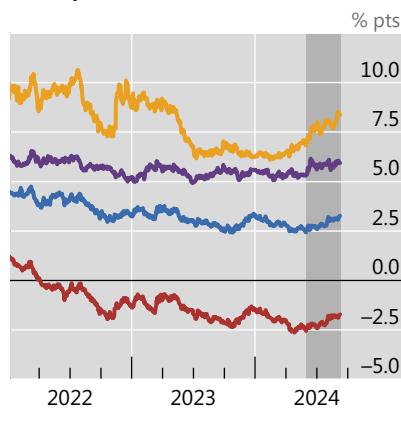
EMEs faced headwinds from the equity markets and idiosyncratic macro risk

Graph 8

A. The turbulence reverberated through some Asian equity markets



B. EME bonds turned more attractive as US yields fell



C. Bond yields in China continued to fall



The shaded area indicates 1 June 2024–6 September 2024 (period under review).

^a Turbulence in the Japanese equity market (5 August 2024).

Sources: Bloomberg; LSEG Datastream; Macrobond; BIS.

Investors were left with some overall question marks regarding the economic situation of China. Mainland Chinese markets did not move in tune with other EMEs and continued to face domestic macroeconomic and financial challenges. Government bond yields in China reached record lows and remained under downward pressure due to a slowing economy, falling prices and the associated policy easing. Furthermore, private savings had been increasingly channelled into Chinese government bonds, amid the shrinking set of attractive investment alternatives with faltering credit growth and a lacklustre stock market. Against this backdrop, Chinese authorities reportedly intervened in the bond market to try to put a floor under falling yields, as the latter approached 2% in August (Graph 8.C).

Sizing up carry trades in BIS statistics

Patrick McGuire and Goetz von Peter^①

Tracking the size of carry trades and the entities involved is notoriously difficult. While BIS statistics record total amounts of yen borrowed from banks or via foreign exchange (FX) derivatives, they do not reveal specific uses – the carry trade being just one of many. This box explains how these statistics can provide some rough indicators of carry trade activity. The figures should be interpreted with care given data gaps and the assumptions used.

A carry trade is a leveraged cross-currency position designed to take advantage of interest rate differentials and low volatility. The strategy involves borrowing funds at a low interest rate in one currency (the funding currency) and buying a higher-yielding asset in another (the target currency). In recent years, low interest rates for the Japanese yen relative to other currencies have made the yen a funding currency of choice (Box C). The use of leverage makes these positions sensitive to changes in exchange rates, interest rates and volatility.

There are several ways to implement a carry trade, each with different implications for what can be seen in international statistics. The textbook case involves borrowing the funding currency, selling it spot and investing the proceeds in an asset denominated in the target currency. This is recorded as debt (eg bank loans) owed in the funding currency. The more common approach used by hedge funds and other speculators relies on derivatives – eg FX forwards, swaps and options – to establish an open forward payment obligation in the funding currency. An outright forward position to deliver yen at maturity is a bet on yen depreciation. Borrowing yen in an FX swap to sell yen spot is an attractive alternative, given the depth of FX swap markets. Since the use of derivatives requires no on-balance sheet borrowing of the funding currency, it is difficult to trace the trade in the statistics.

Despite these limitations, the BIS international banking statistics (IBS) and over-the-counter (OTC) derivatives statistics shed some indirect light on carry trade activity. This is because they provide a currency breakdown of banks' on-balance sheet positions and of outstanding amounts in FX derivatives markets, respectively. Consider on- and off-balance sheet yen borrowing in turn.

The IBS show a sustained rise in on-balance sheet yen borrowing over the past few years, an increase that may – but need not – be linked to carry trades. Banks' yen-denominated claims – which include loans, holdings of debt securities and derivatives with a positive market value – on non-banks resident outside of Japan reached \$880 billion, or ¥133 trillion, in Q1 2024 (up from ¥110 trillion in Q4 2021). The bulk of these claims are on borrowers in the Cayman Islands, mainly non-bank financial institutions (NBFIs). Special purpose vehicles located there issue debt securities purchased mainly by banks located in Japan. Such financing structures, however, have been in place for decades (Dixon (2001))^② and have shown modest growth of late, so that they may not be related to speculative carry trade positions. Banks' yen-denominated *loans* to non-banks outside of Japan have grown noticeably, in particular since mid-2021. Outstanding amounts rose from \$228 billion (¥25 trillion) in Q2 2021 to \$271 billion (¥41 trillion) in the most recent data for Q1 2024. (The depreciation of the yen between then and Q2 2024 would put that value at roughly \$250 billion.) These loans were mainly to borrowers located in the United Kingdom, the Cayman Islands and the United States. Without more detailed data, however, it remains unclear whether this relates to carry trades.

What about information gleaned from the BIS derivatives statistics, the instrument more likely to be involved in carry trades? These statistics show that the notional value of outstanding FX swaps, forwards and currency swaps with the yen on one side has grown to \$14.2 trillion (¥1,994 trillion) by end-2023, up 27% in yen terms since end-2021 (Graph D1.A).^③ FX swaps and outright forwards drove this growth (red shaded area). The bulk of these are used for hedging and liquidity management, but they can also be used for speculative purposes (Borio et al (2017, 2022)).^④ While nearly half of the outstanding FX swaps and outright forwards are with "non-dealer financial institutions" (red line), which includes non-reporting banks and NBFIs, the share specifically related to speculative activity is likely to be much lower. For example, using counterparty turnover data, Aquilina et al (2024)^⑤ estimate hedge fund FX forward positions to have been about \$160 billion.

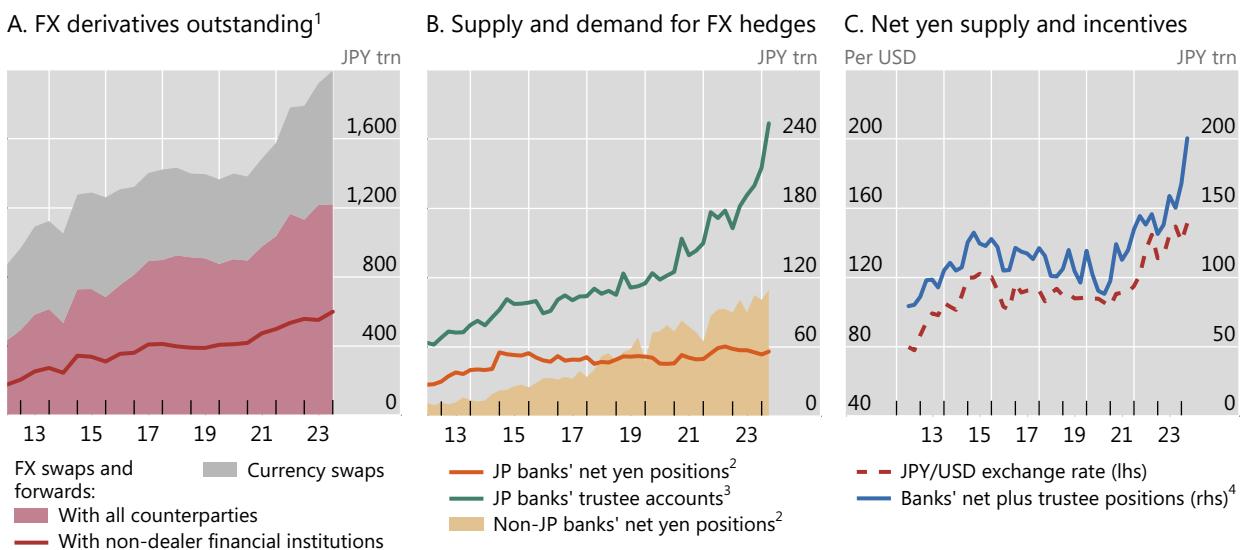
An alternative approach to assessing carry trades via FX derivatives is based on the IBS, which provide an

*indirect and incomplete view of positioning in the markets for FX derivatives. These statistics track banks' net on-balance sheet positions in major currencies, which in turn reveal their net positions in FX derivatives under the assumption that they do not run large open currency positions. This is a reasonable assumption because of supervisory guidance (BCBS (1980, 2020)).*⑥ If so, any open on-balance sheet position must be offset by a corresponding off-balance sheet position. For example, a bank with a yen funding base can exchange yen for dollars via an FX swap to purchase a dollar asset; the offsetting on- and off-balance sheet positions shield the bank from exchange rate movements for the duration of the FX swap since the exchange rate at which it is unwound is set in advance. Currency mismatches in banks' on-balance sheet positions are thus indicative of their (unobserved) net positions in FX derivatives.

To a large extent, banks from different currency areas offset each other's FX derivatives positions. For example, Japanese banks are natural suppliers of yen via FX derivatives (Graph D1.B, orange line): they have a domestic yen deposit base but hold portfolios of foreign currency assets and use FX swaps to hedge the currency risk. Non-Japanese banks in turn absorb much of this supply by providing dollars and other currencies in exchange for yen via FX derivatives. They do so to hedge their own yen-denominated asset portfolios and, since the Great Financial Crisis, to take advantage of the cross-currency basis trade (Kloks et al (2023)).^{⑦,⑧} Their net yen assets, and hence their estimated net yen borrowing via FX derivatives, has grown threefold since 2017, surpassing the net supply of yen from Japanese banks (shaded area minus orange line).

Off-balance sheet positions in Japanese yen

Graph D1



¹ Outstanding FX swaps, outright forwards and currency swaps with the yen on one side (notional value), corrected for inter-dealer double-counting. Non-dealer financial institutions include non-reporting banks and non-bank financial institutions. ² See Kloks et al (2023) for derivation. ³ Foreign currency holdings in trustee accounts managed by Japanese banks on behalf of third parties, assuming that 80% of the total is hedged for currency risk. ⁴ The difference between the estimated supply of yen (green line plus orange line in Graph D1.B) and the observed bank demand for yen (tan shaded area).

Sources: Bank of Japan; Bloomberg; JPMorgan Chase; LSEG Datastream; BIS international banking statistics; BIS OTC derivatives statistics; BIS Triennial Central Bank Survey; authors' calculations.

Non-banks also use FX derivatives, but here the picture provided by the IBS is far less complete. These statistics capture only the assets in "trustee accounts" managed by Japanese banks on behalf of third-party investors (ie not on Japanese banks' balance sheets); they do not capture those of other non-banks around the world. Even so, assets in these trustee accounts, which totalled \$2.7 trillion at end-Q1 2024, imply a supply of yen in FX derivatives when they are hedged for currency risk. More than three quarters of the total amount is denominated in currencies other than the yen, and the bulk is likely to be in debt instruments. Assuming 80% of these holdings are hedged for currency risk, an estimate of the supply of yen via FX derivatives reached \$1.7 trillion (¥254 trillion) at end-Q1 2024 (Graph D1.B, green line). If only 60% were hedged, the amount would fall

to near \$1.3 trillion (¥190 trillion). Other institutional investors in Japan that hold foreign currency asset portfolios on a (partially) hedged basis would add to the supply of yen in FX derivatives, as would corporates outside of Japan that issue yen-denominated bonds on a hedged basis. Unfortunately, these positions are not observable in BIS statistics.

Combining the observable elements – the trustee positions and banks' own use of FX derivatives – yields a time-varying, albeit incomplete, measure of the net supply of yen available for other players in the FX derivatives market. The blue line in Graph D1.C is the difference between the estimated supply of yen (green line plus orange line in Graph D1.B) and the observed bank demand for yen (tan shaded area). Market clearing requires that other, unobserved non-bank market participants absorb this supply. These could include institutional investors outside Japan that hold yen-denominated assets on a hedged basis as well as speculative investors seeking to engage in carry trades by borrowing yen. If the latter transaction involves a subsequent spot sale of yen, to bet on yen depreciation, it can put downward pressure on the currency.

The co-movement between the measure of net yen supply and the USD-JPY exchange rate suggests that speculative investors may indeed have been involved (Graph D1.C). The measure rose by ¥66 trillion between end-2021 and Q1 2024, or \$435 billion at Q1 2024 exchange rates, coinciding with a significant depreciation of the yen (red-dashed line) and rising incentives for engaging in carry trades (see main text).⑨

The IBS alone reveal little more than an indirect picture of the global dealer banks that sit between the various types of non-banks with positions in FX derivatives. Better data on the users of FX derivatives and their positioning in these markets are needed for a more complete picture. To this end, the BIS is working with the Committee on the Global Financial System to enhance the OTC derivatives statistics. Such data would complement other market indicators and flow data (see Box C) in the monitoring of carry trades.

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. ② See L Dixon, "Financial flows via offshore financial centres as part of the international financial system", Bank of England, *Financial Stability Review*, no 10, June 2001, pp 105–116. ③ The figures expressed in Graph D1.A are reported semiannually in US dollars and have been converted to yen using end-of-period exchange rates. ④ See C Borio, R McCauley and P McGuire, "FX swaps and forwards: missing global debt?", *BIS Quarterly Review*, September 2017, pp 37–54; and C Borio, R McCauley and P McGuire, "Dollar debt in FX swaps and forwards: huge, missing and growing", *BIS Quarterly Review*, December 2022, pp 67–73. ⑤ See M Aquilina, M Lombardi, A Schrimpf and V Sushko, "The market turbulence and carry trade unwind of August 2024", *BIS Bulletin*, no 90, August 2024. ⑥ See Basel Committee on Banking Supervision (BCBS), *Supervision of banks' foreign exchange positions*, August 1980; BCBS, "Definitions and application of market risk (MAR 11)", *Basel Framework*, March 2020; and BCBS, "Simplified standardised approach" (MAR 40), *Basel Framework*, July 2024. ⑦ See P Kloks, P McGuire, A Ranaldo and V Sushko, "Bank positions in FX swaps: insights from CLS", *BIS Quarterly Review*, September 2023, pp 17–31. ⑧ This trade is an FX swap of US dollars for yen, typically with Japanese investors that hold dollar portfolios. Non-Japanese banks may then park the yen proceeds from the FX swap in safe yen assets (eg reserves at the Bank of Japan or Japanese government bonds), leaving them with a hedged position (Kloks et al (2023)). ⑨ Allowing the assumed hedge ratio of 80% for the trustee holdings (Graph D1.B, green line) to fall by a full 10 percentage points between end-2021 and Q1 2024 does not materially change this relationship.

Technical annex

Graph 4.A: FX carry trade index (G10) = Bloomberg Cumulative FX Carry Trade Index for Managed G10 Currencies. Nikkei volatility index = The Nikkei Stock Average Volatility Index (Nikkei 225 VI), which is calculated by using prices of Nikkei 225 futures and Nikkei 225 options on the Osaka Securities Exchange.

Graph 4.B: 5 February 2018 is a known episode when the jump in the VIX was amplified by the covering of leveraged and inverse volatility trades.

Graph 4.C: Global FX volatility index = JPMorgan Global FX Volatility Index.

Graph 6.A: US high-yield debt default rate based on Moody's 12-month rolling US speculative grade default rates. High-yield issuance based on a 12-month rolling sum.

Graph 6.C: Twelve-month rolling leveraged loan default rates based, respectively, on Morningstar LSTA US Leveraged Loan Index (LLI) and Morningstar European Leveraged Loan Index (ELLI).

Graph 7.B: For JPY, Asia = CNY, HKD, IDR, INR, MYR, PHP, SGD and THB; while LatAm = ARS, BRL and MXN. For CHF, Asia = HKD, IDR, SGD and THB; while LatAm = BRL and MXN.

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Shifting landscapes: life insurance and financial stability¹

The past decade's low rate environment challenged traditional life insurers' business models and has been a catalyst for ongoing shifts in the sector. To sustain profitability, life insurers have increased exposures to riskier and less liquid asset classes. Some have also offloaded risks through complex reinsurance agreements, often to offshore centres, partly with an eye to economising on capital. Private equity firms have been a driving force behind these trends. They have funnelled investment into private markets by acquiring or partnering with life insurers or assuming insurance portfolios through affiliated reinsurers. While more diversified investments and greater risk-sharing can, in principle, support insurers' resilience, losses in private markets could propagate risks across an increasingly interconnected and complex insurance landscape.

JEL classification: G22, G28, G32.

The life insurance and annuity ("life insurance") sector plays a pivotal role in the financial landscape. Life insurers provide financial protection and savings products to households and represent a key source of funding for governments and the real economy. In 2022 they managed total assets of about \$35 trillion, around 8% of global financial assets, up from \$14 trillion two decades ago (FSB (2023)).

During the era of exceptionally low interest rates, from the aftermath of the Great Financial Crisis (GFC) until late 2021, life insurers' traditional business model encountered significant challenges. Low rates undermined the sustainability of legacy insurance policies that promised high guaranteed rates of return. Furthermore, subsequent reductions in guarantees, introduced to mitigate pressure on returns, damped demand for new policies.

Pressure on traditional business lines contributed to reshaping the life insurance landscape by accelerating two interrelated trends (eg IAIS (2023, 2022)). First, by reducing profit margins, low rates intensified insurers' efforts to develop risk-sharing strategies to cut costs and economise on capital. These efforts spurred the transfer of risks to affiliated or non-affiliate insurers, often located in offshore centres, and insurers' divestment from traditional business lines (eg policies offering guarantees).

¹ The views expressed are not necessarily those of the BIS or the International Association of Insurance Supervisors (IAIS). We thank Ilaria Mattei as well as Giulio Cornelli, Sjur Nilsen and José Maria Vidal Pastor for excellent research assistance. For helpful comments, we are also grateful to Matteo Aquilina, Claudio Borio, Nicolas Colpaert, Gaston Gelos, Dieter Hendrickx, Laura Languedoc, Benoît Mojon, Frank Packer, Romain Paserot, Gabor Pinter, Andreas Schrimpf, Hyun Song Shin, Nikola Tarashev and Daniel Weijand. All remaining errors are ours.

Key takeaways

- *Years of exceptionally low interest rates accelerated ongoing trends in the life insurance sector, raising insurers' exposure to more risky and less liquid assets.*
- *Offshore reinsurance, potentially leveraging regulatory differences across jurisdictions, has surged in some regions, leading to an increasingly interconnected and complex life insurance landscape.*
- *Private equity firms have been a driver of these trends by facilitating insurers' investment in private markets and acquiring insurance portfolios through affiliated reinsurers.*

Second, by intensifying investors' search for yield, low rates underpinned the growth of private markets. Life insurers increasingly invested in these markets to raise and diversify returns, investing in riskier and less liquid assets. These trends have continued, and are poised to continue, even as higher interest rates have mitigated pressure on profit margins.

Private equity (PE) firms have been a driving force behind these trends. By acquiring or partnering with insurers, these firms have been instrumental in channelling insurers' investments into private markets and other alternative asset classes. PE firms have also contributed to insurers' rising reliance on asset-intensive reinsurance (AIR). In these complex reinsurance agreements, life insurers fully or partly owned by PE firms ("PE-linked life insurers")² assume part of the liabilities from other life insurers in exchange for the assets backing them.

The entry of PE firms has provided an additional source of capital to the life insurance sector but the associated changes to insurers' business models also raise risks. These risks are more likely to materialise in the higher interest rate environment that has followed the recent global inflation flare-up. Over the past decade, PE firms have made significant investments in the insurance sector and have relied on their investment expertise to boost insurers' profitability. This has mitigated the impact on policyholders of traditional life insurers' divestment by allowing insurers to offer their policies at more attractive prices. However, life insurers' increased exposure to more risky and illiquid assets raises the risk of losses and vulnerability to sudden liquidity needs, while growing reliance on AIR raises concerns about interconnectedness and complexity.

This special feature discusses the above trends in the life insurance sector. The next section introduces the basic components of life insurers' balance sheets and sketches the mechanism through which low interest rates harm insurance companies' profitability. The second lays out how life insurers have employed AIR to offload risks, thereby addressing their profitability and capital challenges. The third section assesses PE firms' expanding footprint in the life insurance sector, including through reliance on AIR and increasing exposure to private markets. The fourth section discusses related concerns for financial stability, before laying out some concluding considerations.

² For the purposes of the analysis in this special feature, PE-linked life insurers are defined as insurers which operate predominantly in the life and annuity business and in which PE firms have a controlling stake. Data on PE firms' ownership has been sourced from S&P Capital IQ Pro and authors' compilations based on market reports, company filings, public announcements and news articles.

Life insurers' profitability and interest rates – a primer

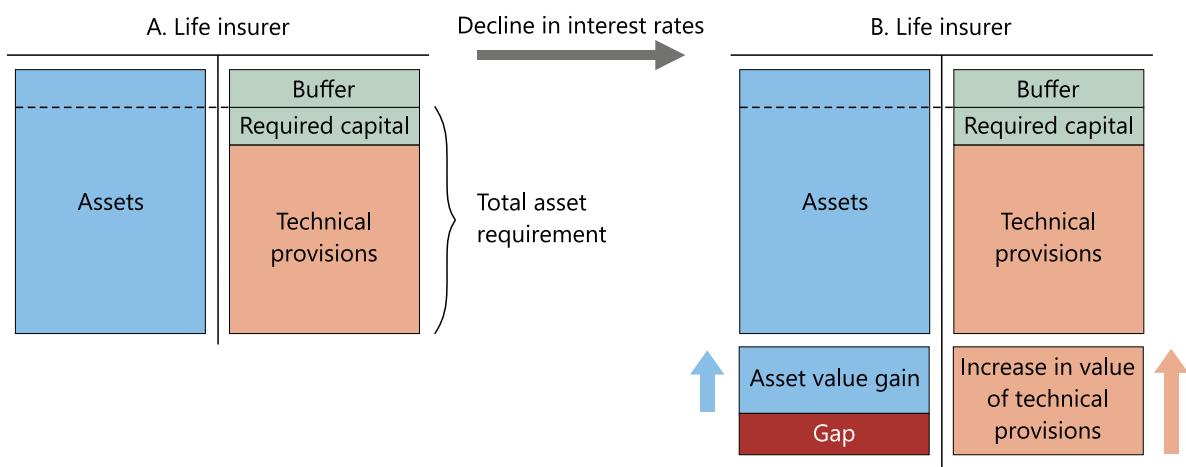
Life insurance companies offer a range of contracts (insurance policies) that allow policyholders to hedge primarily against the financial impact of mortality and longevity risk. Term life insurance, for example, offers financial protection against mortality risk by paying a benefit upon the death of the insured during the coverage period. Life fixed annuities, in turn, guarantee annuity payments for the lifetime of the policyholder to cover the financial risk associated with longevity.³

Policyholders agree to pay premiums for these insurance policies as determined in the contract. If a policyholder stops paying the agreed premiums, the insurer's future payment obligations are lowered or the policy lapses (ie it is no longer in effect). When initiating the contract, the insurer sets the premiums as a function of several factors: the actuarial value of the policy (ie the present value of expected future cash flows, including premiums, benefits and other policy-related payments), servicing costs, capital requirements and a profit markup (Kojien and Yogo (2016, 2023)). The collected premiums are pooled and invested in various financial instruments, such as bonds, stocks and real estate, which constitute the asset side of the insurer's balance sheet (Graph 1.A). These assets are managed with an eye to the insurer's liquidity and solvency, with an allocation that seeks to match the duration and cash flow characteristics of the liabilities.

"Technical provisions" represent the bulk of life insurers' liabilities (Graph 1.A). These provisions comprise so-called "policy reserves", which reflect the expected net present value of the policies, and other reserves or provisions that may be required

Life insurer's balance sheet and economic impact of interest rate decline¹

Graph 1



¹ See technical annex for details.

Source: Authors' elaboration.

³ Life insurers also offer other savings products such as term fixed annuities, which provide the holder with a fixed stream of cash flows for a predetermined number of years, or variable annuities with minimum return guarantees on the investments funding the annuity. Other products combine the savings and life insurance aspects, such as whole life insurance (which provides lifetime coverage and accumulates cash value) or expand the coverage to include health and disability risks.

by regulatory or accounting standards. Technical provisions and capital requirements often exceed the amount of funds received from the policyholder at the start of the life insurance policy. This is because life insurers must be able to meet any payment obligations as of the initiation of the contract while they typically receive premiums in instalments over the course of multiple years. Life insurers cover this gap using their own equity capital, which may require a substantial upfront commitment for some policies ("capital-intensive" business).⁴ Capital buffers are also held to cover unexpected losses. In this context, regulation plays an important role by determining minimum standards for the calculation of technical provisions, capital requirements (eg for credit risk and interest rate risk) and the investment policy to match liability cash flows.

The interest rate environment impacts the financial condition of life insurers in important ways. Life insurers are typically exposed to a decline in interest rates due to a negative duration gap (Farkas et al (2023b)): the duration of their assets is generally shorter than that of their liabilities. The duration gap fluctuates with movements in long-term interest rates due to negative convexity (eg Domanski et al (2017)). A fall in interest rates raises the value of the technical provisions by more than that of the assets.⁵ This leads to a gap on the asset side (Graph 1.B, red "gap") that depletes capital, even though accounting rules may shield insurers from having to recognise the loss immediately in the balance sheet (eg Ellul et al (2015)). In addition, persistently low interest rates reduce insurers' future revenue from new fixed income investments that they make to match their liabilities, weighing on life insurers' profit margins.

Accordingly, stock market valuations of many life insurers underperformed relative to the broader market throughout much of the low-for-long era. This put pressure on insurers to adjust their business models (Graph 2.A).

Adjustments to sustain return-on-equity focused on intensifying efforts to reduce technical provisions and economise on capital, especially for capital-intensive businesses. In this context, some life insurers have increased offerings of unit-linked products,⁶ which shift the investment risk to the policyholders and reduce technical provisions while generating fee-based income ("capital-light" business). Importantly, some have also relied on AIR.

⁴ Capital-intensive or asset-intensive products are types of insurance products that require significant capital reserves or assets to support the associated liabilities.

⁵ Domanski et al (2017) provide empirical evidence that is consistent with German life insurers' balance sheets giving rise to negative convexity. In this case, the duration and value of the insurers' liabilities increases by more than that of their fixed income assets in response to a decline in interest rates. As a result, insurers that aim to adjust the duration gap to its initial level may engage in procyclical trading and buy fixed income assets when the prices of these assets increase.

⁶ Unit-linked products combine life insurance coverage with investment services. When a unit-linked product is purchased, only a fraction of the premium is used to obtain life insurance coverage. The remainder is invested in fund shares ("units"). The policyholder bears the associated investment risk since the value of the investment depends on the units' performance. From the insurers' perspective, the value of the assets and liabilities associated with these products is highly correlated and thus requires very little regulatory capital.

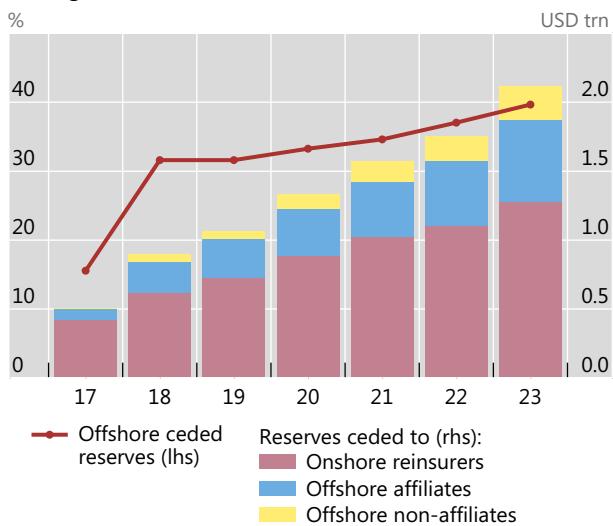
Pressure on insurers' stock prices and surge in reinsurance activity¹

Graph 2

A. Low-for-long weighs on insurers' market valuations



B. Surge in risks shifted offshore²



¹ See technical annex for details. ² Data for the United States. An affiliate is an entity within the same holding company system or a party that is controlled by the reporting entity.

Sources: Bloomberg; S&P Capital IQ; company filings; authors' calculations.

Asset-intensive reinsurance – risk-sharing and other incentives

AIR – also sometimes referred to as “funded reinsurance” – seeks to free up capital of life insurers by transferring risks associated with capital-intensive policies to other insurers. Under an AIR agreement, the reinsurer (ie the insurer providing reinsurance) assumes all risks from the cedant (ie the insurer obtaining reinsurance). These risks comprise those inherent in the issued policies (eg mortality, longevity, contractual guarantees)⁷ and those related to the assets (eg credit risk, market risk) that back the policies. Following mutually agreed investment guidelines, the reinsurer manages the assets, which are typically held in a custody account and pledged as collateral to the cedant.⁸

Consistent with life insurers’ incentives to divest from capital-intensive business, reinsurance activity has grown significantly in major insurance markets over the past decade (IAIS (2023), Moody’s (2023)). In the United States, where detailed data are available, major life insurers had ceded reserves to the tune of \$2.1 trillion at end-2023, roughly equivalent to no less than one quarter of their total assets, and up from around \$500 billion in 2017 (Graph 2.B). Around 40% of ceded risks were assumed by reinsurers in offshore centres, nearly three times the share reported in 2017 (see also Graph 5).

⁷ From the insurer’s perspective, mortality risk refers to the potentiality of policyholders dying prematurely, while longevity risk relates to the potentiality of policyholders living longer than expected, impacting insurance liabilities.

⁸ The assets can also be held in a segregated account on the cedant’s balance sheet.

AIR can serve several objectives (IAIS (2023)). First, when the risk is transferred across affiliates of the same group, it allows the group to centralise asset and capital management. This, in turn, can help cut costs and enhance operational efficiency. Moreover, groups may wish to bundle risks at entities that operate in financial hubs with significant insurance activity, helping the group in raising capital to support its reinsurance activities more efficiently.

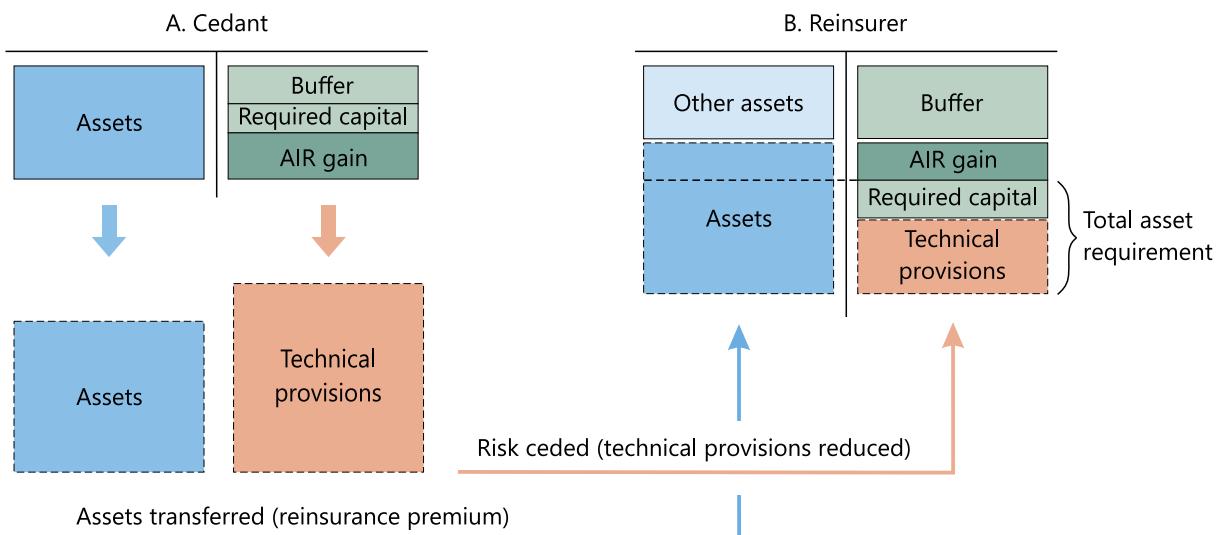
Second, cross-jurisdictional AIR can leverage differences in corporate and dividends taxation, valuation of technical provisions and capital requirements. An illustrative example lays out the mechanism. Building on the stylised balance sheet in Graph 1.A, consider a hypothetical life insurer that holds a block (portfolio) of life insurance policies, for which it books technical provisions and holds capital to meet regulatory requirements. The sum of technical provisions and capital requirements determines the amount of assets the insurer needs to hold to back these liabilities (so-called “total asset requirement”, see Graph 1.A). In some jurisdictions, as in the illustrative example, the regulatory framework may prescribe a lower valuation of technical provisions for the same block, due to lower assumptions on expected cash flows and/or a higher discount rate. In addition, regulation may also grant greater investment flexibility, imposing less stringent constraints on insurers with regard to investments in riskier assets with higher expected yields (eg American Academy of Actuaries (2024)). This, in turn, could also raise the discount rate applied to the calculation of technical provisions.⁹ Additionally, the reinsurer’s jurisdiction might mandate lower capital requirements.¹⁰

Under these assumptions, the cedant and reinsurer could agree on a transfer of assets and risks that creates a gain for both parties. The cedant transfers assets (reinsurance premium) that amount to less than the technical provisions associated with the block of policies (the dashed blue box is smaller than the dashed orange box for the cedant in Graph 3.A). This transfer also reduces the cedant’s required capital, although some capital will be necessary to protect against the counterparty credit risk arising from the agreement (the light green box for the cedant is smaller in Graph 3.A compared to Graph 1.A).¹¹ As a result, the cedant frees up some capital, which creates an “AIR gain” (the dark green box in Graph 3.A). The reinsurer, in turn, receives the assets, which exceed its total asset requirement because of the lower technical provisions (the orange box in Graph 3.B) and required capital (light green box in Graph 3.B) that apply in its jurisdiction. This difference creates an “AIR gain” for the reinsurer (dark green box in Graph 3.B).

⁹ Indeed, reinsurers to AIR agreements are typically domiciled in jurisdictions that allow insurance companies to make more favourable assumptions about the cash flows of the block. For example, the reinsurer could assume that policyholders are more likely to let the policy lapse, which would lead to the termination of the policy and decrease expected cash flows.

¹⁰ For internationally active insurance groups, a designated regulatory authority takes the lead for the group-wide supervision within the IAIS framework. This authority, following IAIS standards, is tasked with imposing supervisory requirements so that cross-border activities such as AIR do not undermine the protection of policyholders and the solvency or liquidity position of the ceding company.

¹¹ In practice, AIR agreements usually have several safeguards in place designed to ensure that reinsurers can meet payment obligations to the primary insurers’ policyholders. AIR agreements tend to be backed by collateral to mitigate counterparty risk. Additionally, the parties determine investment guidelines for the assets, such as portfolio limits for asset classes, collateral levels and valuation methods, credit enhancements and contract termination. Agreements can also be based on funds-withheld structures, whereby the assets remain with the primary insurer while allowing the reinsurer to change the asset allocation as per the agreed investment guidelines (eg Comerford et al (2020)).



¹ This stylised graph illustrates the basic mechanism of an asset-intensive reinsurance (AIR) agreement. The example assumes that the reinsurer (panel B) can book the technical provisions at a lower value than the original value booked by the cedant (panel A) due to, for example, a higher discount rate or reduced estimated cash flows associated with the underlying policies. This assumption does not hold for all AIR agreements.

Source: Authors' elaboration.

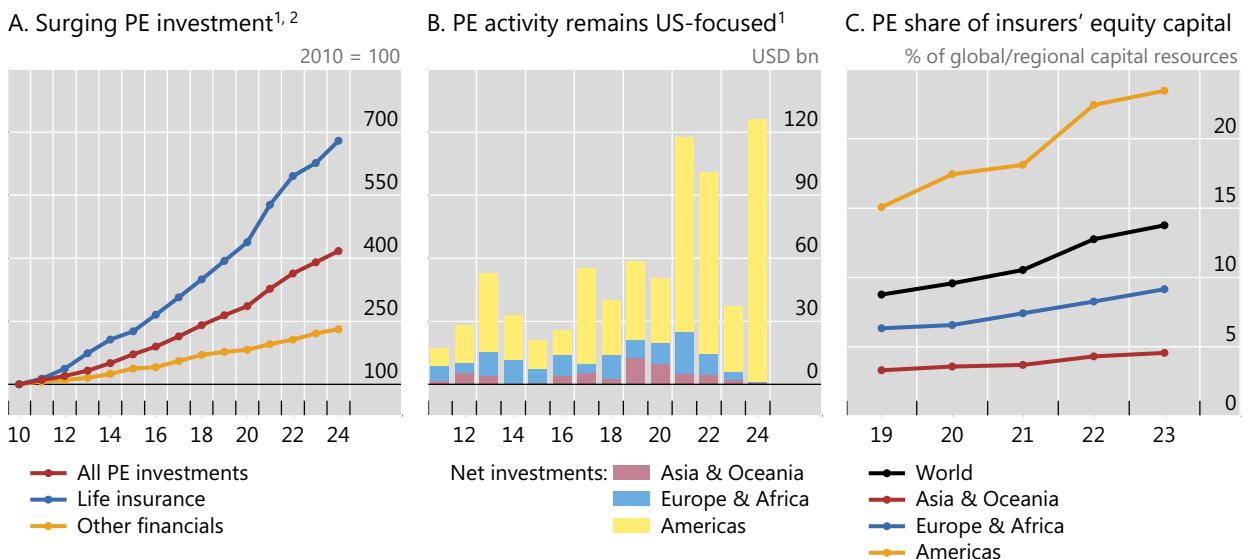
Third, AIR agreements can be motivated by the reinsurer's ability to generate higher returns on the assets that back the deal compared to the cedant. Reinsurers stress this greater ability as a key profit driver (IAIS (2023)). In this regard, AIR differs from more conventional reinsurance in the life insurance sector, which focuses on assuming mortality and longevity risks (ie is driven by the liability side) to leverage diversification benefits for the reinsurer. It is in this context that PE firms have greatly expanded their footprint in the life insurance sector.

Expanding footprint of private equity (PE) firms in life insurance

PE firms' investment in the life insurance sector has surged over the past 14 years. Cumulative investment has grown nearly sevenfold since 2010, outpacing by a large margin the growth rates of total PE investment in other firms, including financials (Graph 4.A). Investment activity has remained concentrated in the US market (Graph 4.B), consistent with the dominance of US-based PE firms (Cortes et al (2023)). Investment in other regions has expanded more gradually, with the share of PE firms' ownership of life insurers' equity still lagging behind the levels prevailing in the United States (Graph 4.C).

Private equity's expanding footprint in life insurance

Graph 4



PE = private equity.

¹ Data as of end-July 2024. ² Cumulative gross investment by private equity firms since 2010.

Sources: PitchBook Data Inc; IAIS sector-wide monitoring data; company filings; authors' calculations.

PE firms' entry into the insurance sector has followed different strategies. One strategy has been acquiring primary life insurers or an equity stake therein. Another has been to invest in existing reinsurers or establish new ones to take over blocks of policies, eg via AIR agreements. A third strategy is providing asset management and origination services in private markets for insurers to generate fee income. Some PE firms have also chosen combinations of these strategies (Swiss Re Institute (2024)).

A range of factors have driven PE firms' greater involvement in the sector. One, as discussed above, has been traditional life insurers' efforts to divest from their capital-intensive business, providing an ample supply of blocks of legacy policies to take over. Related to this, many life insurers' depressed stock market valuations offered attractive investment opportunities. At the same time, PE firms benefited from large inflows of funds, which, combined with cheap leverage, provided them with the financial capacity to invest at scale. The widespread search for yield, including by institutional investors such as life insurance companies themselves (Kaufmann et al (2024), Farkas et al (2023a)), strengthened this trend.

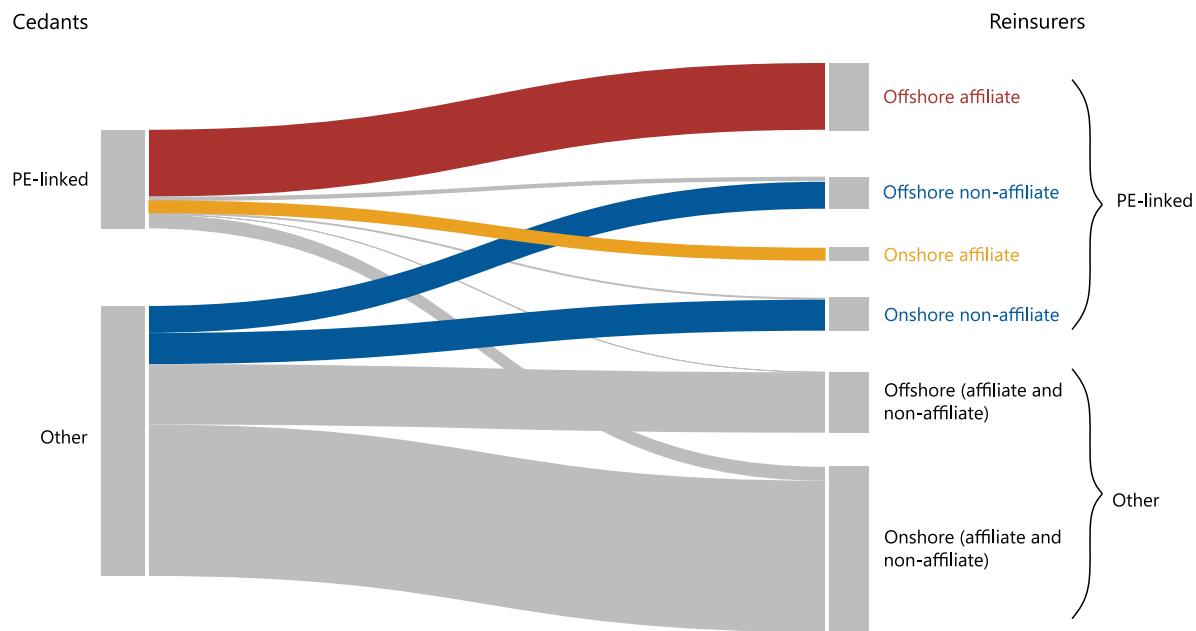
There are three main benefits to be gained by PE firms acquiring or partnering with life insurance companies. First, PE firms can channel the largely predictable cash flows from insurance premiums into assets originated by PE firms, such as structured credit, direct lending and infrastructure. For PE firms, this generates fixed income from fees related to originating and managing the assets. In line with this benefit, PE-linked insurers were twice as likely to invest in assets originated by PE firms compared to other insurers.¹²

Second, PE firms have proven more effective in exploiting opportunities arising from cross-jurisdictional differences in regulatory frameworks and corporate taxation

¹² Based on the authors' comparison of more than 21,000 private market deals from 2006 to mid-2024.

Risks moving to offshore reinsurers with links to private equity¹

Graph 5



PE = private equity.

¹ The graph illustrates the flow of ceded reserves ("technical provisions") from cedants in the United States (left-hand side) to reinsurers (right-hand side). See technical annex for details.

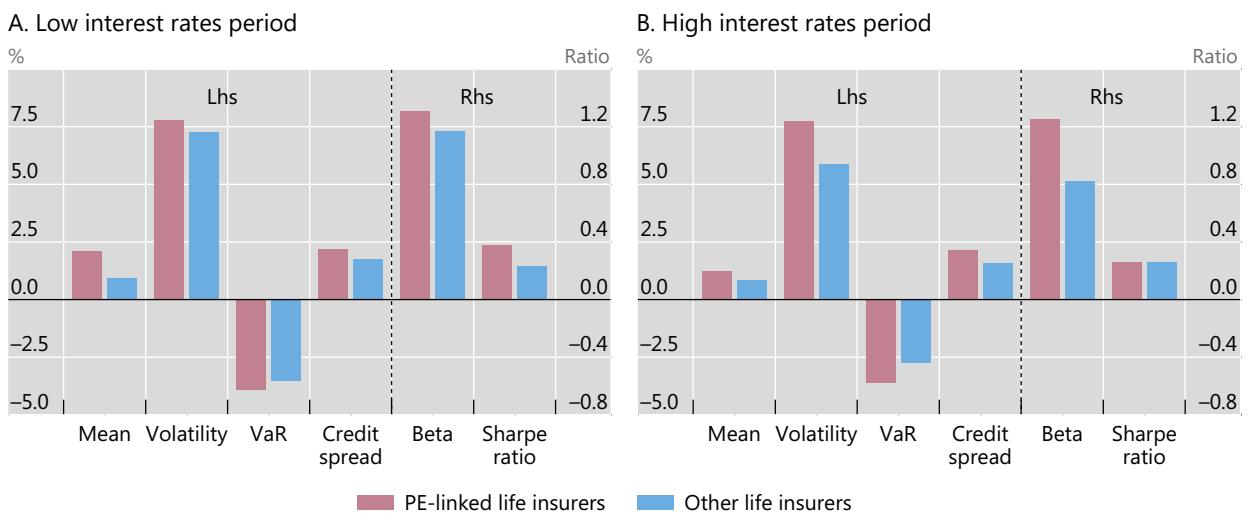
Sources: S&P Capital IQ; company filings; authors' calculations.

to boost life insurers' profits (Kirti and Sarin (2024)). One way to capitalise on these opportunities is by ceding risk from affiliated life insurance companies (ie entities that are part of the same group) to an affiliated reinsurance located in a jurisdiction with lower technical provisioning and capital requirements, or more favourable tax rules. Consistent with this, PE-linked life insurers in the United States had ceded risk to affiliated insurers equivalent to almost half of their total assets (or nearly \$400 billion) by the end of 2023, compared to less than 10% of total assets for other US life insurers. About two thirds of the risks ceded by PE-linked life insurers were assumed by affiliate reinsurers with links to PE located in offshore centres (indicated by the red flow in Graph 5 from *PE-linked cedants* to *offshore affiliate reinsurers*). Onshore affiliates assumed only about 10% (yellow flow from *PE-linked cedants* to *onshore affiliate reinsurers*). Other reinsurers, predominantly companies in onshore locations without links to PE firms, accounted for most of the remainder. Moreover, reinsurers with links to PE firms assumed more than 20% of the risks ceded by other US life insurers, of which half was moved offshore (blue flows from *other cedants* to *PE-linked offshore* or *onshore non-affiliate reinsurers*, respectively).

Third, PE firms can leverage their investment expertise and management capacity. This allows them to give a boost to life insurers' returns. They do so by directing their investment in often opaque private markets, where they have a comparative advantage in assessing credit and liquidity risks. In line with this, PE-linked insurers' investments are often less liquid and more difficult to value, with notably larger shares allocated to structured credit (IMF (2024), Cortes et al (2023)). Granted, these investments may be well suited to match the long-term commitments

Stocks of private equity-linked life insurers hurt by rise in volatility¹

Graph 6



¹ The indicators are based on equity prices for a sample of US life insurers. The low interest rate period is from February 2019 to February 2022, the high interest rate period from February 2022 to June 2024. See technical annex for details.

Sources: Bloomberg; company filings; authors' calculations.

to policyholders. Even so, valuation uncertainty could mask the accumulation of unrealised losses. Furthermore, elevated exposure to liquidity risk could raise these insurers' vulnerability to unexpected outflows. A prominent example was the self-reinforcing acceleration of surrenders that followed the rise in interest rates and resulted in the failure of a PE-linked European life insurer in early 2023 (BIS (2024)).

The ability of PE-linked life insurers to generate excess returns for their shareholders has depended on the interest rate environment. While interest rates were low, the mean returns of shares of PE-linked insurers were more than twice as large as those of their peers (Graph 6.A). Their risk-adjusted returns were also higher, with Sharpe ratios around 50% larger. However, PE-linked insurers had larger market betas, indicating higher exposure to market downturns.¹³ This is also consistent with their greater risk appetite and funding cost on their issued bonds as well as the assumption of higher tail risks, as indicated by their stock price VaR.

Accordingly, the higher risk of PE-linked insurers' assets started to become more visible when interest rates rose. In contrast to their peers, the volatility and betas of PE-linked insurers stayed elevated, and their risk-adjusted returns fell while still exhibiting larger tail risks (Graph 6.B).

Financial stability considerations

Life insurers' rising reliance on AIR, increased exposure to private markets and growing interconnections with PE firms raise several concerns for financial stability and challenges for supervision.

Reinsurance chains have become more complex. The life insurance sector has become more interconnected, with rising amounts of risks migrating across entities

¹³ This tallies with findings for US life insurance during the Covid-19 pandemic as analysed in Foley-Fisher et al (2023).

and jurisdictions.¹⁴ It has therefore become more difficult to assess how risks could propagate through the system, highlighting the importance of rigorous group-wide supervision, systemic risk analysis and international cooperation.

If unaddressed by group-wide supervision, cross-border AIR could raise particular challenges. For one, differences in legal or regulatory frameworks across jurisdictions could represent obstacles for cedants (who remain liable to policyholders) in recapturing assets if the AIR contract is terminated or the reinsurer fails.¹⁵ The reversion of assets and risks to the cedant also weakens its capital ratio as the agreement's capital relief is undone. And the cedant could be left with assets for which it lacks management capabilities or which do not comply with internal or regulatory requirements. Both these effects could prompt cedants to dispose of such assets at scale.

In addition, AIR agreements may result in the same amount of risk being backed by less capital and in riskier assets. Reinsurers that benefit from lower total asset requirements (recall Graph 3) enjoy a competitive advantage because they can offer lower reinsurance premiums. Moreover, reinsurers have an incentive to back the assumed blocks with assets that promise higher yields but are potentially riskier if they are allowed to use a discount rate for their liabilities that corresponds to these higher asset yields, thereby further lowering the present value of the technical provisions.

Risks could also arise from increasing concentration. The complexity of AIR suggests that these agreements are most economically viable when conducted at significant scale. As a result, AIR-related risks could be concentrated in a comparatively limited number of reinsurers and jurisdictions (IAIS (2023)). Yet, in sharp contrast to the diversification benefits derived from conventional life reinsurance by pooling mortality and longevity risk, returns on invested assets could prove highly correlated in the event of widespread market downturns.

Conflicts of interest, if unaddressed by robust governance frameworks, could raise additional risks. Such conflicts loom large where asset managers, including PE firms, have an incentive to allocate insurers' funds to assets they originate. The risks are magnified given the potential for strategic mispricing of illiquid and hard-to-value assets.

Some PE-linked life insurers' greater exposure to widespread market downturns could represent an additional risk for financial stability. To the extent that higher returns under favourable market conditions are predicated on gaining exposure to systematic risk, these insurers could face significant valuation pressures during times of stress.

Conclusion

The life insurance sector has undergone significant structural changes over the past decade. The migration of risks from life insurers' balance sheets and the increasing involvement of PE firms in some regions have sustained the sector's growth and

¹⁴ Interconnections also arise with other market participants, such as banks, which obtain insurance against losses (eg through synthetic risk transfers) from insurance companies.

¹⁵ Recapture refers to the process whereby the original insurer (cedant) reclaims the liabilities and the assets backing them. This can occur under specific contractual conditions or due to regulatory changes or the reinsurer's failure.

relieved capital constraints during a phase of significant challenges to traditional life insurers' business models, most notably when interest rates remained exceptionally low.

These developments have been underpinned by life insurers seeking opportunities to raise returns. Leverage in the system, while inherently challenging to measure, has increased. Insurance risk is now backed by fewer, less liquid and riskier assets. Although the growth of PE firms started on the back of the low rate environment, this expansion has continued even as rates have risen. PE activity, while still concentrated in some regions, has rebounded strongly in the past few years.

Policy challenges arise in various areas. Supervisory monitoring has become more complex owing to cross-border risk-sharing arrangements among or within large (re)insurance companies and their connections with PE firms. Gaps in data availability hinder this task further. These developments also underscore the importance of international supervisory cooperation and internationally agreed regulatory standards. Finally, the resilience of the private markets, which expanded rapidly under ample global funding conditions, remains to be tested. The higher tail risk of PE-linked insurers, coupled with greater investment in less liquid assets, suggests that these firms could prove more vulnerable than peers in difficult market conditions.

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Technical annex

PE = private equity.

Graph 1: This example illustrates a stylised life insurer balance sheet and the impact of a decline in interest rates on its economic value. The illustration abstracts from accounting rules or regulatory requirements, which can affect the recognition of valuation gains and losses in practice. It also abstracts from changes in capital requirements resulting from a decline in interest rates.

Graph 2.A: Data up to mid-2024.

Graph 2.B: Following Koijen and Yogo (2016), reserves (technical provisions) ceded to reinsurers are approximated by the sum of US life insurers' reserve credit taken and modified coinsurance reserves. The sample includes all reinsurance relationships involving coinsurance arrangements associated with annuities, life insurance and long-term care insurance policies. The classification of offshore financial centres is based on Groups II and III from IMF (2000).

Graph 5: The graph distinguishes flows between (i) PE-linked life insurance companies in the United States and other US life insurers that cede the reserves; (ii) reinsurers with links to PE and other reinsurers; (iii) reinsurers affiliated or not affiliated with the cedant that assume the reserves; and (iv) reinsurers located in onshore and offshore financial centres, respectively. Following Koijen and Yogo (2016), reserves (technical provisions) ceded to reinsurers are approximated by the sum of US life insurers' reserve credit taken and modified coinsurance reserves. The sample includes all reinsurance relationships involving coinsurance arrangements associated with annuities, life insurance and long-term care insurance policies. The sample comprises major life insurers, which together account for 90% of the total assets of the US life insurance sector. The classification of offshore financial centres is based on Groups II and III from IMF (2000). Affiliates are entities within the same holding company system or a party that is controlled by the reporting entity.

Graph 6: Based on a sample of 93 US life insurance companies, of which 16 were categorised as linked to PE firms. Beta is with respect to the S&P 500 index. Value-at-risk (VaR) is 5% historical VaR calculated from stock prices. Credit spread is calculated from PE-linked and other life insurers' bonds outstanding.

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Deconstructing global trade: the role of geopolitical alignment¹

Globalisation is threatened as countries impose trade restrictions, especially against trading partners with large geopolitical differences. This feature gauges the impact of this development on trade flows using granular bilateral trade data across finely disaggregated sectors. We find that geopolitical distance – based on country votes at the United Nations – helps explain recent trade dynamics. The impact is sizeable: over 2017–23, we estimate that quarter-on-quarter trade volumes grew around 2.5% more slowly for geopolitically distant countries relative to those that were closer. We also assess how vulnerable individual countries are to an intensification of geopolitical tensions.

JEL classification: F13, F14, F15, F51, F60.

The slowdown in global trade, which intensified following Russia's invasion of Ukraine, has highlighted threats to globalisation. Since the end of the Second World War, the global economy has become increasingly integrated, with trade playing a central role. Increasing integration has been an engine of economic growth, allowing countries to specialise in the goods and services in which they have a comparative advantage. However, rising geopolitical tensions have fuelled concerns about a possible retreat from globalisation, sometimes called "deglobalisation". As an illustration, a popular measure of geopolitical risk based on press articles displays a noticeable spike around the time of the Russian invasion of Ukraine and has remained elevated thereafter (Graph 1.A). Meanwhile, the total value of global trade as a share of global GDP peaked soon after the invasion and has declined since (Graph 1.B).

In this special feature, we examine the relationship between geopolitics and trade flows. Specifically, we measure the geopolitical alignment between countries based on the degree to which they vote similarly at the United Nations (UN) and investigate how this is related to their trade dynamics between 2017 and 2023. Moreover, we assess individual countries' vulnerability in terms of imports and exports to any escalation in geopolitical tensions.

¹ We thank Ryan Banerjee, Claudio Borio, Julián Caballero, Gaston Gelos, Tirupam Goel, Marco Lombardi, Benoît Mojon, Frank Packer, Goetz von Peter, Andreas Schrimpf, Hyun Song Shin and Philip Wooldridge for helpful comments and suggestions. We are also grateful to Luca Iavarone, Berenice Martínez and Jimmy Shek for excellent research assistance. The views expressed are ours and do not necessarily reflect those of the Bank for International Settlements.

Key takeaways

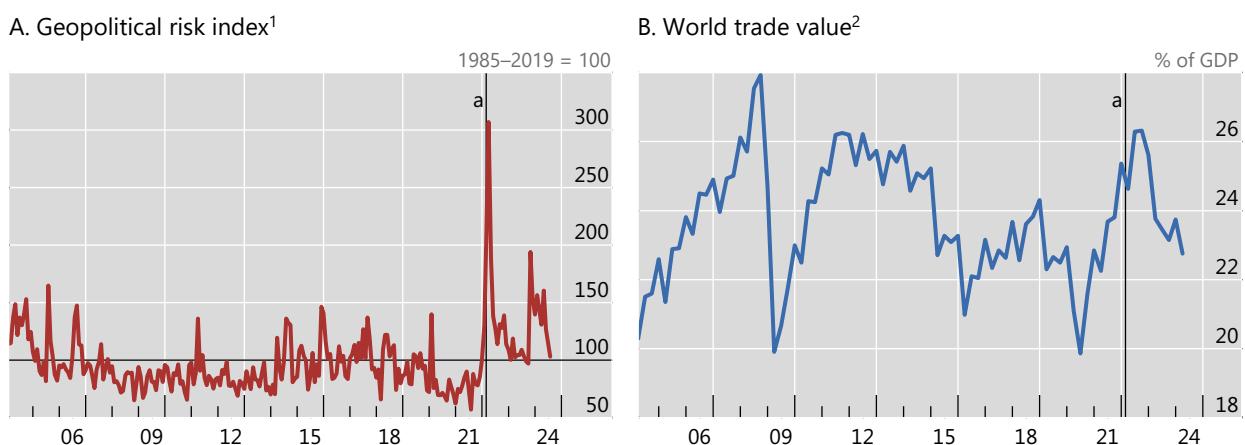
- *Geopolitical alignment influences trade volumes: we estimate that between 2017 and 2023 the quarter-on-quarter change in trade volumes was 2.5% lower on average between geopolitically distant countries relative to those that were closer.*
- *By contrast, the sensitivity of trade prices to geopolitical alignment was limited overall.*
- *Managing trade risks from geopolitics is challenging: the countries most reliant on geopolitically distant trading partners tend to have limited alternatives for diversion.*

We focus on trade data, comprising prices and volumes, for narrowly defined sectors across many country pairs. Compared with simply looking at country-level trade value data, as is common in other work, our “looking under the hood” approach has several advantages. First, it helps us to control for other factors that also shape international trade, such as the strength of supply and demand within individual sectors in different economies. Second, it allows us to break down the impact of geopolitics on trade into its effect on volumes and prices. Third, it allows for a heterogeneous impact of geopolitics on trade flows across different sectors. And fourth, we can provide an assessment of the vulnerability of different countries to an escalation in geopolitical tensions, based on how dependent countries are on others that are geopolitically distant and the availability of alternative trading partners, at the sectoral level.

Our main takeaways are the following. First, geopolitical alignment influences the volume of trade materially. We estimate that the quarter-on-quarter trade volume grew by around 2.5% less for geopolitically distant countries relative to geopolitically close ones over the 2017–23 period, after controlling for other factors. Second, the

Geopolitical risk and global trade

Graph 1



^a Russian invasion of Ukraine (24 February 2022).

¹ The index refers to the number of articles related to adverse geopolitical events as a share of the total number of articles in 10 newspapers each month. ² Calculated as global exports divided by global GDP at current prices.

Sources: Caldara and Iacoviello (2022); Macrobond.

effect of geopolitics on prices received by exporters² was weaker. We find that the direction of the impact was ambiguous, and the size was generally small. And third, we highlight the risks to trade posed by geopolitical flare-ups, based on the degree to which trade is concentrated on geopolitically distant countries and how difficult it is to divert trade from these trading partners. We document that the countries most reliant on geopolitically distant trading partners tend to have more limited alternatives for diversion, highlighting the challenge of managing trade risks.

While our results are broadly consistent with past studies based on alternative approaches using aggregate data (Blanga-Gubbay and Rubínová (2023), Campos et al (2023) and Gopinath et al (2024), for example), we also go beyond them in important ways. Extant work focuses only on the decline in the value of trade. Our approach, by contrast, allows us to go a step further and show that this decline is largely explained by a fall in trade volumes; trade prices have contributed little.

The feature proceeds as follows. In the following section, we outline the ways in which geopolitical alignment affects trade dynamics and highlight the advantages of using granular data. Next, we provide estimates of the effect of geopolitics on trade prices and trade volumes. We then explore countries' vulnerability to any further rise of geopolitical tensions, before concluding.

How does geopolitical alignment affect trade?

Geopolitical alignment can affect trade flows. This is because countries tend to have different trade policies, including tariffs, restrictions and licensing requirements, towards geopolitical allies compared with adversaries. The less geopolitically aligned two countries are, the greater the likelihood that trade barriers will be put in place, and the higher any such barriers are likely to be.

Table A1 in the annex lays out some of the channels through which trade policies can affect trade. It focuses on trade volumes, prices and the value of trade with adversaries compared with allies.

The effect of trade policies on trade volumes to adversaries is likely to be negative. Quantitative restrictions (such as quotas or export bans on geopolitical adversaries) will directly lead to this outcome. Tariffs can have a similar effect, working indirectly through prices. Additionally, these restrictions may lead to trade being re-routed through third-party countries, which reduces the direct trade volume between adversaries.³

On prices received by exporters, the effect is ambiguous. On the one hand, for tariffs imposed on trade between geopolitical adversaries, exporters may cut their prices to offset part of the tariff and protect their market share, with the size of the cut constrained by their profit margins.⁴ On the other hand, if some exporters choose to exit the market altogether, prices for the remaining exporters could rise, especially if adversaries' and allies' exports are poor substitutes for each other. Likewise for

² Commonly called "free on board" prices, excluding any levied tariffs.

³ Qiu et al (2023) documented the lengthening of supply chains on the back of re-routing of trade through third-party countries.

⁴ For example, Jiao et al (2022) find that US tariffs in 2018 had little effect on the free-on-board price of China's exports due to exporters' already compressed profit margins.

quantitative restrictions: prices from adversaries are likely to rise due to their relative scarcity.

Complicating matters, the expectation of restrictions is likely to see adversaries move trade forward to avoid the constraints. This would increase trade volumes (compared with trade between allies) temporarily. The impact on prices, however, could go either way: if importers react more strongly, their increased demand is likely to see prices rise, whereas if exporters do, their increased supply can see prices fall.

Taking all these channels together, geopolitical factors are likely to see a decline in trade volumes between adversaries compared with allies, with the possible exception of a temporary bump before the implementation of anticipated measures. For prices, the effect of geopolitics could go in either direction.

Data

We turn to assessing the impact of geopolitics on trade dynamics in recent years. We make use of bilateral trade data at the sectoral level. Our primary data source is the six-digit Harmonized System (HS) of bilateral trade data from the UN Comtrade data set. The data include bilateral export volumes and values (measured in US dollars) for around 5,000 sectors at monthly frequency. Following Amiti et al (2024a,b), we aggregate the data from monthly to quarterly frequency to reduce their volatility. We then compute prices as the ratio of values to volumes. We focus on a sample of 32 economies. These are the top 50 trading countries (ranked by total trade value) with data available every year from 2017 to 2023.⁵ This unfortunately excludes Russia and Korea, among others, due to incomplete data. That said, it still captures any indirect effects working through third-party countries.

We measure geopolitical alignment between trading partners based on UN voting records. We rely on a distance metric proposed by Bailey et al (2017) that is often used in the literature as a proxy for geopolitical distance. Based on observed votes, they estimate a time-varying annual measure of each country's political preferences, referred to as its "ideal point". They then calculate the "geopolitical distance" between each pair of countries as the distance between their ideal points (Graph 2). The larger the distance, the less aligned the two countries are. Based on this approach, country pairs, say, within the European Union are generally very close to each other. Conversely, the United States and China both tend to be geopolitically distant from many of the other countries in our sample.⁶

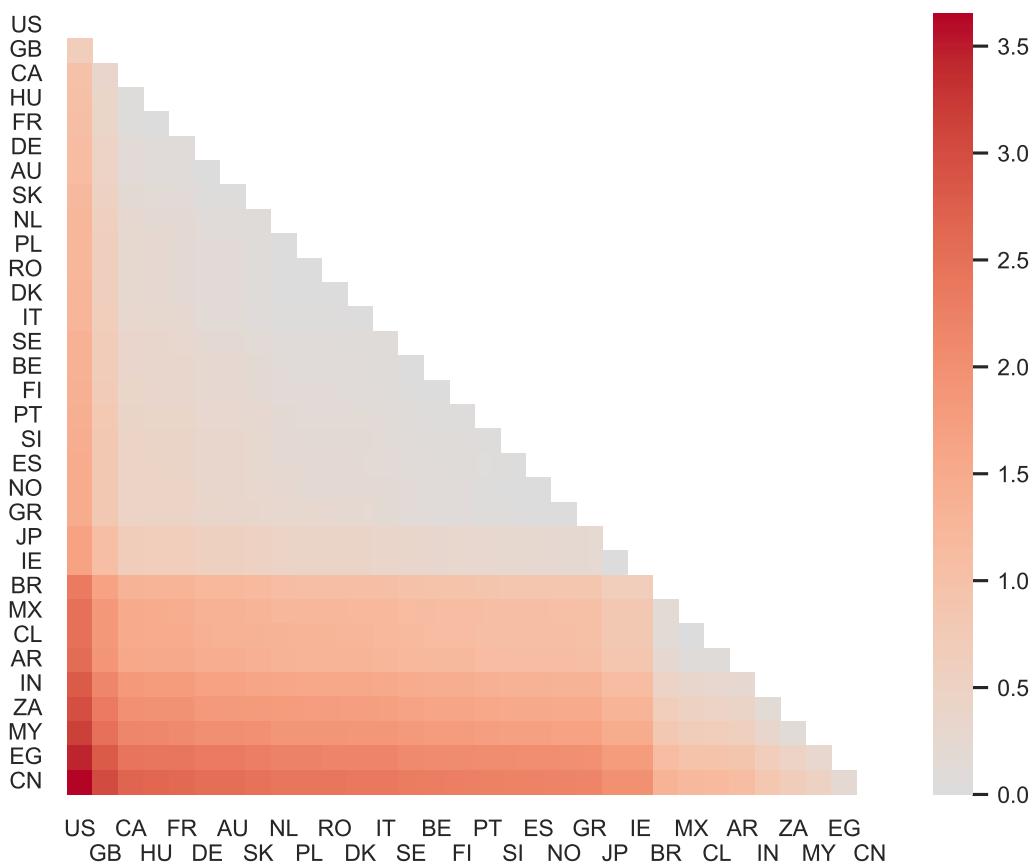
⁵ Our country sample consists of Argentina, Australia, Belgium, Brazil, Canada, Chile, China, Denmark, Egypt, Finland, France, Germany, Greece, Hungary, India, Ireland, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, South Africa, Spain, Sweden, the United Kingdom and the United States.

⁶ The geopolitical distance data are available only until 2022. We assume that the value for 2023 is the same as for 2022 in our analysis.

Geopolitical distance between countries¹

Ideal point distance

Graph 2



¹ This heatmap is constructed using 2022 data. The colour of cells indicates the distance between country pairs, with lighter colours indicating closer geopolitical distance.

Source: Bailey et al (2017).

Event study: trade dynamics after the Russian invasion of Ukraine

We can get a glimpse of the role of geopolitical alignment on trade using an event study centred around the time of the Russian invasion of Ukraine. To do so, we compare changes in trade growth between countries that were more geopolitically aligned with those that were less so. If geopolitical distance did not affect trade flows, we would expect to see similar trade changes regardless of geopolitical alignment.

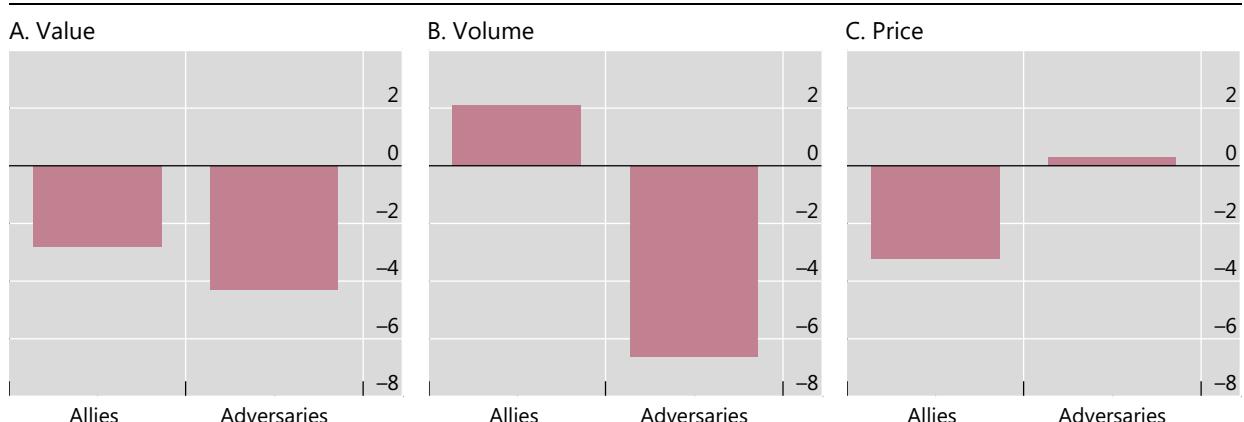
We label country pairs “allies” or “adversaries” based on their geopolitical alignment. Allies are country pairs whose geopolitical distance is below the 25th percentile in our sample each year, while adversaries are those above the 75th percentile. See Graph A1 in the annex for our classification of country pairs.

A simple comparison suggests that some trade flows between adversaries were diverted to allies. We calculate the change in the average quarterly growth rate of trade from the four quarters before the invasion to the four quarters that follow. The value of trade calculated this way declined for both groups, but more so for adversaries (Graph 3.A).

Reconfiguration of trade flows following Russia's invasion of Ukraine¹

Changes in average growth, in percentage points

Graph 3



¹ The panels present the changes in average quarter-on-quarter growth for trade value, volume and price, respectively, weighted by values, between two periods: Q2 2021–Q1 2022 and Q2 2022–Q1 2023. Allies are country pairs whose ideal point distance is below the 25th percentile in our sample, while adversaries are those above the 75th percentile.

Sources: Bailey et al (2017); United Nations Comtrade; authors' calculations.

Beyond trade values, geopolitical factors seem to play out differently for trade volumes and prices. We observe a significant decline in the average quarter-on-quarter growth rate of trade volumes between adversaries, of more than 6%; for allies, by contrast, volumes picked up by 2% (Graph 3.B). Conversely, we see a decrease in the average quarterly growth rate of prices between allies to the tune of 3%, but no material change between adversaries (Graph 3.C). This highlights the importance of analysing trade prices and volumes separately: focusing on trade values alone will miss potentially distinct dynamics of volumes and prices.

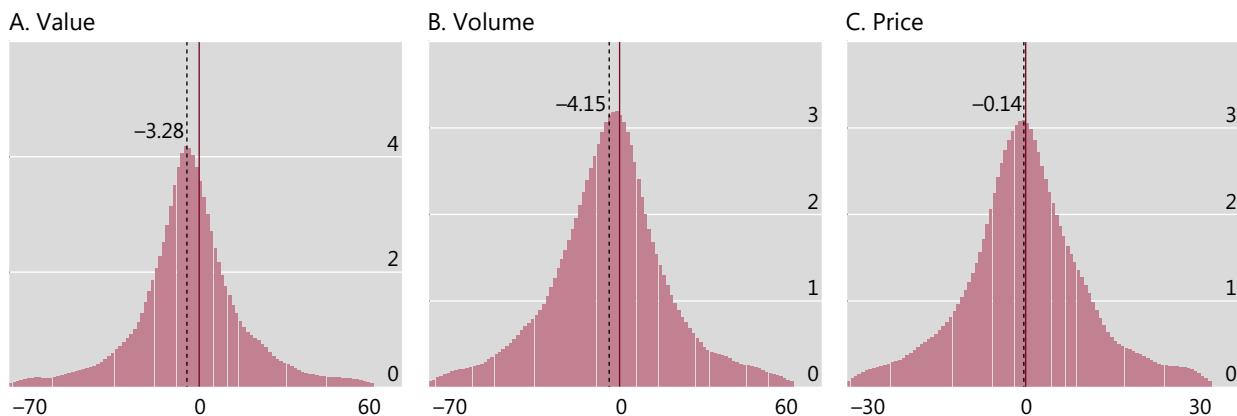
The impact of geopolitical factors also differs across sectors (Graph 4). When zooming into the bilateral trade reconfiguration for individual sectors, the outcomes are very diverse. Take the change of trade value growth, for example: the gap between allies and adversaries, not controlling for any confounding factors, varies between -70% and +60%. Thus, some sectors saw very large increases in trade between geopolitical allies compared with adversaries, while others saw the opposite.

The exercise above provides suggestive evidence of the effects of geopolitics on trade dynamics but could be misleading if factors other than geopolitics influenced trade patterns. For example, a slowdown in an economy that is geopolitically distant from most other countries could lead trade flows between adversaries to decline, independent of geopolitics. Further, trade patterns may have been distorted by the Covid-19 pandemic and its aftermath. We therefore now move to a more comprehensive model that does a better job of controlling for confounding factors.

Heterogeneous reconfiguration of trade flows across sectors¹

Estimated density, in per cent

Graph 4



The median value is indicated by a dotted black line; no change is indicated by a solid red line.

¹ The panels are created by fitting a kernel density to the underlying data, which is then normalised to match the three-sigma range of a normal distribution. They present the changes in average quarter-on-quarter growth for trade value, volume and price, respectively, from Q2 2021–Q1 2022 to Q2 2022–Q1 2023, for adversaries less allies. Allies are country pairs whose ideal point distance is below the 25th percentile in our sample, while adversaries are those above the 75th percentile.

Sources: Bailey et al (2017); United Nations Comtrade; authors' calculations.

Quantifying the impact of geopolitical distance on trade

To quantify the impact of geopolitics on trade, we estimate an equation that explains trade dynamics using geopolitical distance and other factors. We model the growth rate of bilateral trade volumes and prices for each of nearly 5,000 narrowly defined sectors, based on the geopolitical distance between trading partners as well as supply from exporters and demand from importers. We then aggregate these effects across sectors, based on trade shares, to calculate the overall impact of the factors on bilateral trade.

Specifically, we assume that trade between a country pair, for a given sector and time period, can be explained by:

$$\% \Delta V_{hijt} (\text{or } \Delta \log P_{hijt}) = \alpha_{hjt} + \beta_{hit} + \theta_{ht} D_{ijt} + \epsilon_{hijt},$$

where the dependent variable is the quarter-over-quarter percentage change in volume (V) or log change in price (P) from country i to country j for sector h in quarter t .

Coefficients α_{hjt} and β_{hit} are fixed effects for importers and exporters respectively. Including these in the regression is crucial to control for the effects of demand from importers and supply from exporters. Intuitively, we assume that a change in trade that is *common across all exporting countries* to a given importing country j is related to the *demand* of the importing country and will be captured by α_{hjt} . Likewise, we assume that a change that is *common across all importing countries* from a given exporting country i is related to the *supply* of the exporting country and

will be captured by β_{hit} . Using these fixed effects to capture supply and demand influences follows the recent work of Amiti et al (2024a,b).⁷

The crucial coefficient for us is θ_{ht} – the coefficient on the geopolitical distance between trading partners D_{ijt} . It provides an estimate of the effect of geopolitical distance on trade (volumes or prices). If countries shift trade from geopolitically distant countries to geopolitically close ones in a given period, we will see a negative θ for trade volumes. If the shift plays out over time, θ will remain in negative territory in subsequent periods as well. Similarly for prices: if exporters start to charge more to adversaries than allies, θ will be positive, and will remain positive over time if the gap continues to widen.

Our approach complements the existing literature. Much of the extant work relates trade to the size of the trading partners' economies and the geographical distance between them – the so-called gravity model – augmented by adding geopolitical distance measured in a similar way to us (eg Campos et al (2023), Cevik (2023), Gopinath et al (2024) and Hakobyan et al (2023)). Ours differs from that analysis in three ways. First, we focus on trade prices and volumes separately, instead of trade values. Second, we explicitly control for separate supply and demand influences at the sectoral level (instead of proxying supply and demand factors at the aggregate level using trading partners' GDP). Third, we analyse growth rates instead of trade levels to filter out the impact of time-invariant confounding factors such as geographical distance and cultural similarity.

Consistent with our discussion on conceptual drivers above, the impact of geopolitical distance on trade volume growth is generally negative: for the typical sector, the estimated θ associated with trade volume growth is below zero in nearly all periods (Graph 5.A, red line).⁸ Given the setup of our regression, this continual negative effect implies that the gap in trade volumes between geopolitically close and distant trading partners widened continuously over the length of our sample.⁹

The impact seems to be larger when trade policy uncertainty or geopolitical tensions are elevated. For example, the largest impact (in 2018) coincides with heightened trade policy uncertainty as US-China trade tensions flared. This is consistent with Jakubik and Ruta (2023), who find a shift from trading between adversaries to allies that is concentrated in uncertain times, as firms took precautionary actions given the unpredictable policy outlook. The effect remained negative, but less so, in subsequent years, especially during the Covid-19 crisis, but then grew again when geopolitical tensions surged after the Russian invasion of Ukraine. Somewhat surprisingly, the effect following the invasion is smaller than in 2018. This probably reflects the fact that trade reconfiguration due to geopolitical factors was already well under way before then.

⁷ Amiti et al (2024a,b) focus on the price of imports to the US. BIS (2024) uses the same approach to assess the effect of China's exports on imported inflation across a panel of 12 countries.

⁸ There is a lot of heterogeneity in the estimated θ across different sectors, with around half of them being statistically insignificant. Following Amiti et al (2024a,b), we include both significant and insignificant estimates in our analysis.

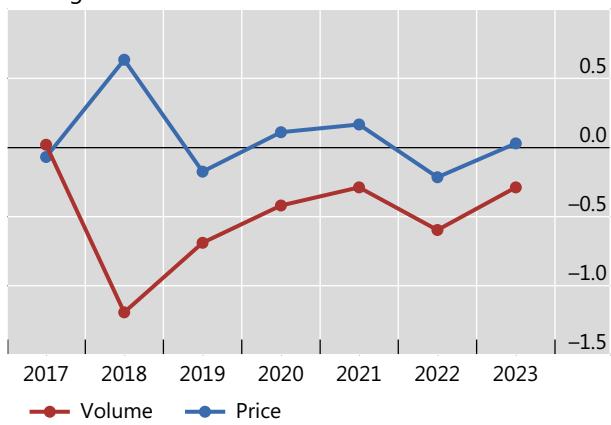
⁹ This is similar to the finding that the impact of geopolitical distance on foreign direct investment (FDI) has increased over the last decade (IMF (2023)).

Impact of geopolitical distance on trade

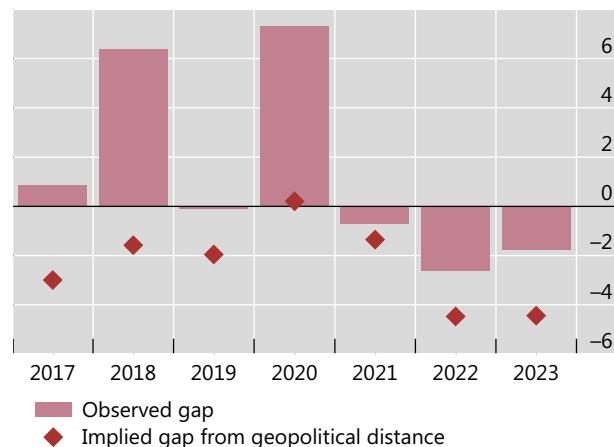
In per cent

Graph 5

A. Estimated impact of geopolitical distance on quarterly trade growth rate¹



B. Growth rate of trade volumes of adversaries less allies²



¹ Median across sectors of the impact of geopolitical distance on the growth rates of volume and price each quarter. ² Allies are country pairs whose ideal point distance is below the 25th percentile in our sample, while adversaries are those above the 75th percentile.

Sources: Bailey et al (2017); United Nations Comtrade; authors' calculations.

Overall, the impact of geopolitical distance on trade volume growth is sizeable. Throughout our sample, geopolitical factors dragged down the quarter-on-quarter growth rate of trade volumes among adversaries by around 2.5% relative to that among allies, on average (Graph 5.B, diamonds). After Russia's invasion of Ukraine, the implied gap widened to about -4%.

So what do we gain by controlling for demand and supply factors? If we did not, then we would just be comparing trade volumes between allies and adversaries. And that could lead us to very different conclusions. In fact, instead of an average effect of geopolitics of -2.5%, we would get +1.5% (Graph 5.B, bars). Over much of our sample, robust supply from China and/or strong demand from the United States were important contributors to global trade volume growth. To the extent that the growth was common across trading partners, our approach attributes this to supply and/or demand rather than geopolitics. Thus, given that both China and the United States are geopolitically far from many of their trading partners, if we did not control for supply and demand, it would materially distort our estimates of the effects of geopolitics.

The impact of geopolitical distance on export prices, in contrast, to that on trade volumes, has been smaller and has tended to fluctuate around zero (Graph 5.A, blue line). This partly reflects the ambiguous nature of the impact that trade barriers have on prices, as discussed previously. One episode that stands out is 2018, when trade prices among adversaries relative to allies increased. That would be consistent with a dominant effect from exporters exiting markets due to either tariffs making trade unprofitable or the imposition of quantitative restrictions.

Other studies that have addressed similar questions report an annualised difference in the value of trade between geopolitical allies and adversaries in the

range of 4% to 22%.¹⁰ Our estimate, of around 10% annualised, is close to the middle of this range. But our methodology allows us to further decompose the change in the value and show that this is mostly explained by a change in trade volumes; trade prices, however, remained relatively static, demonstrating the benefits of our approach.

Risks to trade from geopolitical tensions

Our results highlight the potential risks that geopolitical tensions pose for trade. If political tensions were to intensify, this could result in stronger trade restrictions between geopolitical adversaries. As a result, the gap in trade volume growth between allies and adversaries would probably widen further. But the effects would be spread unevenly across countries.

We use our granular data of sectoral trade flows between country pairs to construct an assessment of these risks. We view bilateral trade flows from the perspective of each of the exporter and importer countries separately and provide a sense of their vulnerability.

The risk of individual countries to geopolitical tensions varies and is related to at least two factors.

For one, it depends on the *extent to which a country may have to divert its trade*. For imports, countries that source more goods from adversaries are at greater risk on this score, since trade with adversaries is more likely to be subject to new barriers. Similarly for exports – countries selling more to adversaries are more vulnerable. To proxy for the need to divert trade, we calculate a “need for diversion index” as the trade value-weighted average of the geopolitical distance between a country’s trading partners in terms of each of its imports and exports.¹¹

For another, it hinges on *how easy it is for a country to divert its imports or exports* to other countries. For example, if a country would like to divert its imports of a particular good, the options for doing so could be limited if suppliers are concentrated in a small number of countries, especially if those countries are geopolitical adversaries. Similarly, the ease of diverting exports would be limited if geopolitical adversaries dominate global demand. To gauge the flexibility of a country to divert trade for a given sector, we construct a measure of sectoral concentration for the sector that weights each potential trading partner by their geopolitical distance. We then aggregate these sectoral concentration measures,

¹⁰ Most existing results are based on comparing trade within and between different geopolitical blocs. For example, Gopinath et al (2024) found that after Russia’s invasion of Ukraine, trade between hypothetical western and eastern blocs – as in our case, identified from UN voting patterns – declined by 12% more than intra-bloc trade, while Blanga-Gubbay and Rubínová (2023) observed a 4% gap. Meanwhile, Campos et al (2023) estimated that fragmentation into western, eastern and neutral blocs could see trade flows drop by 22% in their base scenario, or up to 57% in an extreme one.

¹¹ IMF (2023) uses a metric analogous to our “need for diversion index” to measure individual countries’ risk from geopolitical tensions to FDI flows.

weighted by their trade share in imports or exports, to generate a country-level "impediment to diversion index".¹²

In interpreting our findings, some limitations must be borne in mind. For example, we have focused on risks associated with the composition of trade; for economies less dependent on trade, the macroeconomic costs of reductions in trade volumes will be smaller. In addition, the ease of substitutability may be poorly approximated by actual concentration at any given point in time, especially if infrastructure is essential to trade (eg pipelines for natural gas). Similarly, the criticality of a product for a country's economy is not considered.

For a given country, the risks to exports and imports will vary because of differing sectoral composition of trade flows and geopolitical distances to trading partners.

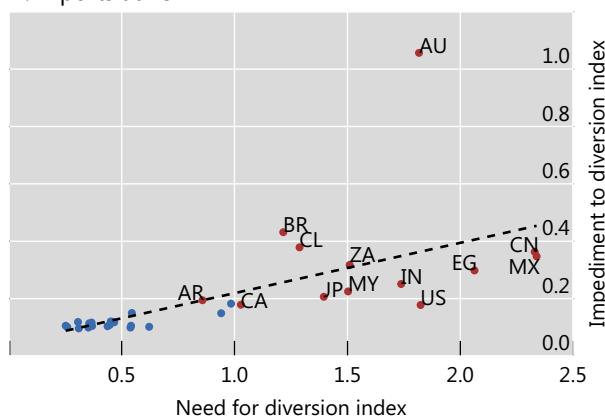
We assess individual countries' risk along these two dimensions, for exports (Graph 6.A) and imports (Graph 6.B) separately, using 2023 data. On the horizontal axis is our proxy for the need to divert trade, and on the vertical axis how difficult it is to do so. Countries further from the origin are those particularly at risk from further trade tension escalation.

European countries in our sample appear to have the lowest risk for both exports and imports. First, they are geopolitically close to their major trading partners, with around 70% of their exports and imports being with other European countries,¹³ and second, they do not have a high share of sectors in which trade is dominated by their

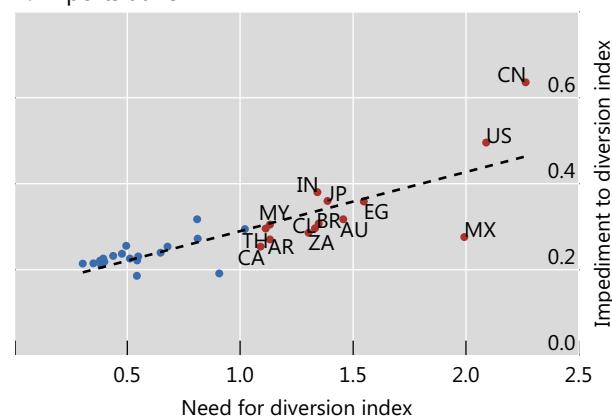
Country risk to further intensification of geopolitical tensions¹

Graph 6

A. Exports at risk



B. Imports at risk



- European countries²

¹ Higher numbers along either axis indicate greater risk. The "need for diversion index" is the trade-weighted average of the geopolitical distance between each country and its trading partners. The "impediment to diversion index" is the trade-weighted average across sectors of a measure of sectoral concentration adjusted for geopolitical distance. This measure is computed in a similar fashion to the Herfindahl-Hirschman index, but with the contribution of each trading partner to the index (which is its market share squared) multiplied by its geopolitical distance to the country of interest. See the annex for details. The dashed line represents a fitted linear regression line; the slope coefficients are both statistically significant at the 1% level. ² European countries are: BE, DE, DK, ES, FI, FR, GB, GR, HU, IE, IT, NL, NO, PL, PT, RO, SE, SI and SK.

Sources: Bailey et al (2017); United Nations Comtrade; authors' calculations.

¹² Our "impediment to diversion index" requires sectoral data and has not been used before. It is a country-specific measure of sectoral concentration (similar to the Herfindahl-Hirschman Index), adjusted for geopolitical distance. See the annex for details.

¹³ This, of course, means that the level of aggregation matters. For instance, if we treated the European Union or euro area as a single entity, their vulnerability would look higher.

adversaries. The resilience partly reflects European countries' efforts to reorient their imports of strategic sectors and exports towards allies following Russia's invasion of Ukraine (Bosone et al (2024)). These countries would have been more vulnerable before 2023, considering their heavy reliance on Russia for energy imports.¹⁴

That said, our measures are limited by our data: a calculation of their resilience before 2022 would have understated the risks they faced, given the absence of Russia from our sample.

From the perspective of exports, a few countries are at notably higher risk than others. China and Mexico stand out based on the need to divert. This partly reflects the fact that, in both cases, their largest trading partner is the United States – a geopolitically distant country based on UN voting records. They both face a high "impediment to divert" as well, given that, in many of the sectors in which they export, geopolitically non-aligned countries are prominent importers. Australia is also vulnerable: while it is less geopolitically distant from its trading partners on average, some of its exports are in markets where geopolitical adversaries are outsize importers. In particular, Australia's largest export by value is iron ore, most of which is sold to China, the world's largest importer and a geopolitical adversary.

For imports, China, Mexico and the United States appear to be at the most risk. All three countries are heavily dependent on imports from countries that are geopolitically distant. Moreover, their adversaries dominate the global supply of imported goods across many sectors, limiting the potential to divert. For example, for China, the United States, Canada and Norway are all adversaries that play a significant role in supplying liquefied petroleum gases, a critical commodity.

Managing trade risks from geopolitical tensions is likely to be challenging. For both imports and exports, there is a statistically significant positive correlation between the need for diversion and the impediment to diversion (Graph 6, dashed line). This suggests that countries that are the most reliant on geopolitically distant trading partners have limited options to find alternative countries to trade with.

The risks discussed above can be mitigated in at least two ways, but with costs and limitations.

First, firms could seek to "de-risk" by reshoring – increasing reliance on domestic production, or friendshoring – sourcing from allies instead of adversaries (Cerdeiro et al (2024)).¹⁵ However, such a process is likely to take time. In addition, reshoring or friendshoring are likely to imply welfare losses due to less efficient use of labour and capital than under free trade. For example, Javorcik et al (2024) estimate that friendshoring may lead to losses to countries' real GDP of as much as 4.7%. Moreover, in some cases sourcing from alternative suppliers is not possible, as when trade patterns are driven by the availability of natural resources, for example trade in rare earths, lithium and uranium.

A second option could be for countries to adjust their political alignment. While we have taken geopolitical distances as a given in our analysis, high economic costs of diversion could incentivise a change in political choices of allies and adversaries. Kleinman et al (2020) finds that, as countries depend more on a trade partner, they

¹⁴ Note that our calculation of their resilience before 2022 would have further understated the risks most European countries faced given the absence of Russia from our sample.

¹⁵ Re-routing trade via third countries can also help to circumvent trade barriers, but this option could trigger further trade restrictions, the more so if it becomes popular.

tend to realign politically towards them. However, this process tends to play out only slowly, over decades.

Will some countries be able to benefit from trade reconfiguration due to geopolitics? It is possible that friendshoring may deliver a boon to certain countries' exports. Mexico and Vietnam, for instance, appear to have benefitted from US-China trade tensions. However, to the extent that the increase in their exports largely reflects the re-routing of existing trade, the real gains may be limited since the value added would be small. And the net benefits of trade diversion would be tempered by weaker demand from countries whose growth is adversely affected (Cerdeiro et al (2024)).

Conclusion

Our analysis suggests that global trade has become increasingly fragmented in recent years due to geopolitical tensions. We find evidence that countries that are more geopolitically distant tend to trade less with each other, all else equal. The risk this poses to individual countries varies: countries whose growth depends heavily on trade with geopolitical adversaries are especially vulnerable. This is not only because they face a greater need to divert their trade from current trading partners, but also because they may have more limited options to do so.

Going beyond the analysis in this feature, trade fragmentation is just one aspect of a more general pattern of international economic interactions being increasingly shaped by geopolitical considerations, sometimes referred to as "geoeconomic fragmentation" (Aiyar et al (2023)). In addition to trade, developments in investment and technology are also fragmenting. IMF (2023) shows that FDI flows are increasingly concentrated in geopolitically aligned countries, leaving some emerging market and developing economies especially vulnerable to capital relocation.

Geoeconomic fragmentation has implications for economic welfare. When geopolitical factors play a stronger role in economic decisions, this comes at the cost of a smaller role for comparative advantage and market efficiency. While some countries may come out winners from these changes individually, the world as a whole suffers as the gains from economic integration dwindle.

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Annex

Effect on trade with geopolitical adversaries (compared with allies)¹

Table A1

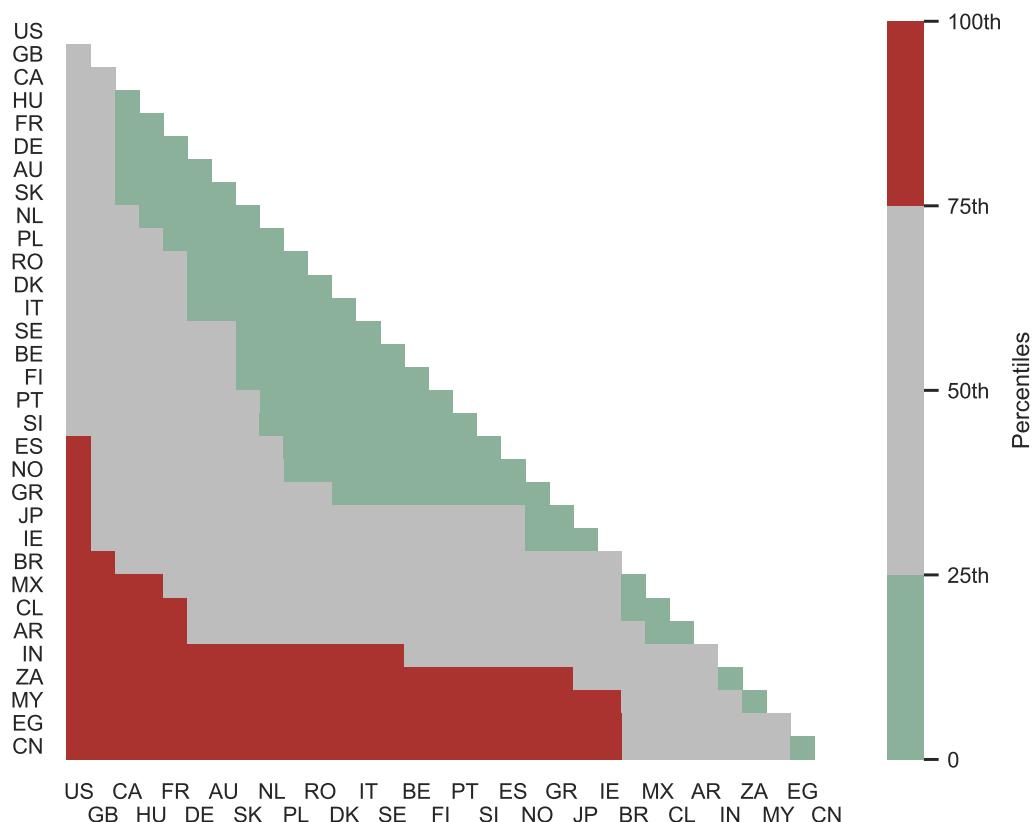
	Volumes	Prices (fob) ²	Values	Channel
Increase in:				
Trade restrictions	–	+	–	Importers are forced to purchase from higher-priced alternative sources.
Trade tariffs	–	–(+)	–	Exporters bear some of the tariff cost to protect market share, while importers turn to higher-priced alternatives from allies (high tariffs may act more like trade restrictions if some exporters in adversary countries withdraw from the market, pushing up prices).

¹ Allies are country pairs whose ideal point distance is below the 25th percentile in our sample, while adversaries are those above the 75th percentile. ² fob = “free on board”, ie the price at the point of transfer from the seller to the buyer, which excludes any tariffs or taxes levied by the importing country.

Source: Authors’ elaboration.

Classifying country pairs: allies and adversaries¹

Graph A1



¹ This heatmap is constructed using 2022 data. For our event study, we treat country pairs with ideal point distances below the 25th percentile (in green) as allies and those above the 75th percentile (in red) as adversaries.

Sources: Bailey et al (2017); authors’ calculations.

Measuring risks to trade from geopolitical tensions

This annex describes two indices to measure the risk of a country's trade due to geopolitics. These can be applied to a country's exports and imports separately, to get a sense of the riskiness of each. For illustration, we focus on the risk to a country's exports.

The first index, N_i , is the need for trade diversion of country i . This is the weighted sum across all sectors (h) and all exporting partners (j) of their geopolitical distance (D_{ij}), where the weights are shares of the total value of country i 's exports:

$$N_i = \sum_h \sum_j s_{hij} D_{ij},$$

where $s_{hij} = W_{hij}/\sum_h \sum_j W_{hij}$, and W_{hij} is the value of trade in sector h from country i to country j .

The second index, I_i , is the impediment to diversion for country i . This is a measure of the concentration of trade across importing countries by sector, but where the contribution of each country j 's trade to the index is weighted by its geopolitical distance to country i .

Each importing country's contribution to the concentration index in a given sector, \widehat{S}_{hj}^2 , is given by the square of that country's share of total trade value in that sector, analogous to a sectoral Herfindahl-Hirschman index:

$$\widehat{S}_{hj}^2 = (\sum_i W_{hij} / \sum_j \sum_i W_{hij})^2.$$

To construct I_i , each of these is weighted by the geopolitical distance between the two countries (D_{ij}), with this sum then aggregated to the country level based on sector h 's share of country i 's total exports:

$$I_i = \sum_h s_{hi} \sum_j \widehat{S}_{jh}^2 D_{ij},$$

where $s_{hi} = \sum_j s_{hij}$.

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The US dollar and capital flows to EMEs¹

Over the past two decades, emerging market economies (EMEs) have shifted their external financing sources away from foreign currency bank lending to local currency bonds and equities. What does this imply for the drivers of capital flows? We document that the strength of the US dollar against advanced economy currencies is a key driver of local currency bond and equity flows as it affects global investors' risk appetite. Moreover, its importance has risen over the past decade, in part driven by a growing role of mutual funds among foreign investors. These findings may help EMEs achieve more stable external financing.

JEL classification: G12, G15, G21, G23.

Since the Great Financial Crisis (GFC), the landscape of portfolio flows to emerging market economies (EMEs) has shifted radically. Portfolio inflows have become a much more important component of capital flows to these economies than bank lending. The growth in local currency bond and equity flows to EMEs has been particularly pronounced, while the share of their foreign currency (FX) borrowing (in the form of both bond and bank flows) has declined.

What does this change in financing patterns imply for the global drivers of capital flows? While a vast literature on capital flows has focused on the role of interest rate differentials and traditional proxies for global financial conditions and risk appetite (in particular the VIX), recent research has pointed to the role of the overall strength of the US dollar as a key driver (eg Hofmann et al (2022) and Bruno et al (2022)).

The current conjuncture underscores the importance of this issue. With some EMEs now cutting policy rates ahead of the United States, narrowing interest rate differentials between EMEs and the United States are seen by market commentators as exerting pressures on capital flows to EMEs. Therefore, it is crucial to understand how important different proxies for global risk appetite and interest rate differentials are in explaining these flows.

Against this backdrop, we first document the shifts in EMEs' external financing over the past two decades. Then we systematically assess and compare the key drivers of EMEs' external financing across types of portfolio flows and banking flows, focusing on the role of the US dollar relative to that of interest rate differentials and other proxies for global risk appetite. In doing so, we take care to avoid potential identification problems related to the possibility that exchange rate movements themselves may reflect EME fundamentals or could be affected by capital flows

¹ The authors thank Claudio Borio, Egemen Eren, Benoît Mojon, Damiano Sandri, Andreas Schrimpf, Hyun Song Shin and Goetz von Peter for helpful comments and discussions. The views expressed in this article are those of the authors and do not necessarily reflect those of the Bank for International Settlements.

Key takeaways

- Since the Great Financial Crisis, local currency bond and equity flows have become more important components of total capital flows to EMEs; the share of foreign currency bank lending, by contrast, has declined.
- The US dollar as a proxy for the risk-taking propensity of global investors is a more important driver of local currency bond and equity flows than interest rate differentials. By contrast, changes in policy rate differentials continue to be an important driver of foreign currency loan flows.
- The US dollar's role as a determinant of capital flows to EME local currency bonds has risen since 2015, while that of the VIX has diminished somewhat.

themselves. We also explore how the importance of these drivers of capital flows has evolved over time.

Two main results stand out from our analysis. As our first core finding, we document that changes in the dollar's strength affect capital flows to local currency bonds and equities, but not those to FX bonds and loans. For local currency flows, the impact of the US dollar dominates that of interest rate differentials. By contrast, the VIX – the most commonly used proxy for global risk appetite – is not a strong driver of local currency bond flows, but matters for equity flows. Our second main finding is that the sensitivity of local currency flows to the US dollar appears to have increased since 2015, particularly for equity flows. By contrast, the importance of the VIX as a driver of local currency bond flows has declined somewhat.

What could explain these patterns? The crucial role of the US dollar is in line with its impact on the risk-taking propensity of global investors: when the dollar depreciates against foreign currencies, local currency assets in global portfolios gain in dollar value, raising the risk appetite of investors focused on dollar returns (Hofmann et al (2022)). It is also in line with the importance of return-chasing, US dollar-based investors. The growing importance of this factor probably reflects both the increasing share of local currency asset holdings in global investors' portfolios and the growing share of mutual funds as investors in EME local currency assets.² The dwindling importance of the VIX, in turn, is consistent with its declining role as a gauge of global risk appetite documented elsewhere (eg Erik et al (2020), Miranda-Agrippino and Rey (2022) and Obstfeld and Zhou (2023)). More recently, the VIX has also been affected by structured products selling options and thus has become more distorted as a measure of risk-taking.³

The remainder of this article proceeds as follows. The first section describes the shift in the source of EMEs' external financing over the past two decades. The second provides a brief conceptual discussion of global factors and interest rate differentials as major drivers of capital to EMEs. The third analyses the impact of the US dollar, the VIX and policy rate differential on portfolio and banking flows, while the fourth examines how the roles of different drivers have evolved over time. The final section draws some policy implications.

² Foreign investors in EME equities typically do not hedge currency exposure, and those in EME local currency bonds overall hedge only partially. For example, BIS (2022) reports that the extent of FX hedging by non-residents investing in emerging Asia is still relatively low.

³ A popular product is so-called covered call ETFs. A covered call involves a purchase of the S&P 500 index and a simultaneous sale of a one-month call option on the index (Todorov and Vilkov (2024)).

Portfolio and banking inflows to EMEs

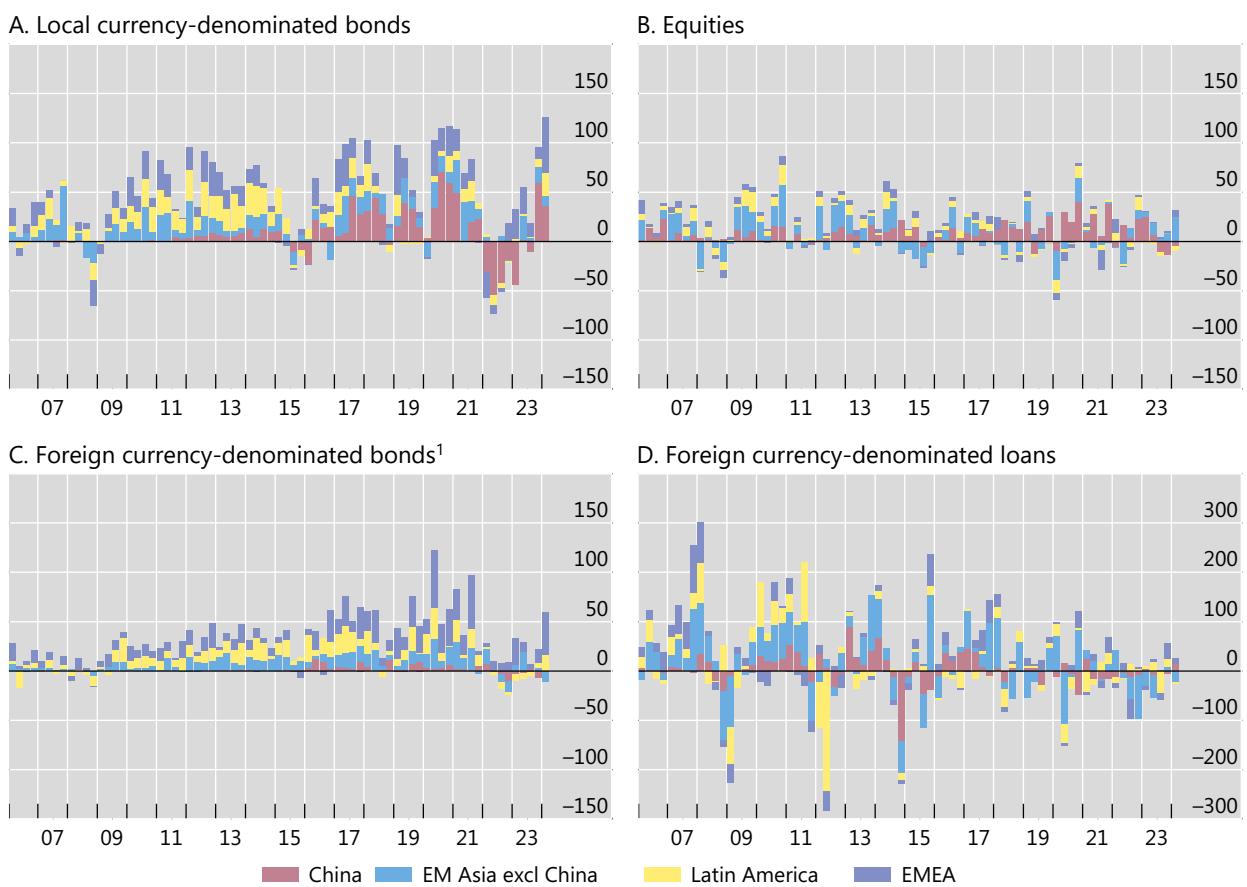
The growth in capital flows since the GFC saw a notable shift in composition from FX to local currency. Specifically, the volume of portfolio inflows to EME local currency bond and equity markets has become larger than that of FX bond and loan inflows since 2006 (Graph 1).⁴

The share of external financing in local currency bonds and equities has grown particularly strongly in emerging Asia and Latin America (where it now stands at 60% and 50%, respectively) at the expense of the FX loan share (Graph 2). Notably, from 2006 to 2014, the share of local currency bond financing rose in all EME regions. From 2015 to the first quarter of 2024, the proportion declined slightly in Latin America, and emerging Europe, the Middle East and Africa (EMEA), but it continued to increase in emerging Asia.

Portfolio capital and banking inflows to EMEs

In billions of US dollars

Graph 1



¹ Quarterly changes in foreign currency (US dollar, yen and euro) credit, converted into the dollar across major economies in each region. China is included from Q1 2010.

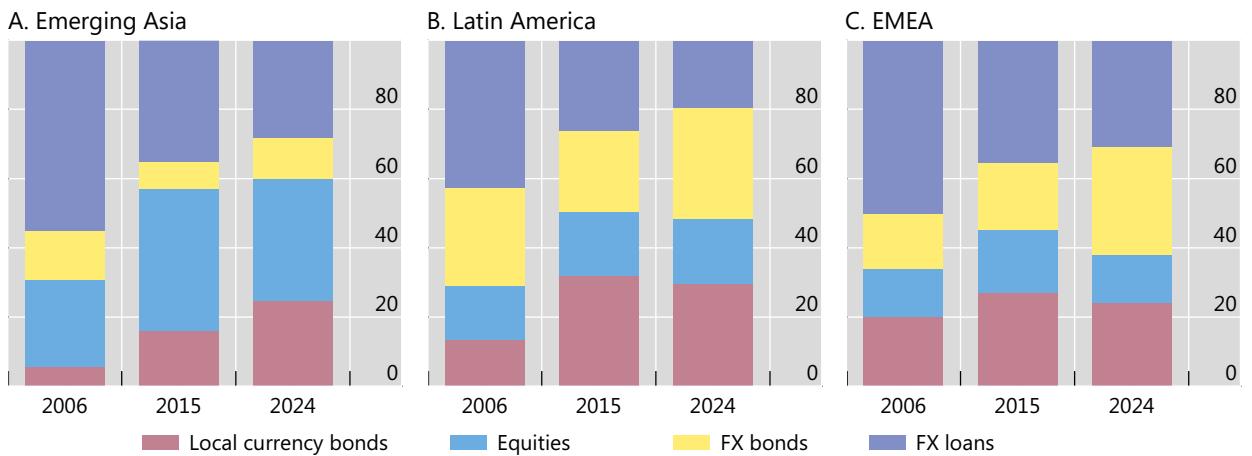
Sources: IMF; BIS global liquidity indicators; BIS locational banking statistics, authors' calculations.

⁴ To the extent that the proceeds from foreign currency bonds issued offshore are repatriated to the issuer's home country, we can view the change in the outstanding amount of bonds as capital inflows.

Changing composition of external financing by EMEs¹

In per cent

Graph 2



¹ External financing comprises foreign currency (FX) credit to EMEs via FX loans and bonds, and foreign investment in EME local currency assets via equities and local currency bonds. Data for each year correspond to Q1.

Sources: IMF; BIS global liquidity indicators; BIS locational banking statistics, authors' calculations.

The increased role of flows into local currency bonds reflects EMEs' efforts to reduce their reliance on FX loans and develop their domestic bond markets, as well as regulatory changes affecting global banks' business models (Ichiue and Lambert (2016)). Higher borrowing in local currency (overcoming "original sin") is generally seen to bring financial stability benefits as it avoids the build-up of FX mismatches among borrowers, which can entail substantial vulnerabilities and complicate policymaking. However, local currency flows do not come without risks. This is because they typically come with currency mismatches on foreign investors' balance sheets, so that exchange rate fluctuations affect investors' risk appetite. This implies that even though the currency mismatch of EME borrowers might be mitigated, EMEs' financial conditions may still be heavily influenced by global factors ("original sin redux"; see Carstens and Shin (2019)).

What factors drive portfolio and banking inflows to EMEs?

A useful and common way of thinking about drivers is to distinguish between push and pull factors (Koepke (2019)). Push factors are external to the recipient economy (such as US interest rates or balance sheet policies of advanced economy (AE) central banks). Pull factors are domestic (eg EME interest rates and local economic prospects). Push factors tend to be more important for lenders and investors, but in general pull and push factors affect both the supply and demand for funds. In the following, we discuss conceptually the role of three proxies for key push and pull factors: (i) proxies for global investors' risk appetite; (ii) the strength of the US dollar; and (iii) interest rate differentials between EMEs and the United States.⁵

A drop in global investors' risk appetite can be expected to reduce demand for all EME assets across the board. The most popular proxy in the literature has been

⁵ In our empirical specification, we include other push and pull factors as control variables.

the VIX (Koepke (2019)). More recently, the strength of the dollar vis-à-vis other currencies has been proposed as a proxy for the risk appetite of US dollar-based investors. For example, Hofmann et al (2022) find that this risk-taking channel operates for foreign investors in EME local currency bonds, and Bruno et al (2022) for those in EME equities. A global investor who holds a diversified portfolio of assets in different currencies (unhedged), but who evaluates gains and losses in dollar terms typically faces an economic capital constraint which limits risk-taking. A broad-based dollar depreciation increases capital through the ensuing valuation effect on local currency assets, relaxing the value-at-risk (VaR) constraint. More generally, the positive wealth effect as such is likely to reduce effective risk aversion. Further, valuation effects that stem from the impact of the dollar on asset returns when converted into dollars may induce return-chasing investors to increase their exposure to EME local currency assets. All these effects work in the same direction.

By contrast, US dollar-based lenders extending EME credit *only* through US dollar-denominated bonds and loans are immune to the effects operating via this mechanism.⁶ That said, the dollar's strength can still have an indirect impact, because EME FX borrowers facing a currency mismatch are affected by the dollar's general strength to the extent that it has an impact on their balance sheet strength and repayment capacity.⁷ This could potentially dampen EME lending.

However, conceptually and empirically it is very important to distinguish broader US dollar movements driven by factors *exogenous* to the recipient country from those driven by domestic factors. After all, changes in the value of the local currency may reflect changes in the recipient country's economy, which would influence investors' demand for the economy's assets. Moreover, bilateral exchange rates themselves can be influenced by capital flows. We deal with this issue by focusing on strength of the US dollar against other AE currencies (ie excluding EME currencies) in our empirical research design.

Turning to interest rate differentials, both policy rate and bond yield differentials could drive capital flows, but through different channels depending on the types of flow. The bond yield differential is more relevant than the policy rate differential for investors in EME local currency and FX bonds, although the policy rate can affect long-term bond yields at least to some degree. We further expect the policy rate differential to be more important for FX loan flows than the long-term bond yield differential, since US dollar-denominated loans extended to EME borrowers are typically short-term (eg less than one-year maturity) or variable rate.

When EME bond yield differentials change, their impact on overall investor flows to EME local currency bonds can be ambiguous. On the one hand, a rise in an EME's bond yields vis-à-vis the United States increases the relative attractiveness of the EME's bonds to new carry-oriented investors such as insurance companies and pension funds, incentivising them to increase positions. On the other hand, for

⁶ As an intermediate case, if a global investor holds both FX- and local currency-denominated EME assets, a relaxation of VaR constraints after a dollar depreciation could allow for more investment in both FX and local currency. However, in practice there is a segmentation between EME FX and local currency bond investors, driven by their mandates. For example, insurance companies and pension funds tend to have a stronger preference for US dollar-denominated EME bonds (Bertaut et al (2024)).

⁷ Avdjiev et al (2017) and BIS (2024) show that a stronger dollar measured by the broad US dollar index is associated with lower growth in US dollar-denominated cross-border bank lending. In addition, for global banks, especially non-US banks, whose assets are denominated in multiple currencies, changes in the US dollar can have a first-order impact on their capital measured in their accounting or performance currency even if there is no currency mismatch in the banks' assets and liabilities.

existing holders of local currency bonds, a rise in the EME's yields implies negative returns and valuation losses. This may, in turn, induce a negative wealth effect and tighten the economic capital constraint, which increases effective risk aversion and dampens demand for EME bonds. In addition, investors in EME local currency bonds who chase returns, such as mutual funds, may be driven to sell bond holdings.⁸

Impact of global factors and interest differentials

We run panel regressions comparing the relative role of two global factors and one interest differential variable, while including a variety of standard control variables. We use monthly balance of payments (BOP)-based data for portfolio flows and quarterly data for FX loan flows from 2006 to early 2024 covering up to 17 EMEs depending on flow types. The annex provides details on the data, our selection of variables and the modelling choices used to arrive at our baseline specification.

Our baseline specification is:

$$\begin{aligned} \text{flow}_{i,t} = & \alpha_i + \eta \cdot \text{flow}_{i,t-1} + \beta_1 \cdot \Delta(\text{AE dollar index})_{i,t} + \beta_2 \cdot \Delta\text{VIX}_{i,t} \\ & + \delta \cdot \Delta(\text{policy rate differential})_{i,t-1} + \gamma \cdot \text{controls}_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

As the first global factor, we use the US dollar index against AEs only, to alleviate the endogeneity issues mentioned above. As the second global factor, we consider the VIX given its prominence in the literature (but financial condition indices provide a similar picture; see the annex). Finally, among interest rate differential variables, we include the change in the policy rate differential⁹ (Graph A1). As is standard in the literature, we use lags of domestic variables (pull factors) to avoid endogeneity as they could be affected by capital flows (Hofmann et al (2022)). For statistical inference, we use standard errors corrected for cross-country and serial correlation.

As expected, the relative importance of the three drivers varies across types of flows (Graph 3). For local currency bond flows, the AE-only dollar index has a much larger impact than the change in the VIX or in the policy rate differential. For equity flows, the change in the VIX is the most important driver, although the US dollar also matters. For FX bond flows, we do not find any significant drivers. Finally, the change in the policy rate differential emerges as the most important driver of FX loan flows.

Regarding the economic magnitude of the effects, the US dollar also stands out among the candidate drivers. Specifically, a one standard deviation depreciation of the US dollar against other AE currencies tends to increase local currency bond and equity flows to EMEs during the same month by 0.29 and 0.16 percentage points, respectively (Graphs 3.A and 3.B).¹⁰ By contrast, it does not have a significant impact

⁸ Miyajima and Shim (2014) find that retail and institutional investor flows to mutual funds investing in EME assets and the total returns on these assets in US dollar terms reinforce each other. See also Brandão-Marques et al (2022) for evidence on return-chasing by EME mutual funds.

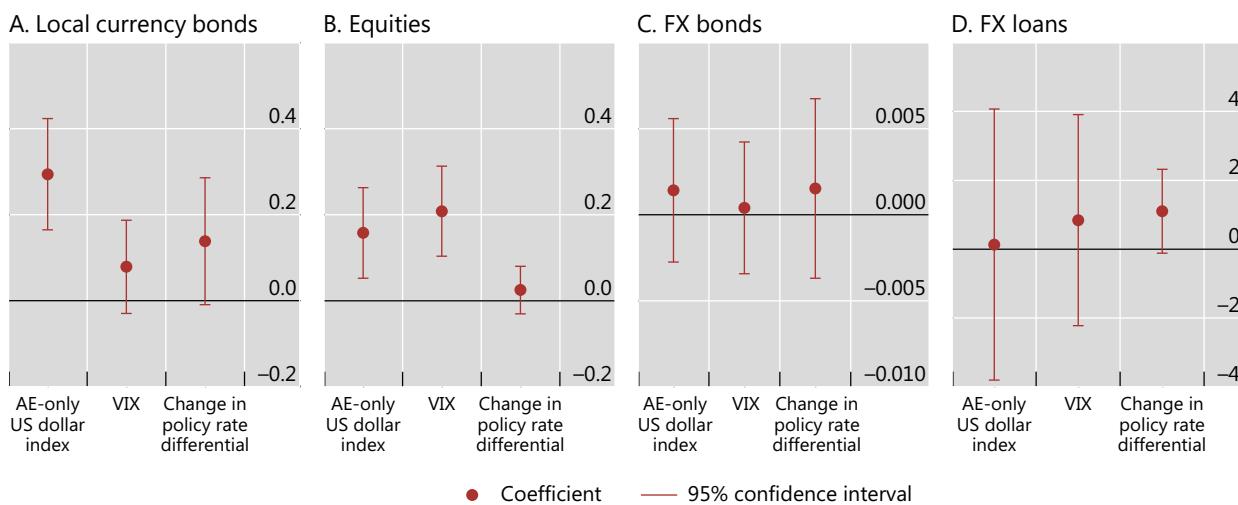
⁹ Neither the level of the policy differential nor the level of the five- or 10-year yield differentials and their changes seem to be strongly correlated with any of the four types of flows considered here.

¹⁰ The higher sensitivity of bond flows to global factors compared with equity flows is in line with the findings reported by Brandão-Marques et al (2022).

Standardised impact of global factors and policy rate differential on capital inflows¹

Coefficient on the standardised explanatory variables

Graph 3



¹ Each dot shows the change in the ratio of capital flows to total foreign holdings in percentage points in response to a one standard deviation depreciation of the US dollar against AE currencies, a one standard deviation decrease in the VIX or a one standard deviation increase in the change in the policy rate differential. The contemporaneous value of the first two variables and the one-period lagged value of the third variable are included jointly in monthly regressions of portfolio flows and quarterly regressions of FX loan flows, together with one-period lagged dependent variable and controls (US CPI, EME CPI, US industrial production (IP), EME IP, Brent oil price; for equities, EME and US equity market returns are also included).

Sources: Federal Reserve Bank of St Louis; Institute of International Finance; Bloomberg; BIS global liquidity indicators; BIS international debt securities statistics; authors' calculations.

on either FX bond or loan flows¹¹ (Graphs 3.C and 3.D).¹² A one standard deviation fall in the VIX raises equity flows by 0.21 percentage points, but has no significant effect on any other flow types. Finally, a one standard deviation increase in the policy rate differential boosts FX loan flows by 1.1 percentage points in the next quarter¹³ and local currency bond flows by 0.14 percentage points in the next month.¹⁴ Overall, these results support the important role of the US dollar in driving local currency flows.¹⁵ A stronger dollar reduces foreign investment in local currency assets, presumably through its effects on investors' balance sheets and risk appetite, as well as on US dollar return-chasing investors. And the impact is greater than that of the policy rate differential. By contrast, the US dollar is not important for FX flows. Finally, rising EME policy rates attract more FX loan inflows as it becomes more cost-efficient to borrow in US dollars.

¹¹ When we consider the broad US dollar index instead of the AE-only dollar index, we find a significant impact on FX loan flows to EMEs, in line with Avdjiev et al (2017).

¹² This may be explained by the limited valuation effect of fluctuations in the US dollar on the balance sheet of US dollar-based lenders and the clientele effect that dollar-denominated bonds are held by more stable insurance companies and pension funds.

¹³ A one standard deviation decrease in the US policy rate increases FX loan flows by 1.3 percentage points. This result confirms that the impact of changes in the policy rate differential on FX loan flows is driven by changes in the US policy rate.

¹⁴ When we consider the impact of an increase in the five- or 10-year bond yield differential, instead of that in the policy rate differential, on local currency bond flows, we do not find a significant impact.

¹⁵ Our estimates can be regarded as a lower bound of the true effects of fluctuations in the US dollar given that we focus on the AE-only US dollar index.

Given the growing importance of mutual funds in local currency flows to EMEs, we investigate their sensitivity to the US dollar further by using mutual fund flow data. We relegate the results to the annex for brevity. A one standard deviation depreciation of the AE-only dollar index increases EPFR bond and equity fund flows by 0.43 and 0.20 percentage points, respectively, which is larger than the corresponding increase by 0.29 and 0.16 percentage points reported in Graph 3. This result suggests that the growing share of mutual funds is probably a factor behind the rising role of the US dollar for local currency asset flows.¹⁶

Finally, we also consider the role of financial conditions as opposed to the VIX, with broadly similar results (again reported in the annex for brevity). The financial conditions proxy we use, the Goldman Sachs Global Financial Conditions Index (FCI), exhibits properties that are similar to those of the US dollar and the VIX. It is highly correlated with local currency bond and equity flows, but not with FX loan or bond flows. Its impact on local currency bond flows is less marked than that of the AE dollar index, but it is larger for equity flows. This pattern is not surprising since the FCI comprises a policy rate, a long-term riskless bond yield, a corporate credit spread, a measure of equity valuations and a trade-weighted exchange rate (Arnaut and Bauer (2024)). In fact, its correlation with the dollar and the VIX is high (0.45 and 0.62, respectively). It is, however, remarkable that the simple AE-only dollar index still outperforms the FCI for local currency bond flows, suggesting that the exchange rate mechanism through investors' balance sheets is very powerful.

Has the impact of global factors changed over time?

Has the US dollar always been a key driver of local capital flows, or is this a recent phenomenon? How has the importance of other global drivers evolved? Considering the increasing importance of foreign investment in local currency assets in external financing by EMEs, we focus on the time-varying impact of the AE-only dollar index and the VIX on local currency bond and equity inflows.

After the GFC, the sensitivity of local currency bond and equity flows to the dollar's strength rose and peaked around 2011–12, before declining rapidly towards zero in 2013–14, around the "taper tantrum" (Graphs 4.A and 4.C). This pattern reflects the unusually large capital flows to EMEs during that period, which coincided with a depreciation of the US dollar. Avdjiev et al (2020) argue that flows were particularly sensitive to US monetary policy around that time, due to a higher degree of monetary policy convergence among AEs, with US monetary policy serving as a stronger indicator of global monetary policy trends.¹⁷

Since the trough in 2014, the sensitivity of local currency bond and equity flows to the strength of the US dollar has gradually risen (Graphs 4.A and 4.C). The increasing sensitivity can be explained by the combination of a larger share of local currency assets in global investors' portfolios as well as the increasing share of mutual funds and exchange-traded funds (ETFs) in foreign holdings of EME bonds and

¹⁶ The coefficient on the VIX (−0.59) is also larger for bond fund flows than for overall BOP bond flows (−0.08).

¹⁷ For example, US-domiciled investors increased their holdings of EME local currency bonds from \$30 billion to \$155 billion (Bertaut et al (2024)).

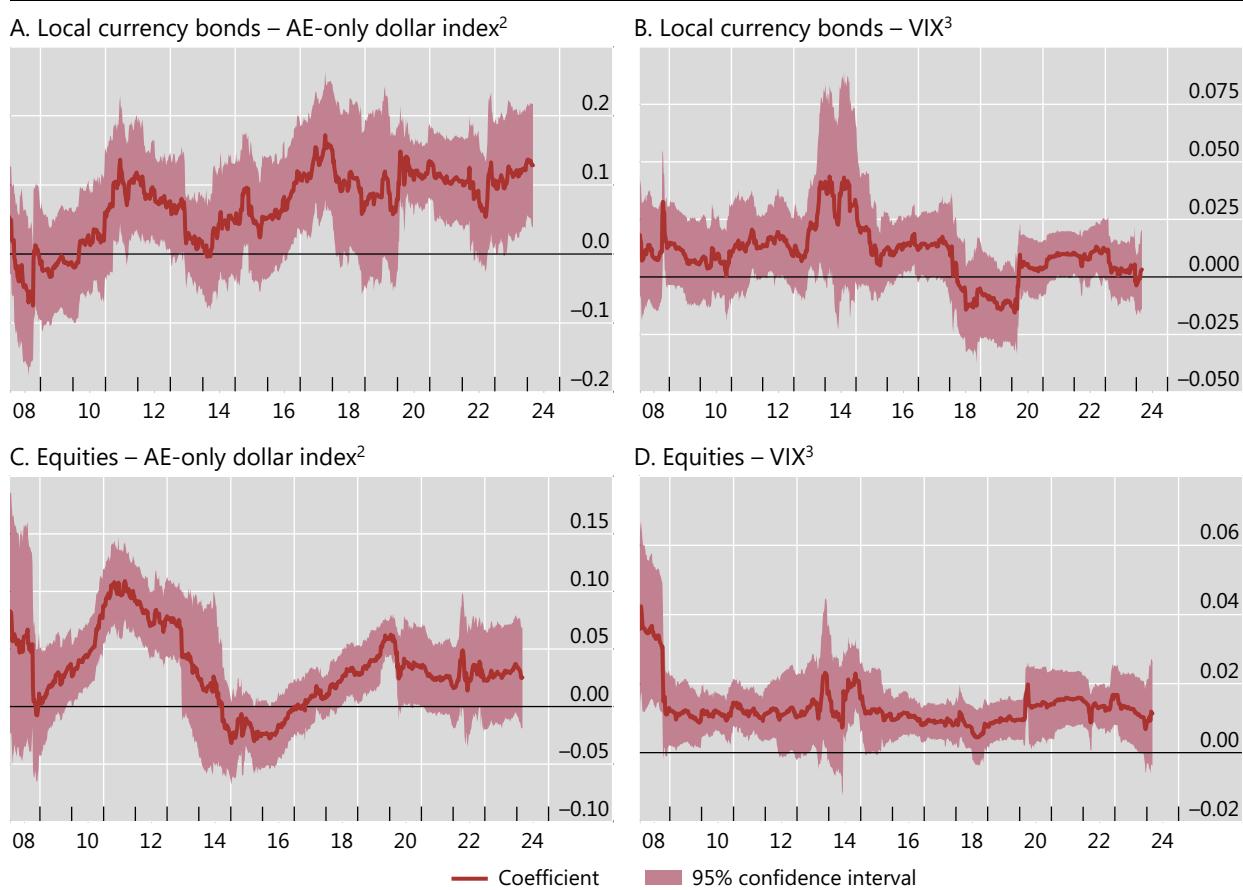
equities (Schmidt and Yeşin (2023)).¹⁸ These funds display a greater sensitivity to the dollar than other investors (Graph A2 in the annex). Moreover, the lengthening maturity of EME local currency bonds has probably accentuated the responsiveness to US dollar fluctuations (Bertaut et al (2024)).

In contrast to the dollar, the impact of the VIX on local currency bonds declined starting around 2014 and has remained weak since 2017 (Graph 4.B). This is consistent with the findings of Forbes and Warnock (2020) that the relationship between extreme capital flow episodes and the VIX has weakened after 2010, as well as those in Miranda-Agrippino and Rey (2020) who find a reduced correlation between the VIX

Changing impact of global factors on portfolio inflows to EMEs¹

Coefficient

Graph 4



¹ The red line shows the change in the ratio of capital flows to total foreign holdings in percentage points in response to a 1% depreciation of the US dollar against AE currencies or a one-unit decrease in the VIX. The regressions use two-year moving windows with weekly data. The contemporaneous value of these two variables and the one-period lagged value of the change in the policy rate differential are included jointly in regressions, together with the one-period lagged dependent variable and one-period lagged controls (US CPI, EME CPI, US industrial production (IP), EME IP, Brent oil price; for equities, EME and US equity market returns are also included). The shaded area shows the 95% confidence interval. ² A positive coefficient means that a 1% depreciation of the US dollar against other AE currencies increases capital flows. ³ A positive coefficient means that a one-unit decrease in the VIX index increases capital flows.

Sources: Federal Reserve Bank of St Louis; Institute of International Finance; Bloomberg; authors' calculations.

¹⁸ Between end-2015 and end-2021, foreign holdings of EME local currency bonds rose 1.7 times from about \$651 billion to about \$1,123 billion (Onen et al (2023)). Over the same period, the total amount of assets managed by global and regional EME local currency bond funds in the Lipper database increased 2.1 times from \$79 billion to \$167 billion.

and the global financial cycle.¹⁹ In addition, the decline in credit risk and the increase in policy transparency in many EMEs over the past decade may also have played a role, if it has reduced the sensitivity of the risk component of local currency bonds to the VIX.²⁰ By contrast, the VIX has remained highly correlated with equity flows to EMEs in both tranquil and stress periods (Graph 4.D), probably due to the close linkage between US and other major EMEs' equity markets and volatility spillovers from US to EME markets (Hattori et al (2021)).

Conclusions

This article presents novel evidence on the importance of the US dollar as a proximate driver of local currency portfolio flows to EMEs for both bonds and equities. Its significance is in line with its effects on global investors' risk-taking propensity. It is also consistent with US dollar return-chasing behaviour of mutual funds, which are the most important investor type in EME local currency bonds. By contrast, we do not find a significant link between the US dollar and FX flows, whether loans or bonds. This may reflect the limited effect of the dollar's swings on the balance sheet of lenders and the more important role of stable and carry-oriented investors in these types of bonds, such as insurance companies and pension funds (Bertaut et al (2024)).

Interestingly, policy rate differentials play only a subordinate role in driving the capital flows considered in our study. Increases in the policy rate differential vis-à-vis the United States attract yield-oriented investors in EME local currency bond markets. But their effects on these flows are considerably lower than those of changes in the US dollar. By contrast, rises in the policy rate differential affect FX loan flows to EMEs by making borrowing in US dollars more attractive.

When assessing the changing role of various global factors over time, we find that the importance of the general strength of the US dollar for local currency bond and equity flows has gradually increased since a trough around 2014. The impact of the VIX on local currency bond flows, by contrast, has weakened somewhat since then. The overall change in the composition of portfolio and bank capital flows towards local currency flows, and the increasing role of mutual funds as EME investors since the GFC are likely to be key factors behind the US dollar's rising importance as a driver for aggregate capital flows.

These findings shed light on the current debate on whether some EMEs, especially those with narrowing interest rate differentials against the United States, may face capital outflows. For example, if the policy rate differential for an EME increases due to a fall in the federal funds rate, the EME may see local currency bond and FX loan inflows. If the US dollar weakens against other AE currencies at the same time, the EME may face local currency bond and equity inflows. The analysis of such

¹⁹ See also Erik et al (2020) for discussions on a weakened relationship between the VIX and capital flows to EMEs. In addition, Todorov and Vilkov (2024) shows that equity index option dealers effectively dampened the VIX in 2023 when they hedged option sales linked to the issuance of structured products.

²⁰ See Brandão-Marques et al (2018).

scenarios could help EMEs design the appropriate policy mix to mitigate the short-term impact of these shocks on capital flows and exchange rates.²¹

Finally, it will be helpful for EMEs to make efforts to deepen their FX, derivatives, bond and equity markets during normal times, in particular by building a diverse investor base (CGFS (2021)). For example, EMEs may need to be cautious about risks from an overreliance on mutual funds given their high sensitivity to US dollar fluctuations. Developing sufficient financial market capacity to deal with large capital inflows or outflows can help EMEs to mitigate undesirable amplifications between exchange rates, local currency asset prices and capital flows triggered by global factors (Doornik et al (2024)).

²¹ Patelli et al (2023) provide an account of how EME regions deployed different sets of policy mixes in response to rapid increases in inflation and tight global financial conditions in 2022–23.

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Annex

This annex describes the data, empirical specification and the choice of explanatory variables for the baseline regressions.

Data on capital flows

For local currency bond and equity flows, we use monthly data on local currency bond flows to 16 EMEs and those on equity flows to 17 EMEs available from the Institute for International Finance Portfolio Flows Tracker. The data follow standard BOP definitions: a flow is recorded when there is a transfer of ownership of an EME asset between a resident and a non-resident. By contrast, fund flows only track investor flows to and from EME-dedicated mutual funds and ETFs and do not reflect the purchase and sale of EME assets by other types of investors such as institutional investors, hedge funds and sovereign wealth funds. We normalise gross bond (equity) flows to an EME's local currency bond (equity) market over a month by the total outstanding size of foreign holdings of the EME's local currency bonds (equities) at the beginning of the month, obtained from BOP data. We then subtract the 10-year moving average of the flow variable for each country to control for country-specific capital flow trends.²²

We obtain data on FX-denominated bond flows from the BIS international debt securities statistics. In particular, we use the net issuance amount of bonds by entities in 15 EMEs and denominated in foreign currencies such as the US dollar, euro and Japanese yen. We use the outstanding amounts at monthly frequency, assuming that all FX-denominated bonds issued by EMEs are purchased by foreign investors. Again, we normalise FX bond flows (ie the net increase in the outstanding amount of FX bonds over a month) by the total outstanding amount of the EME's foreign currency bonds at the beginning of the month.

Finally, for FX banking flows, we employ quarterly²³ FX-denominated banking flows to non-banks for 10 EMEs from the BIS global liquidity indicators. We normalise FX banking flows (ie the net increase in FX loans extended by international banks to an EME's non-banks) by the total outstanding amount of FX loans outstanding to the EME's non-banks at the beginning of the quarter.

Data on capital flow drivers

We now turn to the variables we use as main explanatory variables of capital flows.

Moving on to global risk appetite indicators, we only use the US dollar index against AE currencies to alleviate concerns over the possibility of EME fundamentals driving exchange rate movements, or capital flows to EMEs affecting a US dollar index via the bilateral EME exchange rates against the US dollar. In particular, we use the following variables: (i) AE-only US dollar index obtained from the Nominal Major Currencies USD Index in FRED (as in Kalemli-Özcan and Unsal (2024) and Cristi et al (2024)); and (ii) ICE DXY, which tracks the performance of a basket of 6 global

²² We obtain similar results when we use the percentage flow variable without adjusting for the trend.

²³ Because monthly data on FX loans are unavailable, we use quarterly data for FX loan flow regressions.

currencies against the US dollar. We do not use the broad US dollar index because the basket includes bilateral exchange rates of the US dollar against EME currencies.

For indicators of global financial conditions, we consider: (i) the percentage change in the Goldman Sachs Global Financial Conditions Index (FCI); (ii) the change in the VIX; and (iii) the change in the MOVE index. We use the change in these variables instead of their level because we are interested in capturing the short-term or immediate impact of changing global financial conditions on capital flows to EMEs.

For interest rate differentials, we consider both the policy rate and long-term bond yields, both in level and changes. For the policy rate differential, we use the policy rate differential between an EME and the United States in percentage points. We also employ the five- and 10-year local currency government bond yield differentials between an EME and the United States.

Finally, in our empirical analysis we include inflation and industrial production in EMEs and the United States as control variables. We also include Brent oil prices as a proxy for global commodity prices, since commodity prices are important for commodity exporters. For regressions on equity flows, we also include the equity market returns in EMEs and the United States.

Towards the baseline regression specification

To arrive at our baseline specification, we first run regressions including one contemporaneous global factor or one lagged interest rate differential variable at a time, the lagged dependent variable and the set of lagged control variables, as well as country fixed effects. The frequency is monthly for portfolio flows and quarterly for FX banking flows. We include the lagged dependent variable in the regressions even though the serial correlation of monthly local currency bond, equity and FX loan inflows is small. We also focus on the contemporaneous impact of global factors, which are unlikely to be affected by capital flows to EMEs.²⁴ We use one-period lagged interest rate differential variables because capital flows to an EME in the same period may affect the EME's policy rate decision in the current period. Finally, we use Driscoll-Kraay (1998) standard errors to correct for cross-sectional and serial correlation.

Based on the size and statistical significance of the coefficients reported in Graph A1, we choose the key explanatory variables in the baseline specification. First, the AE-only dollar index has consistently larger effects on capital flows than the ICE DXY. Therefore, we use the AE-only dollar index as the first global factor. Between the FCI, the VIX and the MOVE index, we use the VIX as the second global factor because it has been widely used as an indicator of global risk appetite. When we use the FCI instead of the VIX, the FCI has a significant impact on equity flows and is the most important driver of equity flows (Graph A2). Finally, among interest rate differential variables, the level of the three interest rate differentials is statistically insignificant for all types of flow. Among the change in interest differentials, the change in policy rate differential is significant for FX loan and local currency bond flows. Therefore, we choose the change in the policy rate differential for our baseline specification.²⁵

²⁴ The main results hold when we consider the lagged global factors instead.

²⁵ Low correlation among the three explanatory variables implies that collinearity is not a concern.

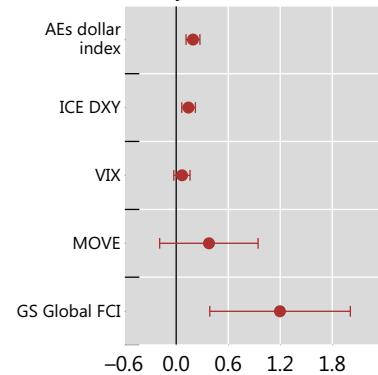
Impact of global factors and interest differentials on portfolio and banking flows to EMEs¹

Coefficient

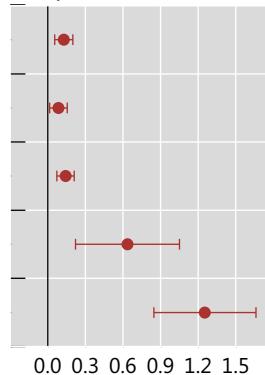
Graph A1

Global factors

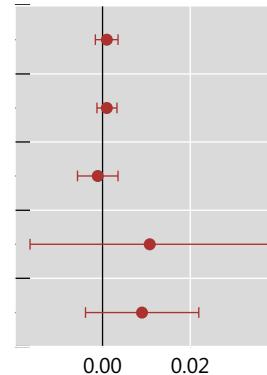
A. Local currency bonds



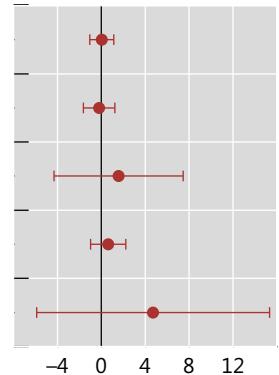
B. Equities



C. FX bonds

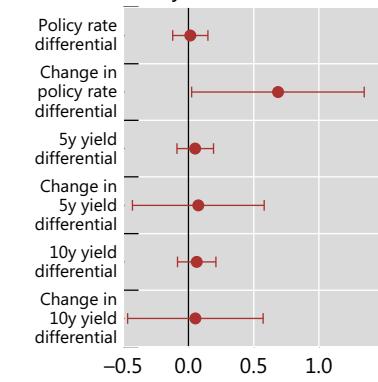


D. FX loans

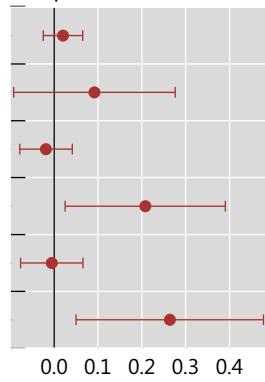


Interest rate differential variables

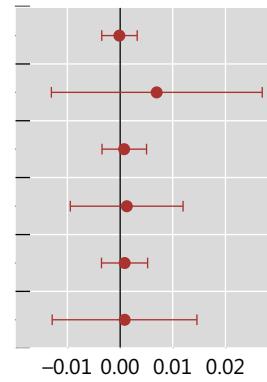
E. Local currency bonds



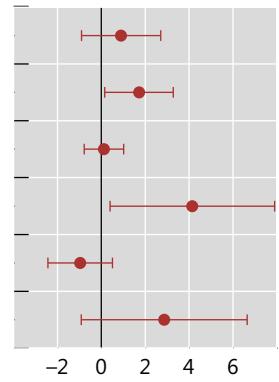
F. Equities



G. FX bonds



H. FX loans



● Coefficient — 95% confidence interval

¹ Each dot shows the change in the ratio of capital flows to total foreign holdings in percentage points in response to a 1% depreciation of the US dollar against seven AE currencies (AE-only dollar index) and against six AE currencies (ICE DXY), a 1% increase (ie tightening) in the Goldman Sachs (GS) Global Financial Conditions Index (FCI), a one-unit decrease in the VIX or MOVE index, or a 1 percentage point increase in interest rate differentials. The current period value of each global factor, or the one-period lagged value of each interest rate differential variable is included individually in separate monthly (quarterly) regressions of portfolio (bank) flows, together with the lagged dependent variable and lagged controls (US CPI, EME CPI, US industrial production (IP), EME IP and brent oil price). For equities, EME and US equity market returns are also included.

Sources: Federal Reserve Bank of St Louis; Institute of International Finance; Bloomberg; Goldman Sachs Global Investment Research; BIS global liquidity indicators; BIS international debt securities statistics; authors' calculations.

Changing impact of the dollar on BOP portfolio inflows and mutual fund flows^{1, 2}

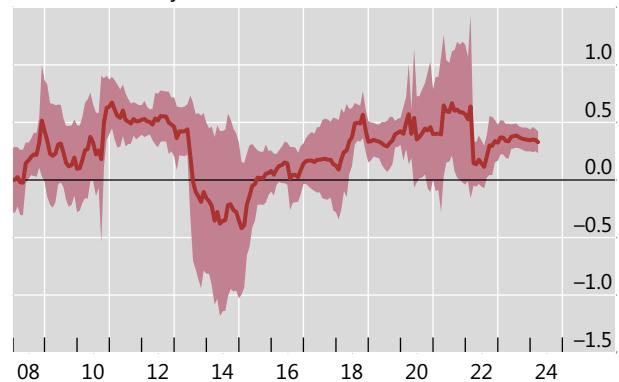
Coefficient

Graph A2

A. IIF weekly local currency bond flows



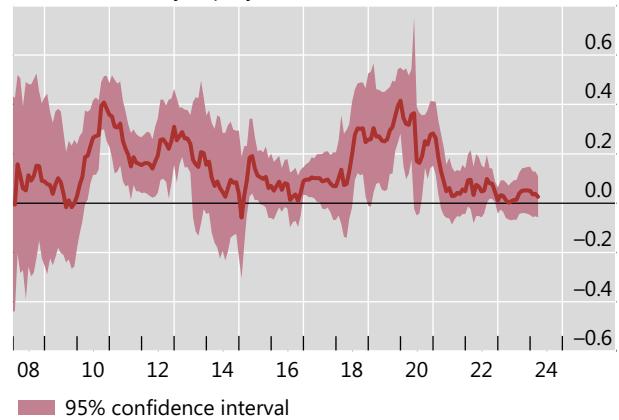
B. EPFR monthly bond fund flows



C. IIF weekly equity flows



D. EPFR monthly equity fund flows



— Coefficient ■ 95% confidence interval

¹ The red line shows the change in the ratio of capital flows to total foreign holdings (or total fund holdings) in percentage points in response to a 1% depreciation of the US dollar against AE currencies. The regressions for local currency BOP bond and equity flows use two-year moving windows with weekly data, while the regressions for EPFR bond and equity fund flows use two-year moving windows with monthly data. The contemporaneous value of the percentage change in the AE-only dollar index and the VIX change and the one-period lagged value of the change in the policy rate differential are included jointly in regressions, together with the one-period lagged dependent variable and one-period lagged controls (US CPI, EME CPI, US industrial production (IP), EME IP and Brent oil price; for equities, EME and US equity market returns are also included). The shaded area shows the 95% confidence interval. ² A positive coefficient means that a 1% depreciation of the US dollar against other AE currencies increases capital flows.

Sources: Federal Reserve Bank of St Louis; Institute of International Finance (IIF); Bloomberg; EPFR; authors' calculations.

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International finance through the lens of BIS statistics: bank exposures and country risk¹

The BIS consolidated banking statistics (CBS) are one of the few data sets to provide banks' consolidated exposures to individual countries. The consolidated perspective shifts the focus from where banking activity takes place to who drives this activity and bears the risks. Originating after the Latin American debt crisis of the 1980s, the CBS provide the most comprehensive measures of banks' consolidated exposures to countries and sectors. They have helped policymakers, market participants and researchers understand bank exposures, country risk, and how financial stresses spill over from one country to another.

JEL classification: F23, F31, F36, G15.

Sovereign defaults, sanctions, payment moratoriums, financial and economic crises, wars and natural disasters: all such events have macroeconomic consequences that expose creditor banks to potential losses. The largest global banks operate in scores of countries; their balance sheets straddle national borders. A bank's capital will be affected by losses no matter where they happen. Moreover, losses on exposures to one country can have implications for borrowers elsewhere, as banks adjust their global balance sheets in response. Understanding how stresses propagate through banks' balance sheets across countries is a key aspect of financial stability analysis. Data on the geography – ie country and sector – of banks' global exposures are a critical input that is unavailable in most bank disclosures.

This feature is a primer on how BIS international banking statistics can be used to understand the geography of banks' country exposures. Examples include Japanese banks' global expansion in the 1980s; European banks' retrenchment after the 2007–09 Great Financial Crisis (GFC) and the 2010–12 euro area sovereign debt crisis; and, more recently, banks' unwinding of exposures to Russia after the sanctions imposed in 2014 and 2022.

Understanding such developments requires statistics that capture the *geography* of banks' *consolidated* worldwide exposures. These should reveal the countries to which banks are exposed, and the countries in which they operate. The long list of

¹ This is the third feature in a series showcasing the BIS international banking and financial statistics, following McGuire et al (2024a, 2024b). We thank Iñaki Aldasoro, Douglas Araujo, Stefan Avdjiev, Claudio Borio, Gaston Gelos, Robert McCauley, Swapan-Kumar Pradhan, Andreas Schrimpf and Hyun Song Shin for their helpful comments, and Jhuvesh Sobrun for excellent research assistance. The views expressed are those of the authors and do not necessarily reflect those of the Bank for International Settlements.

Key takeaways

- *The BIS consolidated banking statistics (CBS) track banks' exposures to country risk, ie the risk arising from macroeconomic events or policies in a given jurisdiction.*
- *The CBS are compiled following supervisory practices, and thus provide information about on-balance sheet positions as well as other potential off-balance sheet exposures.*
- *Consolidation in the CBS shifts the focus from where banking activity takes place to who drives this activity. The CBS reveal the size, type and evolution of banks' exposures to countries.*

credit events and crises since the 1970s are recurrent reminders of the need to measure banks' exposure to *transfer risk* – the risk of non-payment by obligors in a particular jurisdiction due to policies taken in that jurisdiction – and to *country risk* more generally – the risk associated with the economic, business, political and social environment in which the debtor operates.

While supervisory authorities monitor the geography of individual home banks' exposures, the BIS consolidated banking statistics (CBS) provide a global view. Consolidation follows the contours of the banks' global balance sheets, including those of affiliates abroad, and allocates all positions to the country of banks' headquarters (ie home country) where decisions that affect the whole balance sheet are made (eg *French* banks). Intragroup positions are netted out, leaving only positions with unaffiliated entities. This makes the CBS ideal for measuring banks' financial exposures. The CBS thus complement residence-based banking statistics (eg banks *located* in France) by revealing *who* drives changes in global banking positions.

The CBS are a key input for various areas of policy interest. First, for more than four decades, they have been a primary tool to assess banks' aggregate potential losses. They complement micro-level supervisory data and facilitate analysis of how crises spill over across borders. Moreover, the CBS have in some cases yielded early warnings of perceived changes in borrowers' creditworthiness. As concerns about country risk mount, banks may seek third-party guarantees before rolling over maturing credits, hedge their exposures in derivatives markets or curtail credit to borrowers that lack corporate parent guarantees.

Second, the CBS record the *maturity structure* of banks' claims. This helps in assessing the flexibility banks have to unwind outstanding positions and provides critical information for national authorities about the risk of a sudden stop to countries' external debt flows. When global banks retrenched in the wake of the GFC, countries that had borrowed mainly short-term saw outsize contractions in credit.

The CBS thus shed light on the way banks adjust their exposures in response to material changes in country risk. For instance, as Greece's credit rating fell in 2010, banks shed exposures to borrowers in Greece and transferred risk out of the country. In 2022, cross-border claims and guarantees on entities in Russia also declined substantially, more so than the local operations of foreign banks in Russia.

The feature proceeds as follows. The first section covers the origin of the CBS and the underlying concepts (further detailed in a box and the annex). The second and third sections examine concentration in banking and the measurement of country risk. The fourth section explores how the CBS are useful in analyses of policy-relevant topics. The final section concludes.

Origin and evolution of the CBS

The origin of the CBS lies in the expansion of international banking activity in the Caribbean and other financial centres in the 1970s, when little information was available about such activity. Many central banks had for decades collected residence-based data to compile the BIS locational banking statistics (LBS). They directed banks to report claims – ie loans, holdings of debt securities and other financial instruments – booked at offices abroad with those of their head offices. Banks began reporting claims with maturity and geographical breakdowns, although only vis-à-vis emerging market economies (EMEs).²

The evolution of the CBS has followed the lessons from the history of financial crises (Caruana (2017)). The collection was formalised in response to the Latin American debt crisis in the 1980s. At the time of the Mexican sovereign default in 1982, attention was focused on **transfer risk**, ie the risk associated with policy measures with a territorial scope that prevent the withdrawal of funds from a country, such as capital controls and payment moratoriums (McGuire and Wooldridge (2005)). Banks were asked to fully consolidate their *foreign claims* – ie claims on borrowers residing outside their home country – with inter-office positions netted out. This measure includes cross-border claims as well as *local claims* – ie claims of a bank's foreign affiliate on residents of the host country. This approach differs substantially from the LBS and other data sets used in international finance that aggregate balance sheets from a (residence-based) national accounts perspective rather than (consolidated) supervisory perspective.³ The BIS first published the CBS on an *immediate counterparty basis* (CBSI) in 1983 based on data reported by 15 countries (see technical annex), with claims broken down by the country where the contractual borrower resides.

With the Asian financial crisis of 1997–98, attention shifted from transfer risk to the broader concept of **country risk**, which refers to country-wide events (eg economic, political, social) that could expose banks to losses. Measurement of country risk exposures requires more comprehensive data than for transfer risk exposures. For example, guarantees and collateral received that offset exposures can lower banks' exposure to country risk. At the same time, banks' have *potential* exposures which are not included in claims that can increase exposure to country risk.

The CBS were thus adjusted to provide more information that better reflected banks' approach to risk management. This included reporting of guarantees received and other credit enhancements that result in the reallocation of exposures from the country of the immediate counterparty to that of the ultimate obligor (see box).⁴ In addition, in response to banks' growing derivatives and asset management business,

² To be precise, banks reported their claims on borrowers residing in non-reporting countries, most of which were EMEs. This feature uses "emerging market economies (EMEs)" as a short form for *Emerging markets and developing economies*, the set of economies not classified as advanced economies (AEs) in the BIS country grouping convention.

³ Banks' public financial statements usually itemise their consolidated balance sheet by instrument but often lack information on country exposures. By contrast, the EU-wide transparency exercise conducted by the European Banking Authority details banks' sovereign exposures by country.

⁴ In addition, efforts were made to improve the timeliness, frequency and coverage of the CBS. In 2000, quarterly rather than semiannual publication began, the reporting lag was shortened, additional banking systems joined the reporting population and the counterparty country breakdown was expanded to include (from Q2 1999) all countries instead of only EMEs.

they began to separately report their derivative exposures.⁵ Finally, banks began to report their potential exposures to countries in the form of undisbursed credit commitments and guarantees provided. The BIS in 2005 began publication of the CBS on a *guarantor basis* (CBSG), which captures these elements.

Further enhancements were introduced in the wake of the GFC, which highlighted the need for better data on major banking systems' funding and lending (Avdjiev et al (2015)). Coverage of banks' balance sheets was expanded to include their domestic positions, ie positions vis-à-vis residents of the home country. And additional granularity on the sector of banks' counterparties was added, notably banks' exposures to non-bank financial counterparties (García-Luna and Hardy (2019)). Successive rounds of expansion thus resulted in the structure of the CBS available today (see box and annex).

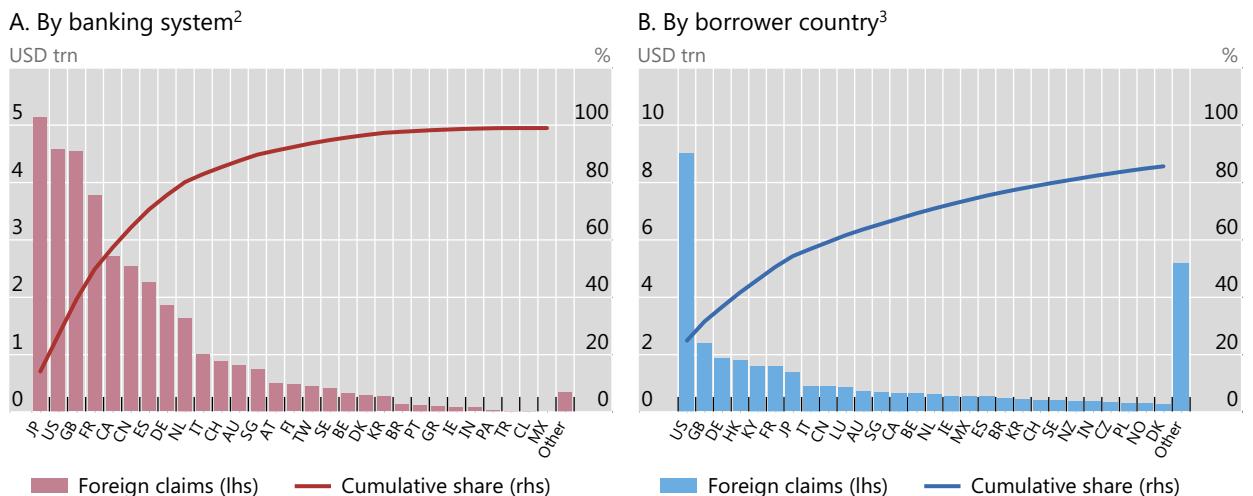
Concentration in banks' country exposures

The consolidated perspective of the CBS shifts the focus from *where* banking activity takes place to *who* drives this activity. Multinational banks, like corporates, have operations in, and exposure to, countries around the world, and their decisions affect multiple economies at the same time. Thus, the country exposure of banks and the impact of corporate decisions are better understood by focusing on their consolidated balance sheets (McGuire and von Peter (2012)).

Taking a consolidated perspective reveals a remarkable degree of concentration in decision-making in international banking. Banks headquartered in a mere four countries (Japan, the United Kingdom, the United States and France) accounted for

Concentration in foreign claims at end-Q1 2024¹

Graph 1



¹ The bars show worldwide consolidated foreign claims. Foreign claims of Chinese banks are estimated from data reported in the LBS. See technical annex for details. ² "Other" reporting countries are not shown separately due to confidentiality. ³ "Other" is an aggregate of more than 180 other countries and jurisdictions available individually.

Sources: BIS consolidated banking statistics; BIS locational banking statistics by nationality.

⁵ Banks derivatives activity expanded in the 1990s (McCauley et al (2002), Domanski et al (2003)). In the LBS, derivatives are included in claims, along with loans, holdings of debt securities and other instruments. In the CBS, derivatives are reported separately from other claims (see Box A).

half of global foreign claims at end-Q1 2024 (Graph 1A).⁶ These four countries are home to 17 of the 29 global systemically important banks (G-SIBs) that have operations in more than 160 jurisdictions. With consolidation, financial positions booked by affiliates in financial centres (eg the Cayman Islands) "disappear" as assets (and liabilities) are reallocated to the countries where the parent companies that own (owe) them are headquartered (McGuire et al (2024a)).

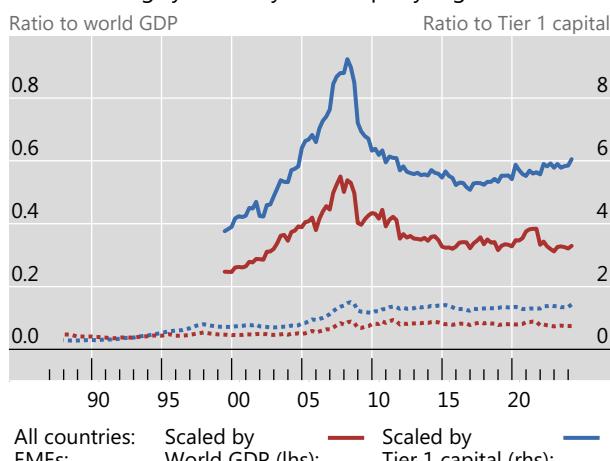
Foreign claims are not quite as concentrated on the counterparty side, although the United States stands out as an obligor to roughly a quarter of the global total (Graph 1.B). Claims on the United States are prominent due to the dominance of the US dollar in international finance and the size of the US economy; many non-US banks hold US Treasuries and have local operations in the United States that extend credit to corporates and other borrowers there (McGuire et al (2024b)). Claims on three financial centres, the Cayman Islands, Hong Kong SAR and the United Kingdom, are also substantial, jointly accounting for 16% of global foreign claims.⁷ The remaining 59% of foreign claims are distributed across more than 200 jurisdictions.

Banks' foreign claims have evolved significantly over time, outpacing global economic activity and bank capital in some periods. In the run-up to the GFC, total foreign claims soared to more than 50% of global GDP (Graph 2.A, solid red line), which significantly stretched banks' regulatory capital bases (solid blue line). The retrenchment in the wake of the GFC reflected a massive deleveraging, mainly by European banks, and stricter regulation that required banks to hold more regulatory capital (Graph 2.B). Other banking systems, eg US, Japanese and Canadian banks, saw smaller disruptions in the trajectory of their foreign claims relative to capital.

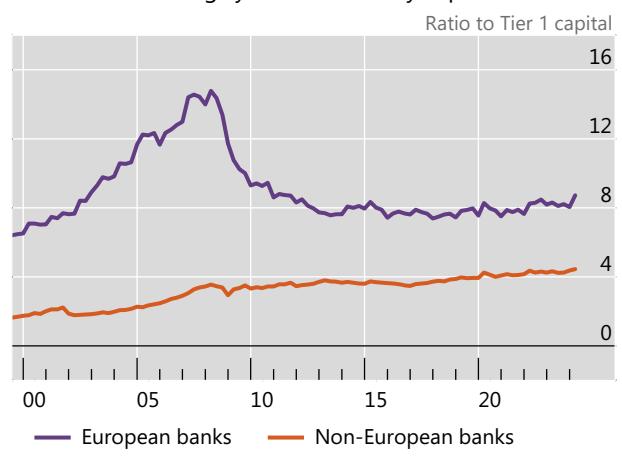
The rise and fall of banks' foreign claims¹

Graph 2

A. All banking systems, by counterparty region



B. Selected banking systems, scaled by capital



¹ Eleven countries did not report foreign claims (CBSI) before Q4 2000. See technical annex for details.

Sources: FitchConnect; IMF, *World Economic Outlook*; BIS banking list; BIS consolidated banking statistics; authors' calculations.

⁶ Thirty-one countries report the CBS as of 2024, capturing the bulk of global consolidated banking positions. One major non-reporting country is China; a lower-bound estimate of Chinese banks' consolidated claims can be derived from the BIS locational banking statistics by nationality.

⁷ Banks' exposures are fully consolidated by nationality; however, on the counterparty side, the definition of a country remains residence-based (box in McGuire et al (2024a)).

Box A

The structure of the BIS consolidated banking statistics (CBS)

Bryan Hardy, Patrick McGuire and Goetz von Peter^①

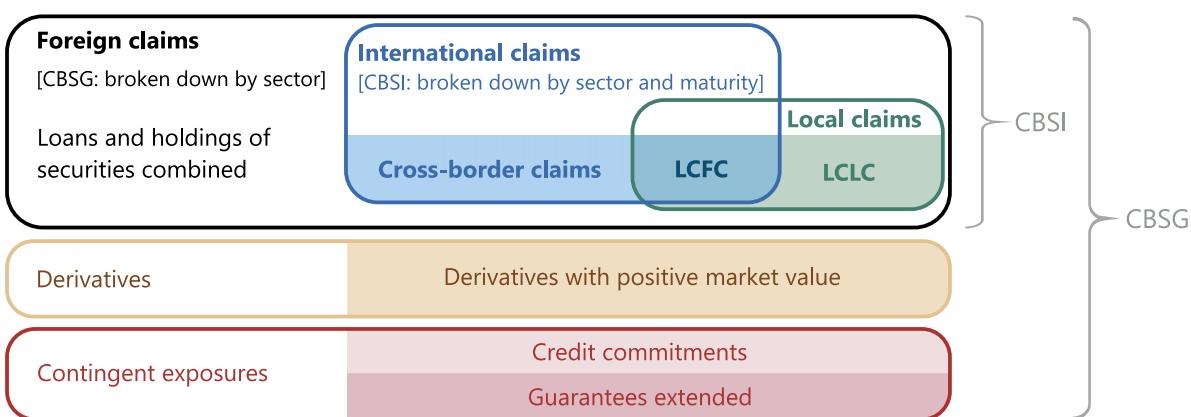
The CBS is one of the few statistical collections that provides a *geography* of banks' consolidated exposures. The statistics are compiled following supervisory principles to capture current and potential exposures to counterparties in particular countries and sectors. This box provides an overview of the structure of the CBS.

Reporting banks' positions are consolidated and then grouped by nationality, defined by the country of the supervisor of the global consolidated banking group (typically the country of headquarters). Banks report their on-balance sheet claims (assets) (Graph A1); only limited data on liabilities are collected. *Claims* comprise loans and holdings of securities (debt and equity). *Derivatives* claims are reported separately: only derivatives that give rise to a counterparty risk are reported; thus, derivative exposures are calculated as the positive market value of outstanding contracts.^② Banks also report contingent exposures: *credit commitments* (eg credit lines) are irrevocable contractual obligations which, if utilised, result in the extension of a loan or purchase of a security; *guarantees extended* are contractual obligations to a third party if the bank's client fails to fulfil them.

The focus of the CBS is on *foreign claims* (FC), ie claims on counterparties outside the bank's home country. The counterparty country breakdown has been expanded over time, from emerging market economies (EMEs) since 1983 to all counterparties (more than 200 countries and jurisdictions) in 1999. In 2013, domestic claims on the home country were added, completing the worldwide consolidated view of banks' exposures.

Structure of the consolidated banking statistics

Graph A1



LCFC = local claims in foreign currency; LCLC = local claims in local currency.

Source: Authors' elaboration.

The CBS also shed light on the geography of banks' operations (Graph A1). Banks report foreign claims (FC) separately as cross-border or local, where $FC = XBC + LC$. Cross-border claims (XBC) are claims on non-residents booked by a bank's head office or a foreign affiliate. Local claims (LC) are those booked by a bank's affiliate on residents in the country in which the affiliate operates. Most local claims are in local currency and funded by local currency liabilities, while local claims in foreign currency are often funded from abroad in major currencies.^③ Hence, foreign claims can also be split into international claims (INTC) and local claims in local currencies (LCLC), where $FC = INTC + LCLC$. International claims comprise cross-border claims and local claims denominated in a currency foreign to the counterparty country. For derivatives and contingent facilities in the CBSG, banks report only total exposures on a given country regardless of where these are booked.

The CBS distinguish between the residence of the immediate counterparty and that of the ultimate guarantor. The latter refers to the counterparty ultimately responsible for servicing any outstanding obligations in the event of a default by the immediate counterparty, eg a loan to a German corporate entity in Brazil is recorded as a claim on Brazil on an immediate counterparty basis (CBSI). If the German parent guarantees the

loan to the entity, the bank records a claim on Germany in the CBSG, along with an outward risk transfer from Brazil and an inward risk transfer to Germany in the CBSI.^④ For any given counterparty country, CBSG foreign claims thus equal CBSI foreign claims plus net risk transfers:

$$\text{Foreign claims(G)} = \text{Foreign claims(I)} + \text{inward risk transfers} - \text{outward risk transfers}$$

Some types of claims are also broken down by maturity and by the sector of the counterparty. Counterparties are classified into the official sector (general government and central bank combined), unrelated banks or the non-bank private sector; the latter comprises non-bank financial institutions, households and non-financial corporations. Maturity information is available only for international claims (CBSI), in buckets of up to one, up to two and over two years of remaining maturity. The sector breakdown applies to international claims in the CBSI and to foreign claims in the CBSG. The technical annex elaborates on the reporting basis and valuation methods, and shows a table with the latest aggregate data covering the dimensions in Graph A1. Data availability depends on the confidentiality settings and reporting practices of individual reporting countries.

^① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. ^② This takes into account legally enforceable bilateral netting arrangements but not collateral. Contracts with negative market value are classified as liabilities. ^③ Banks also report their affiliates' local liabilities to local residents denominated in local currencies. ^④ The purchase of credit default protection, and legally enforceable guarantees and collateral, if recognised as a risk mitigant under the Basel Framework, all lead to risk transfers. For every outward risk transfer there is an equivalent inward risk transfer elsewhere, so in aggregate net risk transfers should equal zero.

Measuring exposure to country risk

For monitoring exposure to transfer risk, the most appropriate data are *international claims* on an immediate borrower basis (CBSI). Transfer risk arises from both components of international claims: cross-border claims as well as local claims denominated in *foreign currencies*, which are often funded from abroad. By contrast, local claims in local currencies are usually funded by local deposits in local currency – a typically stable form of funding – and so are not affected by restrictions on external payments. This is why they are not part of *international claims* (but are part of *foreign claims*; see box).⁸

By contrast, measures of exposure to overall *country risk* should be broadened to capture all exposures, as tracked in the CBSG. Local currency claims extended locally in host countries, as well as international claims, are subject to country risk. Thus, total *foreign claims*, which include both of these components, is the more appropriate measure for country risk exposure. Foreign claims are typically 60–80% greater than international claims in aggregate, as local positions in local currency can be significant (Graph 3.A). Large international banking groups often acquire local claims by taking over domestic banks operating in a particular country.

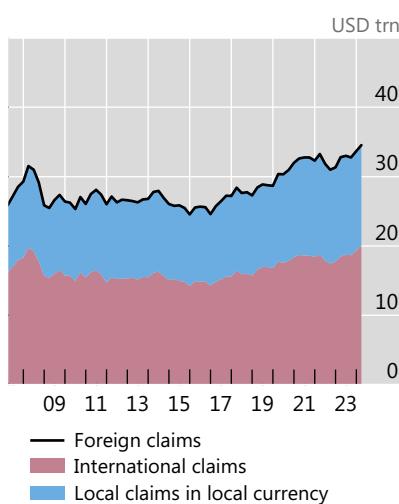
The CBS on a guarantor basis (CBSG) captures additional exposures to country risk beyond just loans and securities holdings (ie claims). These data also include derivatives – which are reported separately from claims in the CBS – and contingent exposures. Derivatives facilitate leveraged trading; hence, small movements in the price of the underlying instrument can result in large changes in exposures. Further, borrowers may draw down lines of credit and call on guarantees provided by banks, especially in times of stress. Such contingent exposures raise banks' actual country

⁸ Local claims in local currencies can be funded in foreign currency from abroad. This increases transfer risk exposures by the amount by which local claims exceed local liabilities in local currencies.

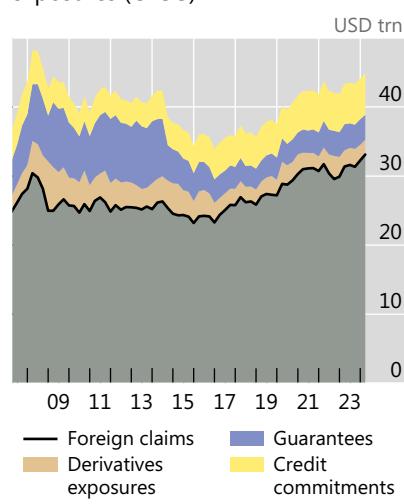
Foreign claims and other potential exposures in the CBS

Graph 3

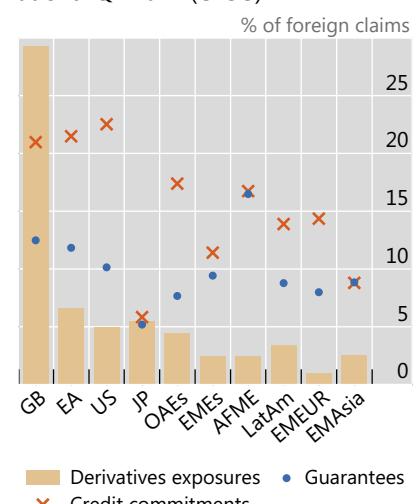
A. Foreign claims, by type (CBSI)



B. Foreign claims and other exposures (CBSG)



C. Other exposures by counterparty at end-Q1 2024 (CBSG)



AFME = Africa and Middle East; EA = euro area; EMAsia = emerging Asia; EMEUR = emerging Europe; LatAm = Latin America and Caribbean; OAES = other advanced economies. CBS = consolidated banking statistics; CBSG = CBS on a guarantor basis; CBSI = CBS on immediate counterparty basis.

Source: BIS consolidated banking statistics.

risk exposure when drawn.⁹ These off-balance sheet exposures add another 30% on average to aggregate foreign claims, while derivatives add 6% (Graph 3.B). For some counterparty countries, derivatives and contingent exposures can boost foreign exposures significantly, up to 63% in the case of borrowers in the United Kingdom (Graph 3.C). The outsize derivatives exposures on the United Kingdom mainly reflect the role of London as a centre for derivatives clearing.

Shifting to a guarantor basis also takes into account credit risk mitigants, eg guarantees and collateral received, and credit protection bought via derivatives. These have the effect of transferring risk from the country where the immediate counterparty resides to that where the ultimate guarantor resides. For example, if a country were to declare an external debt moratorium, then guarantees provided by the foreign parent of a borrower resident in the country (ie an outward risk transfer) can reduce a reporting bank's exposure to transfer risk. At the same time, claims on overseas affiliates of banks headquartered in the crisis-stricken country would increase a reporting bank's exposure (ie an inward risk transfer). In addition to guarantees, the purchase of credit protection (eg a credit default swap) and collateral provided by the borrower can also lead to outward risk transfers. In any case, the overall level of exposures stays the same, but the counterparty country for those exposures (and hence the transfer or country risk faced by the bank) changes.

Risk transfers in fact significantly alter the geography of banks' exposures. In March 2024, banks' claims on major financial centres (eg the Cayman Islands, Luxembourg and the United Kingdom) were some 6–15% lower once risk transfers are taken into account (Graph 4.A). This reflects the fact that many of the immediate

⁹ This was the case at the onset of the Covid-19 pandemic, as firms drew down existing credit lines, which substantially increased banks' on-balance sheet claims (Casanova et al (2021)).

counterparties in these locations have parents elsewhere that provide guarantees to the creditor banks. These parents tend to be located in large economies (eg the United States, China and Germany) that are home to multinational firms. Accordingly, banks' positions vis-à-vis these economies on a guarantor basis (CBSG) are larger than on an immediate counterparty basis (CBSI).

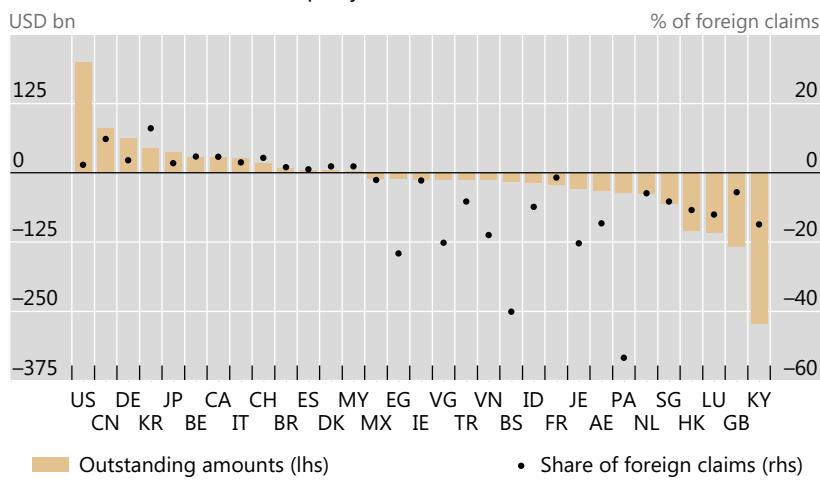
Risk transfers evolve with the riskiness of borrower countries and the mix of creditor banks (Graph 4.B). They reflect the creditworthiness of counterparty countries: net inward risk transfers (and so exposures) to major EMEs tend to increase as their sovereign credit ratings improve (Aldasoro and Ehlers (2017)). The closeness of creditor banks to a region also matters. For example, reporting banks transferred around 8% of their exposures out of emerging Asia in early 2007; by 2013, they reported net transfers *into* the region (red line). Underlying this shift was a change in the composition of creditor banking systems: as European banks retreated in the wake of the GFC, banks from Chinese Taipei, Hong Kong SAR, Japan and Singapore increased their exposures to emerging Asia (Aldasoro and Ehlers (2017)).

Understanding banks' ultimate vulnerabilities to credit events in particular countries requires a deeper analysis that takes into account banks' business models (Avdjiev and Wooldridge (2018)). While a bank may have large exposures to a given country, it may have little capital at stake. For example, a multinational bank with a subsidiary in a crisis-stricken country could choose to sell the subsidiary, or even let it fail and simply write down the capital that the bank had invested in the subsidiary. In this case, the bank's exposure would be limited to its equity participation plus any intragroup funding and guarantees it provided. The decision of whether to exercise this option depends on a myriad of factors including the size of the equity stake and intragroup funding, the ownership structure (eg wholly owned or joint venture), the financial health of the overall banking group, the regulatory framework and the reputational risks associated with letting a subsidiary fail. The CBS do not provide the information needed to examine such scenarios.

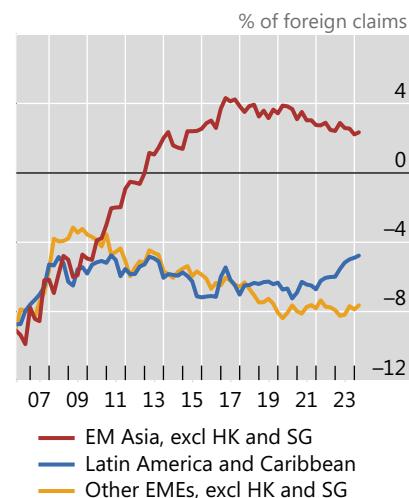
Net risk transfers in international banking¹

Graph 4

A. Vis-à-vis selected counterparty countries, at end-Q1 2024



B. Vis-à-vis selected EMEs



¹ Danish, Luxembourger, Mexican and Panamanian banks are excluded as they do not report net risk transfers.

Sources: BIS consolidated banking statistics; authors' calculations.

Banks' exposures and financial stability

Banks' exposure to country risk comes in many forms, and banks have several options to manage it. Problems in one part of a global bank's balance sheet (eg exposure to country A) often have implications for other parts (eg lending to country B), as banks adjust their global balance sheet.¹⁰ This section highlights cases where a consolidated view of banks' operations and exposures is essential for understanding issues of financial structure and stability.

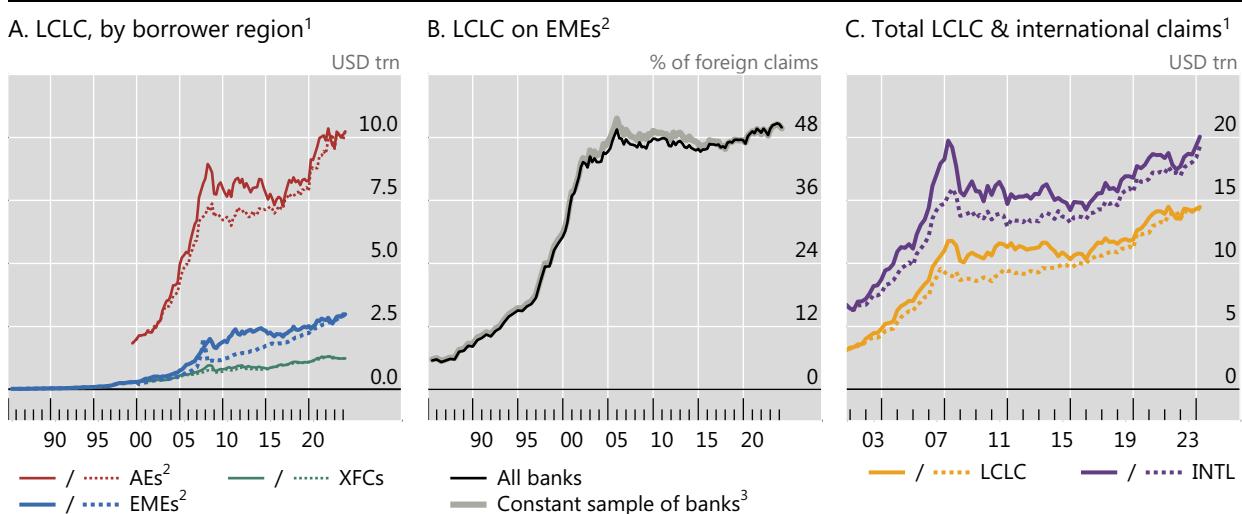
The rise of local banking

The global operations of large banks create country exposures for the consolidated group through the local positions of their affiliates. In the 1980s, banks' exposures to EMEs were largely international claims (cross-border claims and local claims in foreign currencies), in part led by a boom in Japan and the expansion of banks headquartered there. In the 1990s and up to the GFC, major banks expanded their global operations by setting up local affiliates for local currency business in many countries. The largest offices were in advanced economies, where local currency claims grew to over \$10 trillion, but operations in EMEs also steadily expanded (Graph 5.A). Such local currency positions are typically funded by local currency liabilities, so a higher share of such positions lowered banks' exposure to both transfer risk and currency risk.

The trend of global banks towards local banking in EMEs levelled off after the GFC but may again be on the rise. The share of foreign claims on EMEs that came from local offices rose rapidly from 6% at end-1985 to 50% at end-2005 (Graph 5.B). Since 2015, local and international claims have again been growing steadily to reach \$15 trillion and \$20 trillion at end-Q1 2024, respectively (Graph 5.C).

Local claims in local currency (LCLC) and international claims (INTL)

Graph 5



¹ Solid (dotted) lines show claims at current (constant end-Q1 2024) exchange rates. XFCs are cross-border financial centres defined in the technical annex. ² Excludes claims on XFCs. ³ Banking systems that have reported data since 1985. See technical annex for details.

Sources: BIS consolidated banking statistics (immediate counterparty basis); authors' calculations.

¹⁰ A wide geographic exposure also diversifies bank risk, making them more resilient to local economic shocks in host countries where they have exposure (Doerr and Schatz (2021), Aldasoro et al (2022)).

Maturity of international claims

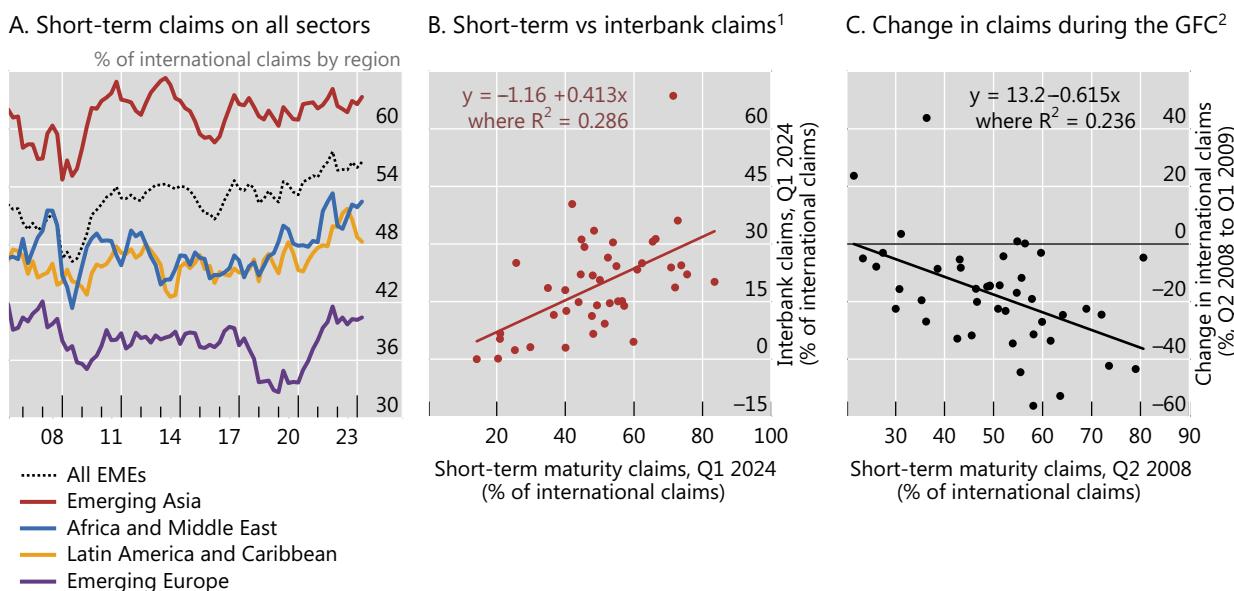
When analysing countries' external vulnerabilities, it is important to monitor banks because of the typically short maturity of their claims. The CBS provide a maturity breakdown for international claims on individual countries, and a separate breakdown by sector.¹¹ This information is also useful for borrower countries, complementing International Investment Position (IIP) data to monitor risks in external positions.

The maturity of banks' exposures differs systematically across borrower countries. Claims on EMEs in Asia, for instance, tend to have a larger short-term component than those on other regions, especially emerging Europe (Graph 6.A). The differences in the short-term share have remained fairly constant over time. To some extent, the short-term share reflects the sectoral distribution of banks' claims, since interbank positions tend to be short-term (Graph 6.B).¹²

Details on the sector and maturity of bank claims provide crucial insights into banks' ability to adjust their exposure to country risk and the implications for the borrowing countries. Banks can quickly unwind their interbank positions due to their short-term nature. They can also reduce sovereign exposures by selling holdings of government bonds (possibly taking a loss on the market value), which shifts the risk to other creditors without reducing the funding obtained by the issuer.

International claims on EMEs by maturity, region and sector

Graph 6



¹ Claims of all banking systems on the 43 largest EMEs (by international claims), representing more than 90% of total international claims on all EMEs. ² Claims of advanced European banking systems on the same 43 EMEs as in panel B.

Sources: BIS consolidated banking statistics (immediate counterparty basis); authors' calculations.

¹¹ Short-term international claims have a residual maturity of one year or less. Other maturity buckets are up to two years, more than two years and unclassified (eg equities and participations).

¹² The same holds for certain positions with non-bank financial institutions (NBFI). Since the GFC, unsecured interbank lending has given way to secured lending (ie repurchase agreements), much of which are cleared with central counterparties (generally treated as an NBFI counterparty in the CBS).

The maturity of bank credit matters greatly during a crisis. The experience of EME borrower countries during the GFC illustrates this point. For many, credit from banks accounted for the bulk of their total external debt. As the GFC unfolded, European banks – saddled with losses on their real estate exposures and faced with a need to deleverage – retrenched their global positions in part by letting their short-maturity claims run off. In a sample of the top 43 EME borrower countries, a 10 percentage point higher share of short-term borrowing from European banks on the eve of the GFC (end-Q2 2008) translated into a contraction in international claims some 6 percentage points larger than otherwise (Graph 6.C). The maturity breakdown in the CBS is thus a useful barometer for how quickly bank credit can evaporate (Avdjiev et al (2018)).

Grappling with country risk

Banks have a number of different strategies to reduce exposures to risky countries. As concerns about country risk mount, banks may cut lending, seek third-party guarantees before rolling over maturing credits or hedge their exposures using derivatives. In some cases, banks may find it more cost-effective to buy protection against credit risks rather than sell their exposures outright or wait for them to mature. The CBS provide an aggregate view of these risk management strategies.

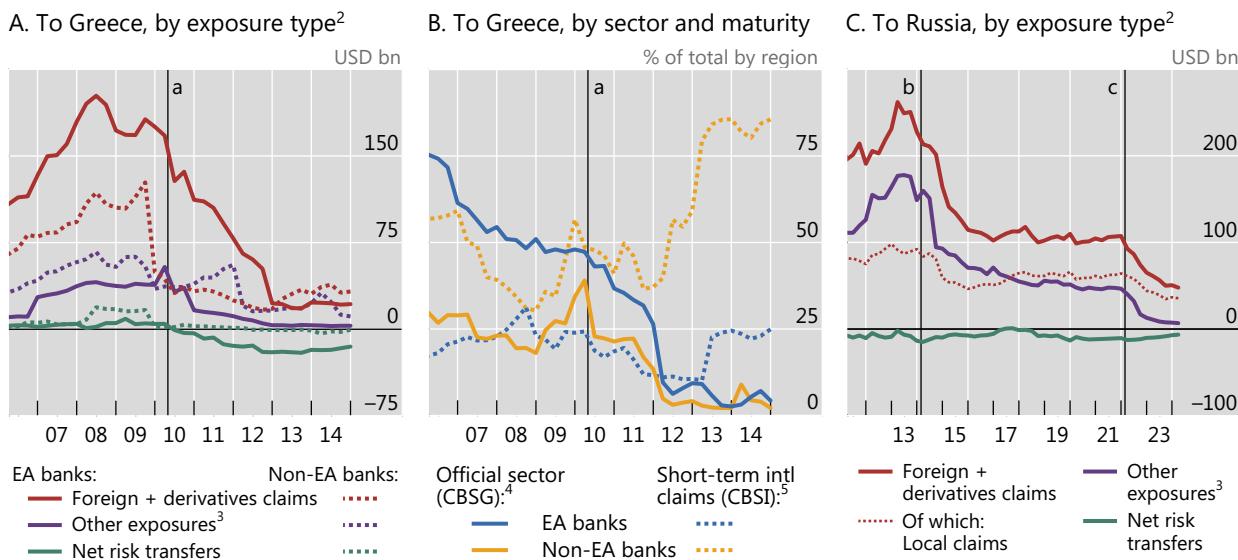
Consider banks' exposures to Greece during the euro area crisis. As Greek sovereign bonds grew risky, ultimately being downgraded to junk status in 2010, banks reacted by curtailing foreign claims on Greek borrowers, transferring risk out and decreasing other exposures like credit commitments (Graph 7.A). For banks from outside the euro area, this included selling a Greek subsidiary in 2009, as well as shedding exposures generally. By end-2011, non-euro area banks ended up with smaller exposures to Greece on their balance sheets than their off-balance sheet credit commitments and guarantees. By contrast, euro area banks had, by end-2012, shifted most of the risk from their remaining Greek exposures to other counterparties.

The sector and maturity composition of exposures to Greece shifted during this retreat. Half of euro area banks' claims were on the official sector in Q1 2010, but this share fell to nearly zero by 2012 (Graph 7.B). Non-euro area banks similarly reduced their claims on the official sector to near zero. As they cut long-term exposures, however, they increased their short-term claims. This may have reflected a high spread on such lending as well as these banks' trepidation about lingering exposure to Greek counterparties.

The Russian invasion of Ukraine and associated sanctions provide another example of banks adjusting their exposures to rising country risk. Foreign claims on Russia fell following the annexation of Crimea in 2014, and fell further after the 2022 invasion as many countries imposed wide-ranging sanctions (Graph 7.C). Risk transfers out of Russia remained relatively small during this period. While banks maintained some foreign claims, other exposures were all but eliminated. Before 2014, other exposures (notably guarantees) were as large as three quarters the size of foreign claims. However, guarantees sharply declined from Q1 2014 to end-2021, by 71% to reach \$47 billion. In 2022, strict financial sanctions probably made credit commitments and guarantees incalculable, causing those on Russia to fall sharply to just 4% of their peak values. The few exposures left were mainly from banks that kept their local affiliates in Russia.

Banks' exposures to Greece and Russia¹

Graph 7



^a Rating downgrade of the Greek sovereign debt to junk status (2010). ^b Annexation of Crimea (2014). ^c Invasion of Ukraine (2022).

¹ China does not report to the CBS. ² On a guarantor basis. ³ Comprises credit commitments and guarantees extended. ⁴ As a percentage of total foreign claims. ⁵ As a percentage of total international claims.

Source: BIS consolidated banking statistics.

Conclusion

The history of recurrent financial crises shows that economic events in one country or region can have ramifications elsewhere. Often, stresses propagate across the balance sheets of creditor banks. This reflects the high degree of concentration in international banking and the wide geographic reach of global banks. The largest of these banks have local operations in scores of countries, but decision-making is concentrated in a select few.

Monitoring such a globalised financial system requires statistics that both reflect this concentration and capture these geographic exposures. The BIS CBS were designed with this need in mind. They allow users to evaluate how losses vis-à-vis particular countries and sectors might diminish bank capital. And supplementary information in the CBS sheds light on banks' use of guarantees, credit derivatives and collateral to shift risk away from riskier borrowers rather than winding down outstanding positions.

The CBS have been a key tool in global monitoring since the 1980s. They have been used for forensic analysis of system-level losses during the Asian financial crisis in the 1990s, the GFC in 2007–09, the European sovereign debt crisis in 2010–12 and, more recently, the Russian annexation of Crimea in 2014 and the full-scale invasion of Ukraine in 2022.

The recent rise in geopolitical tensions has sparked debate about geo-financial fragmentation, and whether the world is moving towards a multi-polar economic order (Qiu et al (2024)). Residence-based financial statistics, such as the BIS LBS and the IMF's Coordinated Portfolio Investment Survey and Coordinated Direct Investment Survey go a long way in mapping out the geography of global financial

positions, and are thus essential in monitoring financial fragmentation moving forward. The CBS complement these statistics with crucial information about which national banking systems drive this process.

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Technical annex

All graphs are based on data from the CBS reporting countries (see below for details). China does not report to the CBS.

Graph 1: The bars show worldwide consolidated foreign claims on a guarantor basis (CBSG) for 26 banking systems, and on an immediate counterparty basis (CBSI) for five banking systems that do not report the CBSG.

Graph 2: The 11 countries that started reporting foreign claims (CBSI) after Q3 2000 are AU (Q4 2000), BR (Q4 2002), CL (Q4 2002), GR (Q4 2003), IN (Q4 2001), KR (Q4 2011), MX (Q4 2003), PA (Q4 2002), SG (Q4 2000), TR (Q4 2000), and TW (Q4 2000). They accounted for 3% of total foreign claims in Q4 2000. Annual world GDP figures converted to quarterly frequency by using the end-year figure over the quarters of the same year are used.

Tier 1 capital is reported by 16 European countries (AT, BE, CH, DE, ES, FI, FR, GB, GR, IE, IT, LU, NL, NO, PT and SE) and nine non-European countries (AU, BR, CA, HK, IN, JP, KR, TW and US) in the CBS, with different reporting dates. Missing and/or confidential data are supplemented by bank-level data aggregated at the country level from FitchConnect; growth rates of FitchConnect country-level data where available are used to backdate CBS data. Tier 1 data only for countries for which foreign claims are available (and vice versa) are included.

Graph 5: XFCs are cross-border financial centres as defined in P Pogliani, G von Peter and P Wooldridge, "The outsize role of cross-border financial centres", *BIS Quarterly Review*, June 2022, pp 1–15. The XFC aggregate in Graph 5 comprises BH, BM, BS, CW, CY, GG, GI, HK, IE, IM, JE, KY, LR, LU, MH, MT, MU, NL, PA, SG, SM, VG and VU. The names of jurisdictions corresponding to ISO codes are provided under the abbreviations on pages iv–vii. Banking systems with long historical data for local claims in local currency are: BE, CA, CH, DE, ES, FR, GB, IT, JP, NL, US. For the denominator (foreign claims), all reporters are included irrespective of whether a country reported local claims in local currency.

The structure of the CBS – detail complementing Box A

This Annex complements Box A with detail on valuation and reporting practices and illustrates the structure of the CBS (Table A). See the [glossary](#) for a list of terms related to the BIS international banking statistics.

Valuation. Claims and derivatives are reported on a gross basis at fair value, or at nominal value for non-negotiable assets such as loans and deposits. Quarterly movements in outstanding stocks include changes in asset valuations or writedowns in the original currency. By contrast, credit commitments and guarantees extended are reported at face value so as to measure reporting banks' maximum possible exposure. Recording positions at face or nominal value does not take account of the likelihood of adverse circumstances (nor of the recovery value in the event of a loss). Derivative claims are calculated as the positive market value; contracts which have negative market value are classified as liabilities of the bank. Derivatives include contracts covering foreign exchange, interest rate, equity, commodity and credit risks. However, credit protection bought to hedge an outstanding claim is classified as a risk transfer, whereas credit protection sold is recorded as a guarantee.

Table A lays out the breakdowns available for two reporting bases (CBSI and CBSG) for the latest available data. Overall totals differ because the CBSI are reported by 31 countries, the CBSG by 26 countries (see "reporting countries" below).

Consolidated foreign exposures of BIS reporting banks ¹				Table A
Positions outstanding at end-Q1 2024, in billions of US dollars				
	Basis for risk allocation			
	Immediate counterparty	Net risk transfers	Guarantor	
By type of exposure				
Claims (loans and securities) ²				
Foreign claims				33,125.0
Cross-border claims				17,876.6
Local claims – in foreign currency				
– in local currency	34,539.7	-632.0		15,248.3
International claims ³	20,057.8			
	14,476.7			
Derivatives with positive market value				2,132.9
Contingent facilities				
Guarantees extended				3,600.0
Credit commitments				6,060.2
Other breakdowns ⁴				
Claims by sector	20,057.8			33,125.0
Official sector	4,267.8			10,034.6
Banks	3,956.4			4,192.9
Non-bank private sector	11,687.7			18,537.6
Non-bank financial institutions	5,411.2			6,571.6
Non-financial corporates	5,038.2			5,924.3
Households and NPISHs ⁵	408.9			3,149.2
Unallocated by sector	146.0			359.8
Claims by maturity	20,057.8			
Up to and including 1 year	9,088.6			
Over 1 year up to and including 2 years	1,021.2			
Over 2 years	6,209.6			
Unallocated	3,728.9			
Memorandum: Starting date of time series	December 1983	June 1999	March 2005	

¹ Sum of positions reported by banks headquartered in all CBS-reporting countries. ² Outstanding loans and deposits, plus holdings of debt and equity securities; historically referred to as on-balance sheet claims. ³ Cross-border claims denominated in all currencies plus local claims of foreign offices denominated in foreign currencies. ⁴ For claims on an immediate borrower basis, the breakdowns refer to international claims; for claims on an ultimate risk basis, the breakdowns refer to foreign claims. ⁵ NPISHs = Non-profit institutions serving households.

Exchange rates. All outstanding stocks are reported in current US dollars. Unlike the locational banking statistics (LBS), no currency breakdown is available for the CBS; positions in other currencies are converted by reporting banks into US dollars at end-of-quarter exchange rates. Therefore, dollar appreciation leads to a reduction in reported claims in other currencies when expressed in dollars, even when actual positions remain unchanged.

Reporting countries. The CBSI data reporting began in Q4 1983 and included 15 reporting countries: Austria, Belgium, Canada, Denmark, France, Germany, Ireland, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States. Since then, another 16 countries have joined. CBSG reporting began in 2005. See the international banking statistics' [reporting country list](#) for detail. Seventeen countries reporting the LBS do not report the CBS, notably China, Russia, and a number of cross-border financial centres.