BIS

BIS Quarterly Review

International banking and financial market developments

March 2022

BIS Quarterly Review
Monetary and Economic Department

General queries concerning this commentary should be addressed to Nikola Tarashev (tel +41 61 280 9213, e-mail: nikola.tarashev@bis.org), queries concerning specific parts to the authors, whose details appear at the head of each section.

This publication is available on the BIS website (http://www.bis.org/publ/qtrpdf/r_qt2203.htm).

ISSN 1683-0121 (print)
ISSN 1683-013X (online)

BIS Quarterly Review

March 2022

International banking and financial market developments

Special features

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

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

Countries

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

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	SR	Suriname
ML	Mali	SS	South Sudan
MM	Myanmar	ST	São Tomé and Príncipe
MN	Mongolia	SV	El Salvador
MO	Macao SAR	SZ	Eswatini
MR	Mauritania	TD	Chad
MT	Malta	TG	Togo
MU	Mauritius	TH	Thailand
MV	Maldives	TJ	Tajikistan
MW	Malawi	TL	East Timor

Countries (cont)

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

Markets jolted

Before the sharp escalation of geopolitical tensions ushered in a new wave of uncertainty, financial markets had been jolted by signals of a global shift towards a quicker pace of monetary policy tightening. During the period under review,[1] government bond yields increased significantly. Stock markets fell amid an investor rotation away from technology and other growth stocks and into value stocks. Corporate credit spreads were little affected, by comparison. Financial conditions tightened moderately in non-Asian emerging market economies (EMEs).

Inflationary pressures intensified globally over the three-month period ending 21 February, even though the impact of the Omicron variant faded quickly. While a traditional inflation hedge – gold – was flat, a surge in energy commodity prices and persistent supply chain bottlenecks played a key role in the high inflation readings.

In this environment, investors appeared unnerved by the prospect of a determined monetary policy tightening on a global scale. Nominal bond yields increased materially in most advanced economies (AEs) starting in mid-December, as investors' perception of a shift by the Federal Reserve firmed up. The increase in nominal yields translated mostly into a surge of real yields – while inflation compensation moved sideways. That said, real (inflation-adjusted) yields remained largely in negative territory. In the United States, the runups in rates were tilted towards the short end of the yield curve, which flattened with respect to the term structure of other AEs. The dollar appreciated against AE currencies, particularly with respect to those of central banks less advanced in the tightening cycle. In the euro area, the Fed and the ECB's tightening guidance widened peripheral spreads to bunds.

The monetary policy shift left a clear imprint on risky assets. Global equity markets were on the back foot in the first weeks of 2022. Technology stocks – seen as more sensitive to interest rate changes – suffered large valuation losses in January as investors rotated towards energy and value stocks. Surprisingly perhaps, corporate spreads widened modestly overall, even narrowing for sectors initially harmed by the emergence of Omicron. Similar to equities, credit spreads reflected a rotation away from technology into energy and value.

In EMEs, financial conditions were mixed but remained largely stable. Local currency yields increased more at the short end, particularly in non-Asian countries. Spreads on dollar-denominated debt rose moderately across the board. In China, the central bank gradually added support, as the economy appeared to struggle with persistent headwinds coming from the real estate sector and a new wave of Covid-19. Exchange rates vis-à-vis the US dollar were flat, except for Latin American currencies which appreciated significantly. Portfolio flows into Asian EMEs regained momentum, supporting less stringent financial conditions than in other EMEs.

[1] The period under review extends from 29 November 2021 to 21 February 2022.

Key takeaways

- In the three-month period ending 21 February, fixed income markets were jolted by the sudden shift towards a tighter monetary policy outlook amid persistently high inflation readings.
- Stock markets plummeted but corporate credit spreads widened only modestly, while investors rotated away from sectors seen as particularly sensitive to interest rate hikes.
- EMEs faced mixed financial conditions, with favourable investor sentiment towards Asian economies and more pronounced bond yield increases in other regions.

Bonds repriced sharply as the policy outlook shifts

Amid persistently high inflationary pressures during the period under review, investors reacted strongly to a global monetary policy outlook that turned markedly less accommodative. Rates on government fixed income securities increased substantially. As short-term rates rose more than long-term ones, the term structure in the United States flattened vis-à-vis those of most other AEs. In contrast to last October, higher nominal yields resulted mainly in increased real yields, with little change in inflation compensation. The dollar appreciated, particularly against AE currencies with a looser monetary policy outlook.

Several central banks tightened policy during the review period, but timings varied. As inflation pressures intensified, investors began to anticipate an acceleration in the pace of accommodation removal by the Federal Reserve from late November, particularly following the mid-December Federal Open Market Committee (FOMC) meeting. The late January FOMC meeting seemed to consolidate the views of investors that a tightening could start with a lift-off in March and continue with the central bank's balance sheet shrinking at a quick pace soon thereafter. Several other central banks in both AEs and EMEs hiked policy rates further, including those in the United Kingdom (which also announced upcoming sales of corporate bonds), New Zealand, Norway, Korea, and the major Latin American and EMEA countries.[2] In January, the Reserve Bank of Australia announced the end of its asset purchase programme. In December, the ECB also communicated a gradual scaling down of its balance sheet policies.[3] Moreover, in February, the ECB tilted its guidance in a less accommodating direction. Among the major AE central banks, only the Bank of Japan (BoJ) kept its stance unchanged. In contrast, the People's Bank of China (PBoC) actually loosened policy.

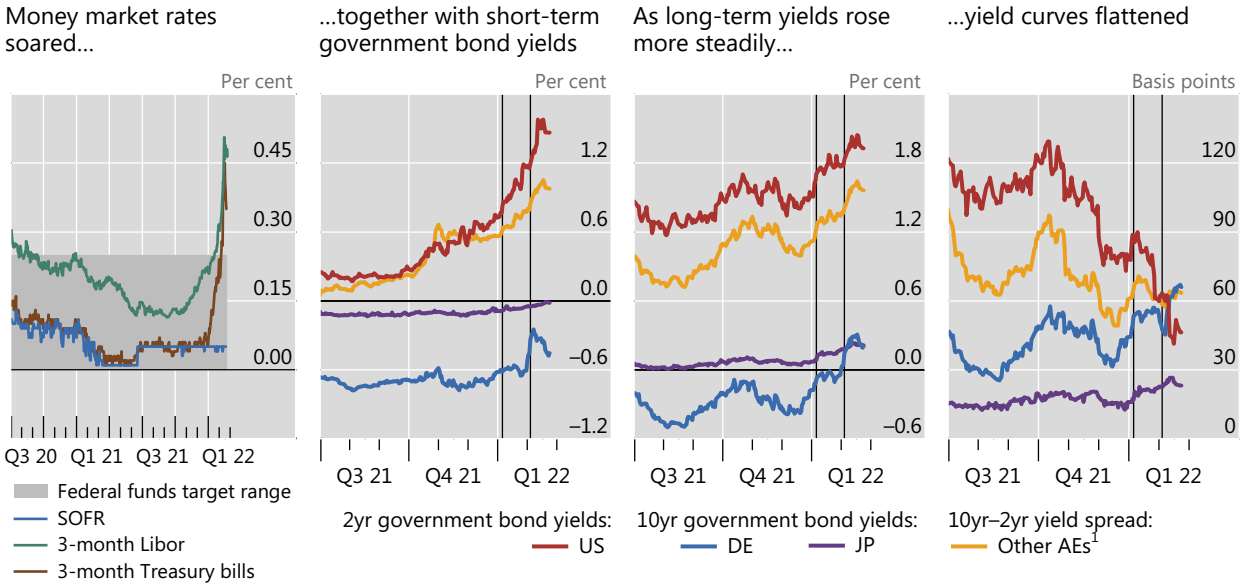
The impact on short-term rates was particularly strong in the United States. Soon after the release of the minutes of the December FOMC meeting on 5 January, the December 2023 futures rate breached the corresponding dot plot projection. Likewise, key money market interest rates soared in January, moving above the

[2] EMEA stands for Europe, Middle East and Africa.

[3] The ECB confirmed the shift from the PEPP (Pandemic Emergency Purchase Programme) towards a gradually shrinking APP (Asset Purchase Programme) starting in March 2022, and the end of the extra 50 basis points discount relative to the deposit facility rate for TLTROs (Targeted Longer-Term Refinancing Operations) in June 2022, as scheduled.

The tightening monetary policy outlook jolts fixed income markets

Graph 1



SOFR = Secured Overnight Financing Rate.

The vertical lines indicate 5 January 2022 (release of the minutes of the 14–15 December FOMC meeting) and 3 February 2022 (ECB monetary policy meeting).

[1] Simple average across AU, CA, DK, GB, NZ and SE.

Sources: Federal Reserve Bank of St Louis, FRED; Bloomberg; BIS calculations.

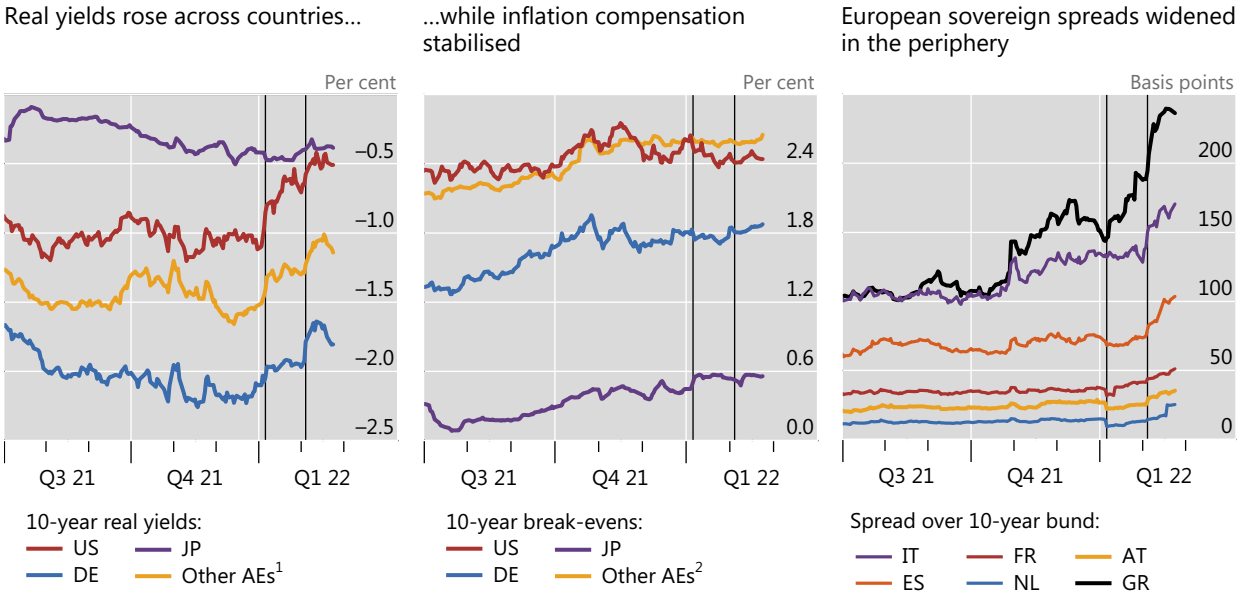
Federal Reserve's policy target range for the first time in over a year (Graph 1, first panel, green and brown lines). This shift intensified in early February, as the US Consumer Price Index (CPI) showed an unexpectedly high reading. Overnight repo rates (blue line), however, remained pinned at the level of the overnight reverse repo facility.

The expectation of higher policy rates boosted nominal bond yields in most AEs, particularly at the short end. Initially, short-term yields increased most in the United States (Graph 1, second panel). The subsequent spillover to other sovereign yields suggested that investors expected the corresponding central banks to follow suit. Short rate increases were initially muted in the euro area. But the tightening shift in the ECB's guidance in February surprised investors, triggering a jump in the euro area's short end as well.

Long-term yields moved largely in sync across all AEs. Following the release of the minutes of the FOMC December meeting in early January, the yield on the 10-year bund approached zero for the first time since early 2019 (Graph 1, third panel). Similarly, the yield on 10-year Japanese government bonds (JGBs) reached its highest level in five years. Long yields received another push up across all AEs in the wake of the ECB meeting in early February. The repricing was sharpest for long-term bund yields, which moved decisively into positive territory. US long-term yields also rose during this period but by much less than short yields. Thus, the US yield curve flattened markedly with respect to those of other AEs, which mostly steepened to varying degrees (fourth panel).

Real yields soar; some euro area sovereign spreads widen considerably

Graph 2



AEs = advanced economies.

The vertical lines indicate 5 January 2022 (release of the minutes of the 14–15 December FOMC meeting) and 3 February 2022 (ECB monetary policy meeting).

[1] Simple average across AU, CA, GB and SE. [2] Simple average across AU, CA, DK, GB and SE.

Sources: Bloomberg; Datastream; BIS calculations.

The increase in nominal long-term rates largely reflected a surge in real (inflation-adjusted) yields. For instance, the yield on the 10-year US Treasury inflation-protected note increased about 60 basis points by mid-February (Graph 2, left-hand panel), more than the roughly 40 basis points increase in the corresponding nominal yield. Similar shifts occurred in other AEs except Japan, where real yields hardly moved. As a result, inflation compensation remained largely flat and even trended down in some AEs, after rising during the first three quarters of 2021 (centre panel). This reflected the stabilisation of inflation expectations across maturities except at the short end, which saw considerable volatility.

As the monetary policy outlook tightened in core markets, investors also reassessed sovereign credit risk in the euro area, causing sovereign spreads for some euro area countries to widen. Spreads relative to German bunds had been trending upwards since early Q3 2021. They rose in January with the FOMC minutes, and again in February when the ECB adjusted its guidance (Graph 2, right-hand panel). To varying degrees, investors perceived Greece, Italy and Spain as more exposed to a tightening of the ECB policy stance, and in particular the termination of asset purchases.

In this environment, the US dollar gained vis-à-vis AE currencies. The dollar had begun to appreciate in October 2021, as news on inflation worsened and investors appeared to anticipate a policy change (Graph 3, left-hand panel, red line). The currency extended its gains following the January FOMC meeting. As monetary policy stances among AEs diverged, the dispersion of their exchange rates against the dollar widened (red area). The dollar appreciated the least vis-à-vis the currencies of those AE countries that were perceived as more advanced in their tightening cycles, as captured by relative changes in risk-adjusted interest rate differentials (centre panel). The United Kingdom, Norway and Australia saw their respective currencies appreciate

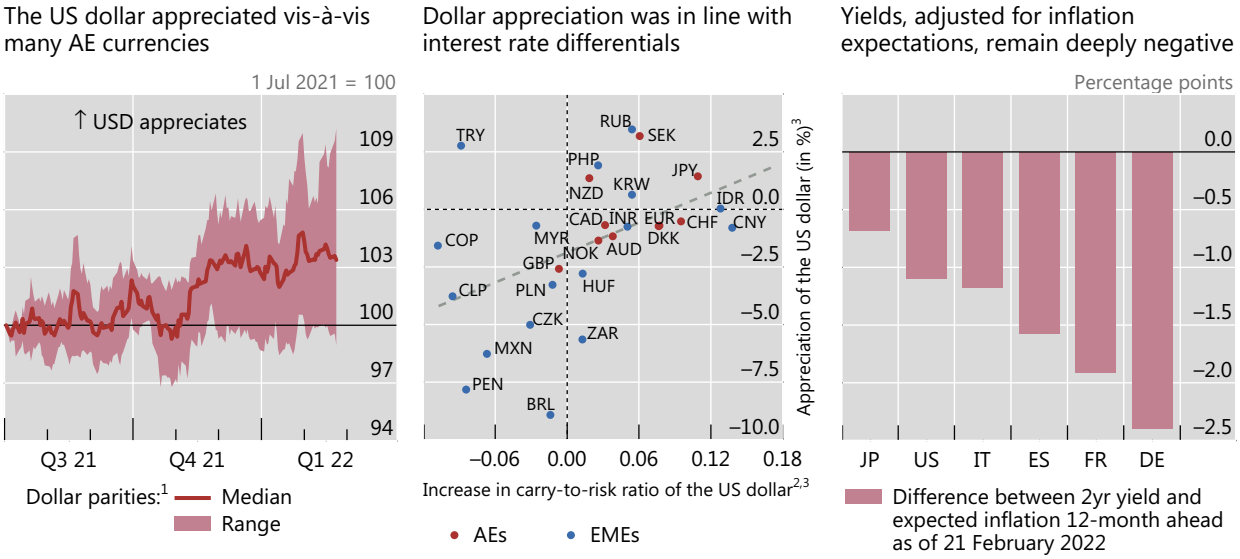
against the US dollar, whereas the Swedish krona and the yen depreciated. The euro depreciated in January and bounced back in February, seemingly supported by the ECB meeting guidance. The Swiss franc was an exception in this context, as its strength was possibly boosted by safe haven flows linked to geopolitical concerns.

Overall, financial conditions remained very loose in all major AEs during the review period. Despite their increases, the long-term real yields in all major AEs remained below zero, where they have been since the outbreak of the pandemic or earlier. Real yields were even more negative at the short end, especially when derived from analysts' inflation expectations. For instance, the spread between the nominal yield on two-year government bonds and expected inflation over the next 12 months stayed in deeply negative territory in many large AEs, notably in the euro area (Graph 3, right-hand panel).

Financial condition indexes, which rely on a number of indicators, showed some moderate tightening, particularly for the United States, where conditions returned to the average over the period following the pandemic outbreak, while still remaining in loose territory. Conditions tightened marginally in the euro area and Japan but also remained generally loose. Most of the tightening stemmed from the increase in long-term yields and the sharp fall in equity prices.

US dollar strengthens amid persistently loose financial conditions in AEs

Graph 3



AEs = advanced economies; EMEs = emerging market economies.

[1] AUD, CAD, CHF, EUR, GBP, JPY, NZD and SEK. [2] Carry to risk ratio = 12-month interest rate differential as implied by forward and spot exchange rates, divided by the option-implied volatility of the exchange rate. An increase in the carry-to-risk ratio would typically make US dollar more attractive vis-à-vis the corresponding currency. [3] Changes over 30 November 2021–21 February 2022 (period under review).

Sources: Bloomberg; Consensus Economics; JPMorgan Chase; BIS calculations.

Rotation across risky assets intensifies

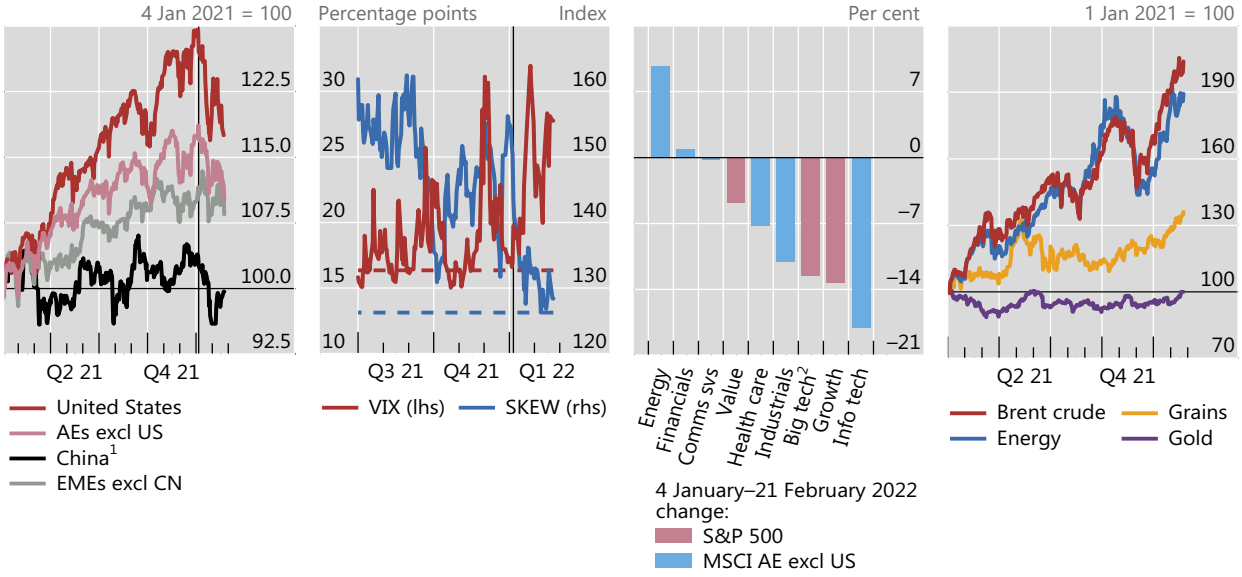
Global stock markets saw significant upheaval during the review period. In contrast, corporate bond markets were little affected, as credit spreads remained generally compressed. Overall, investors rotated away from sectors particularly sensitive to interest rates, and into energy and some sectors initially harmed by the pandemic.

Equity markets declined globally with the central banks' shift in policy stance. The drop in AEs was stronger than that in EMEs, except for China (Graph 4, first panel). In January, US equities suffered their worst month since the beginning of the pandemic. The surge in real yields underlay the swift adjustment in the valuations of US stocks. Market commentary was rife with speculation about the size and timing of the lift-off and its possible implications for financial markets. The prospect of an earlier and faster than anticipated balance sheet run-off also contributed to these concerns.

The prevailing uncertainty manifested itself in asset prices differently from the recent past. In the second half of 2021, the uncertainty had surfaced as higher downside than upside risks (blue line, second panel of Graph 4). In early 2022 however, the likelihood of the two sets of outcomes was seen as less skewed even as the range of possibilities – ie the implied volatility – widened (red line).

The prospect of higher yields weighed on sectors particularly sensitive to interest rates. As such, technology stocks underperformed most other sectors globally (Graph 4, third panel). This was part of a general rotation from rate-sensitive growth stocks to value stocks (Box A). In addition, energy stocks outperformed other sectors across most jurisdictions, probably supported by rising oil and gas prices.

Equity markets drop globally, with technology stocks leading the decline — Graph 4



AEs = advanced economies; EMEs = emerging market economies; VIX = Cboe Volatility Index, designed to reflect investors' consensus view of future (30-day) expected stock market volatility; SKEW = Cboe SKEW Index, which estimates the skewness of S&P 500 returns at the end of a 30-day horizon.

The vertical lines indicate 5 January 2022 (release of the minutes of the 14–15 December FOMC meeting). The dashed lines indicate 2010–2022 medians.

[1] Shanghai composite equity index. [2] Amazon, Apple, Google, Meta, Microsoft and Netflix.

Sources: Bloomberg; Datastream; Refinitiv Eikon; BIS calculations.

Rotation from growth to value stocks and its implications

*Fernando Avalos, Karamfil Todorov*①

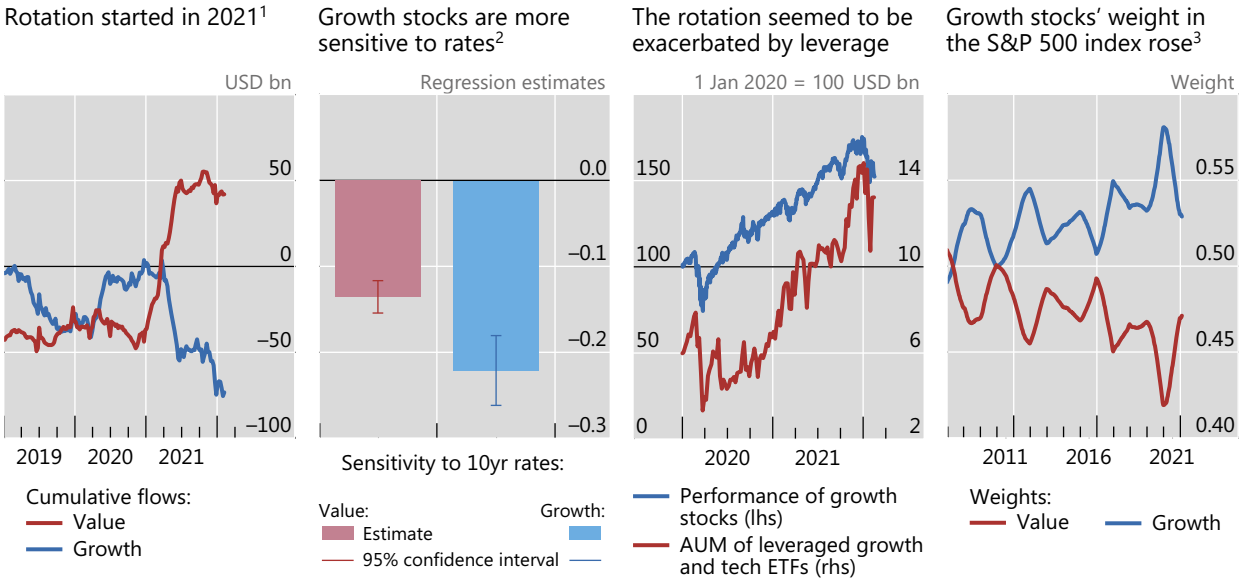
The prospects of tighter monetary policy seemed to spark a stock market rotation. From early 2021 to the third week of February 2022, investors reduced positions in so called "growth" stocks, which typically include sectors like technology and, more generally, younger firms. At the same time, investors added to their positions in "value" stocks, which typically include established firms with consistently positive cash flows (Graph A, first panel). The rotation reversed an earlier trend that had favoured growth stocks, which outperformed value stocks by nearly 40% in the course of 2020. In this box, we examine the drivers of this rotation and the potential implications for the broader market.

The shift from growth to value stocks is likely related to their different sensitivities to interest rates. This difference is related to the timing of the underlying cash flows. For growth companies, it is expected that a large fraction of their cash flow will accrue in the distant future, for instance when the underlying business model has reached maturity. By contrast, well established value firms – such as financial companies – have a track record of regularly generating positive cash flows. In this context, the prospect of higher rates would more greatly reduce the stock prices of growth firms, whose future-tilted cash flows would be more heavily discounted. Indeed, the sensitivity of growth stocks to interest rates is almost twice as large as that of value stocks (Graph A, second panel).

The recent rotation away from growth stocks could have been exacerbated by deleveraging. Earlier, in 2021, leveraged exchange-traded funds (ETFs) that focus on growth and technology stocks saw their assets under management (AUM) increase steadily, due mainly to capital gains (Graph A, third panel). Whenever the market prices of these ETFs' holdings increase, their leverage drops. Since the funds are contractually committed to lifting leverage back to target, they need to buy more stocks on margin. In other words, leveraged ETFs act like momentum traders, creating the potential for feedback loops.② Indeed, as growth stocks' prices dropped in early 2022, the AUM of leveraged ETFs declined – and the attendant leverage rose above target – thus calling for sales into a falling market.

Investors rotate from growth to value as yields increase

Graph A



AUM = assets under management; ETF = exchange-traded fund.

[1] Cumulative annual flows into active and passive ETFs and mutual funds. [2] Elasticity of value and growth indices with respect to the 10-year US Treasury rate, from June 1998 to February 2022. [3] Average annual weights of growth and value stocks in the S&P 500 index.

Sources: Datastream; EPFR; Refinitiv Eikon; authors' calculations.

The heft of growth stocks suggests that their high sensitivity to interest rates could have significant market implications. As a result of their stellar performance since the pandemic's outbreak, the weight of growth stocks in the S&P 500 index rose to 57% before the latest index rebalancing in 2021 (Graph A, fourth panel). Taking the sensitivity estimates in the second panel at face value, this weight implies that a 1 percentage point increase in 10-year rates would go hand in hand with a repricing of growth stocks that translates into a roughly 12% drop in the whole index. In turn, the high sensitivity of the overall index to rates could spill over to other instruments linked to the performance of the benchmark, such as derivatives, or to investment funds whose performance mimics the index. More generally, outsized drops in the index could lead to large wealth losses for investors and might have macroeconomic implications if those losses were to weaken consumer spending and overall economic growth.

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. The authors thank Claudio Borio, Stijn Claessens, Andreas Schrimpf and Nikola Tarashev for helpful comments and discussions, and Alessandro Barbera and Pietro Patelli for excellent research assistance. ② See K Todorov, "Passive funds affect prices: evidence from the most ETF-dominated markets", *BIS Working Papers*, no 952, July 2021.

Investors also rotated into energy commodities, perhaps as a hedge against inflation. Prices of these commodities took off sharply in the second half of 2021. During the review period, the oil price reached its highest level since 2014, likely attributable to rising geopolitical tensions. Grains and other food commodities also increased but to a lesser extent than energy. In contrast, gold, which is often perceived as an inflation hedge, was surprisingly flat throughout 2021 and early 2022.

The corporate bond market was less affected than the stock market by the prospect of tighter monetary policy. Corporate spreads in the euro area and the United States fell early on but started rising in late January. They stayed low in historical terms for both investment-grade (IG) and high-yield (HY) securities in the United States but reached long-term medians in the euro area (Graph 5, left-hand panel). At the level of individual rating categories across regions, spreads hovered at the lower end of their post-GFC distribution (centre panel).

The rotation towards less interest rate-sensitive sectors was also evident among corporate bonds. Credit spreads narrowed the most for energy companies and sectors that had been threatened by the emergence of the Omicron variant and that subsequently benefited from its favourable evolution: entertainment and air transport (Graph 5, right-hand panel). By contrast, spreads widened for telecommunications and technology companies. Despite the overall small change in spreads, corporate bond prices declined, driven by rising government benchmarks. With their duration near all-time highs, IG bonds experienced price drops more pronounced than HY securities, which tend to have shorter maturities (Graph 6, left-hand panel).

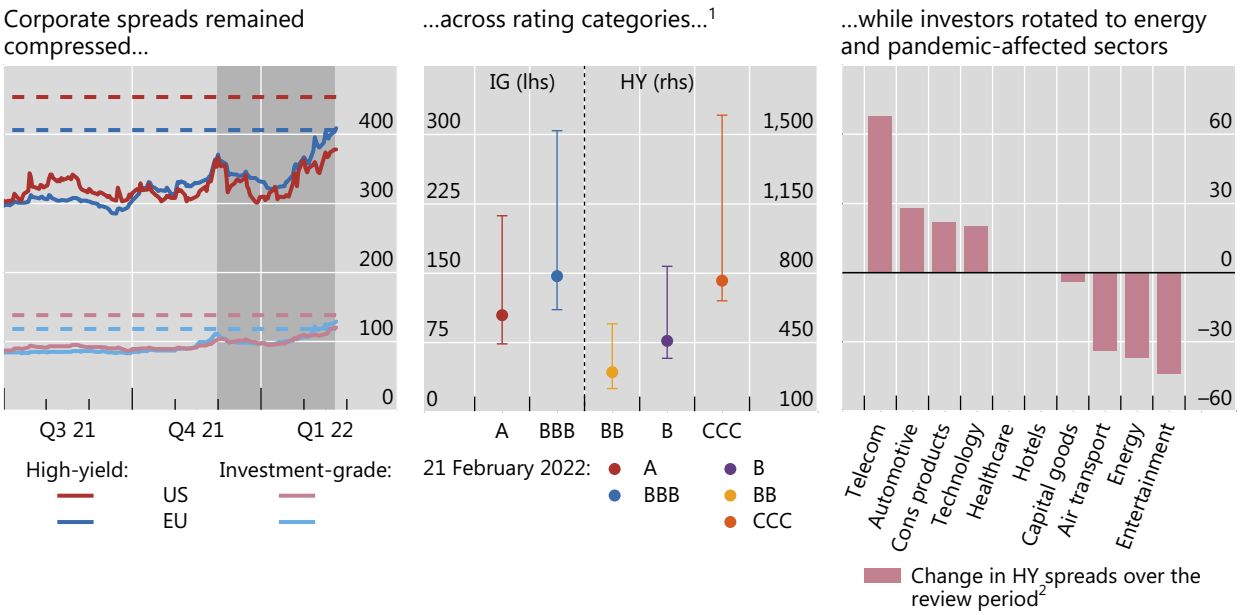
Compressed credit spreads may reflect, in part, the perceived financial condition of corporates. The cash holdings of large firms in the United States and the euro area exceeded short-term debt (due within 12 months) by an average of 20%. In particular, the cash ratios of US firms were higher than before the pandemic (Graph 6, centre panel). Even though cash ratios need not be a good measure of credit risk,[4] investors may see them as a positive signal about firms' overall financial conditions.

[4] See R Banerjee and E Kharroubi, "The financial vulnerabilities driving firms to the exit", *BIS Quarterly Review*, December 2020.

Corporate credit markets appear less affected than equities

In basis points

Graph 5



The dashed lines indicate 2005–2022 medians. The shaded grey area indicates 30 November 2021–21 February 2022 (period under review).

[1] Whiskers plot the fifth to 95th percentile of time series starting in 2010. Each time series is constructed from GDP and PPP exchange rate-weighted averages of euro area and US ICE BofA ML corporate spread indices. [2] The period under review is from 30 November 2021 to 21 February 2022.

Sources: ICE BofAML indices; Refinitiv Eikon; BIS calculations.

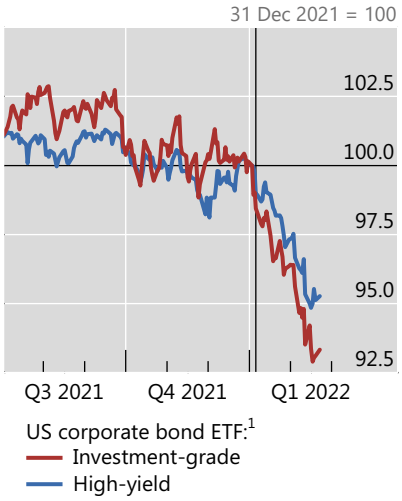
Consistent with this, the share of firms on negative rating watch declined steadily throughout 2021 and even fell below pre-pandemic levels at the start of 2022 (right-hand panel). The number of net downgrades also declined, and defaults remained historically low.

Investor concerns surfaced in the credit default swap (CDS) markets, while those of policymakers were directed at leveraged loan markets. CDS spreads tightened slightly more than bond spreads from comparatively lower levels. In addition, trading volume in the CDS market increased, suggesting that investors' view on credit risk was in flux. As regards the leveraged loan market, prudential authorities expressed concerns about weak lending standards, not least for corporates that had tapped the market during Covid but could face repayment difficulties. Moreover, a large share of leveraged loans reside in collateralised loan obligations (CLOs), which are opaque collective investment vehicles.[5]

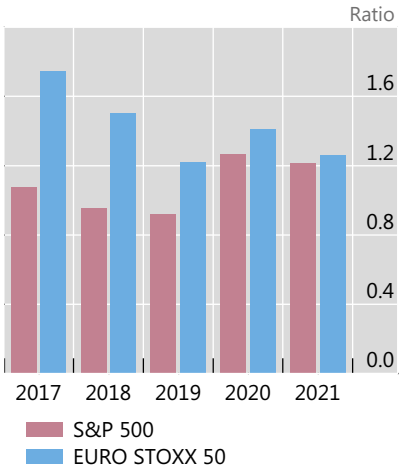
[5] See S Aramonte and F Avalos, "Structured finance then and now: a comparison of CDOs and CLOs", *BIS Quarterly Review*, September 2019.

Long duration drives IG bond prices lower; corporate credit gauges signal low risk Graph 6

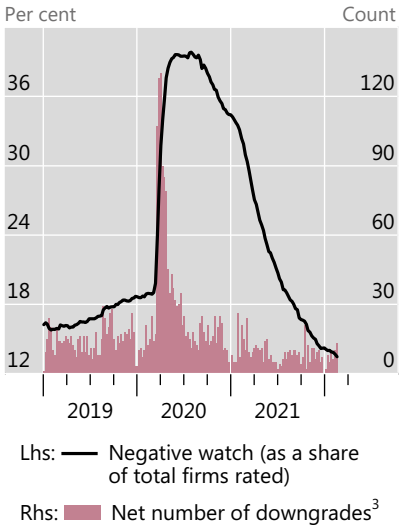
IG bond prices fell more than HY due to longer duration



Cash ratios stayed high[2]



Ratings outlook remained benign



IG = investment-grade; HY = high-yield.

The vertical line in the left-hand panel indicates 5 January 2022 (release of the minutes of the 14–15 December FOMC meeting).

[1] iShares iBoxx USD Investment Grade and High Yield corporate bond ETFs. [2] End-of-year cash and equivalents divided by current liabilities. [3] Number of downgrade actions minus number of upgrade actions.

Sources: Bloomberg; S&P Capital IQ; BIS calculations.

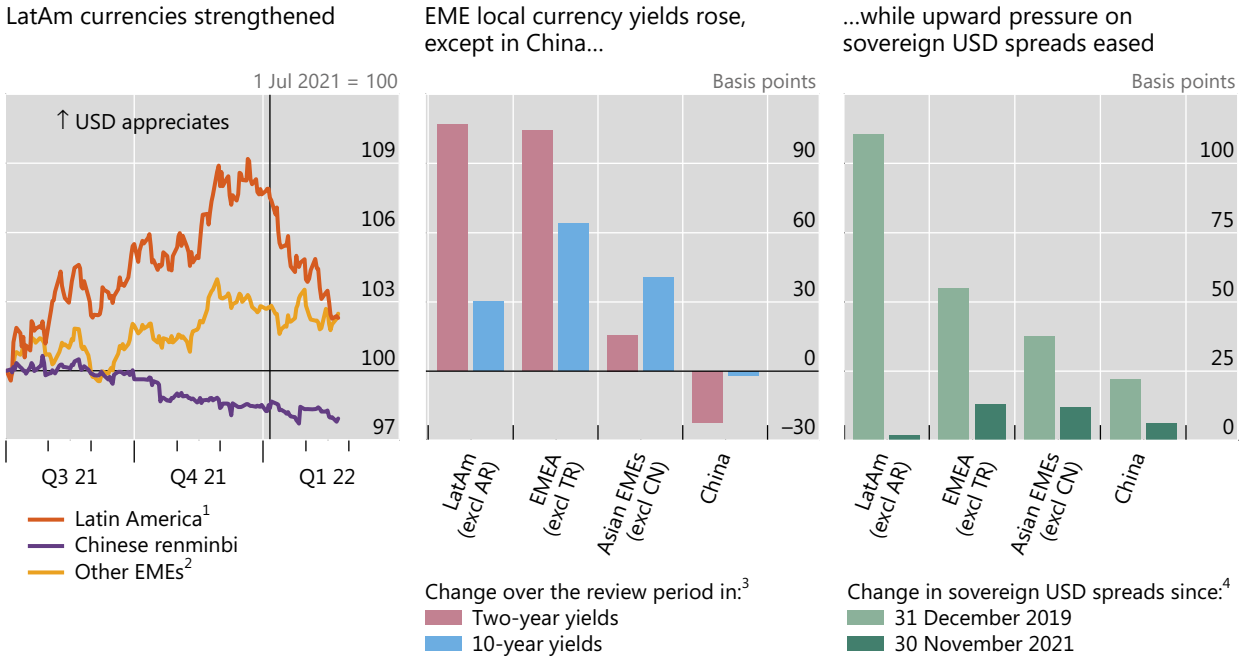
EMEs proved resilient amid mixed conditions

Financial conditions in EMEs were mixed. The dollar traded sideways or depreciated in relation to most EME currencies. Local currency sovereign financing costs varied by tenor and geography, while those in US dollars changed little. In China, the central bank eased policy in view of the difficulties faced by the economy.

EME currencies held steadfast versus the US dollar despite the monetary policy shift in the United States. The dollar zigzagged vis-à-vis EMEA and Asian currencies, but overall remained essentially unchanged by the end of the review period (Graph 7, first panel). The exceptions were the Turkish lira, which depreciated significantly in December (and featured prominently in cryptoasset trades, Box B), and the Russian rouble, which plummeted amid growing geopolitical tensions. The renminbi continued with the gradual appreciation seen in recent months. Remarkably, Latin American currencies, which had been depreciating throughout the second half of 2021, saw a sharp appreciation as the new year began, despite comparatively high inflation rates. Central banks in the region were among the most proactive globally in raising policy rates in the face of strong inflationary pressures. That in turn widened differentials vis-à-vis benchmark US interest rates, bolstering the attractiveness of local currencies vis-à-vis the dollar (Graph 3, centre panel). Accordingly, in the period under review, the currencies seemed partly supported by long positions in local currency assets taken by non-resident investors. For instance, such investors' holdings of Mexican and Brazilian government bonds increased for the first time since mid-2020.

Financial conditions in EMEs: mixed but generally steady

Graph 7



EME = emerging market economy; EMEA = Europe, the Middle East and Africa; LatAm = Latin America.

The vertical line in the left-hand panel indicates 5 January 2022 (release of the minutes of the 14–15 December FOMC meeting).

[1] Simple average across BR, CL, CO, MX and PE. [2] Simple average across CZ, HU, ID, IL, IN, KR, MY, PH, PL, RU, TH, TW and ZA. [3] The period under review is from 30 November 2021 to 21 February 2022. [4] JPMorgan Chase EMBI Global sub-indices, stripped spreads.

Sources: Bloomberg; JPMorgan Chase; BIS calculations.

Sovereign funding conditions tightened to varied degrees in different regions. Starting in November, local currency short-term yields rose the most in Latin America and EMEA (Graph 7, centre panel, red bars), in part boosted by rate hikes. Long-term yields increased by less in these regions (blue bars). Against the backdrop of generally lower inflation rates and thus less pressure for monetary policy action, local yield rises in Asian economies were more subdued and tilted towards the long end. In parallel, spreads on dollar-denominated sovereign debt rose only slightly across regions (Graph 7, third panel, dark green bars). That said, they remained much higher than pre-pandemic, particularly in Latin America (light green bars).

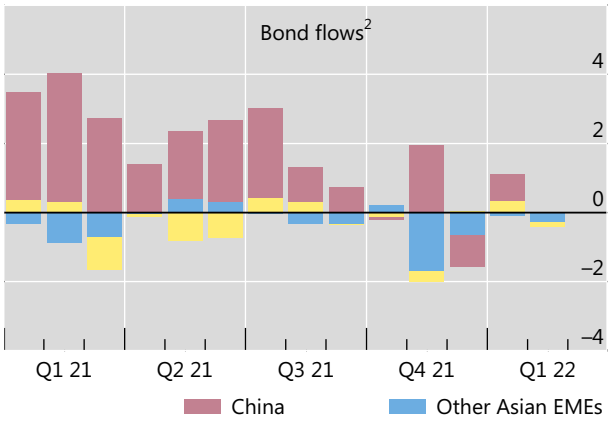
In China, PBoC actions kept a lid on sovereign yields. As the domestic economy seemed to struggle with persistent headwinds from the real estate sector and a new wave of Covid-19, the central bank provided support by reducing reserve requirements and policy rates several times during the review period. As a result, renminbi sovereign yields fell in nominal terms.

Investment flows to EME funds recovered somewhat, driven mainly by inflows to Asian stock funds. Flows to bond funds were mixed, with the significant outflows in December being followed by modest inflows in January (Graph 8, left-hand panel). Chinese bond funds received the largest share of inflows, possibly owing to the perspective of further drops in yields. Equity fund inflows gained further momentum in December and January, targeting China in particular, as well as Korea and Chinese Taipei (right-hand panel). These flows continue to indicate favourable investor sentiment towards Asian EMEs.

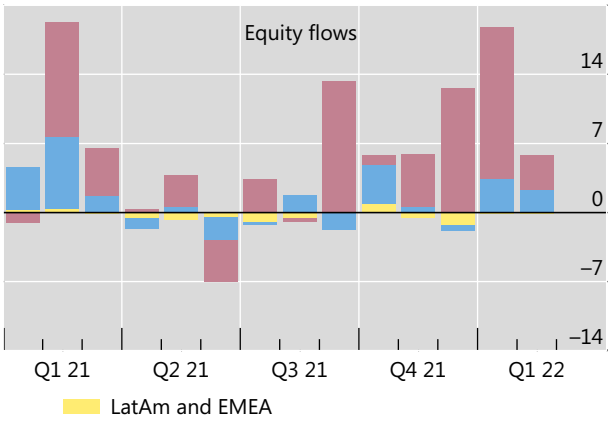
Investor sentiment towards Asian EMEs remains favourable[1]

In billions of US dollars — Graph 8

Flows to bond funds oscillate…



…as investor flows to Asian equity funds gain momentum



China — Other Asian EMEs — LatAm and EMEA

EME = emerging market economy.

[1] Monthly sums of weekly data. [2] Flows to local currency bond funds.

Sources: EPFR; BIS calculations.

Box B

Tracing the footprint of cryptoisation in emerging market economies

*Sirio Aramonte, Wenqian Huang and Andreas Schrimpf*①

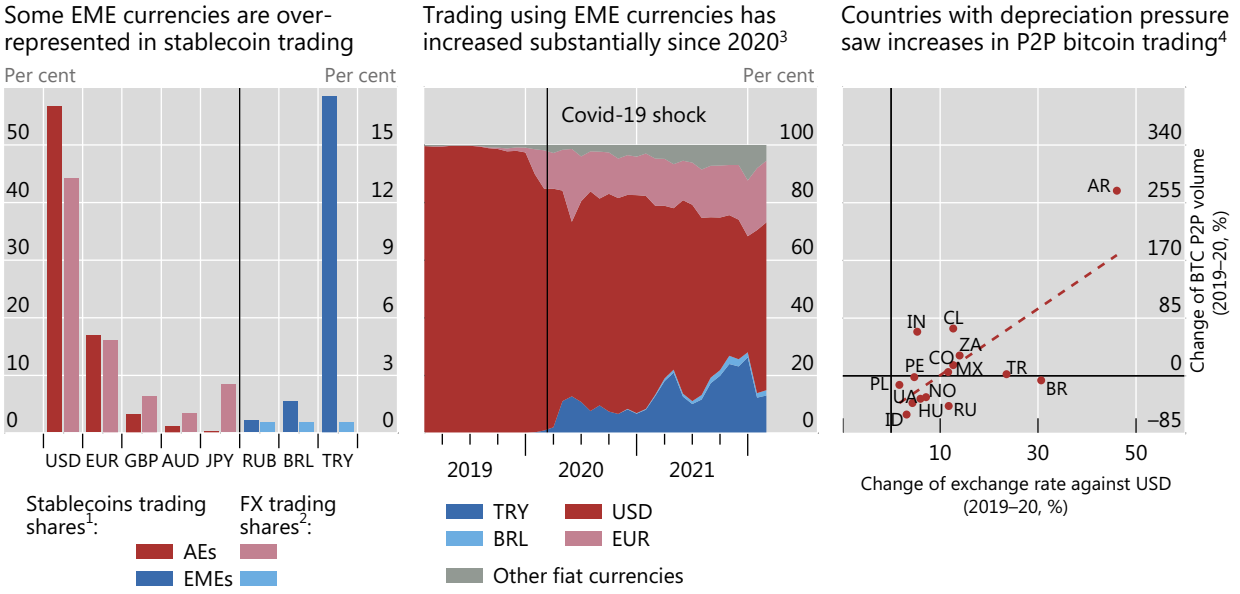
Cryptoassets have gained in popularity in emerging market economies (EMEs) in recent years. This development accelerated further after the Covid-19 crisis, especially in countries with volatile exchange rates. During periods of depreciation, holders of domestic fiat currencies have incentives to shift into claims denominated in more stable currencies. For residents in these countries, cryptoassets pegged to reserve currencies, such as US dollar-linked stablecoins, can be a convenient tool to do so, especially as they may help avoid capital controls and know-your-customer/anti-money laundering (KYC/AML) requirements. In the extreme case of sharp declines in the purchasing power of local fiat currencies and stringent capital controls, some may even seek refuge in highly risky cryptoassets such as Bitcoin, which are not pegged to any reserve currency. As "cryptoisation" is akin to currency substitution (eg "dollarisation"), it may impinge on monetary sovereignty.② While detailed information on crypto trading locations is typically very limited, the box relies on trading patterns involving EME currencies to provide novel empirical evidence on this phenomenon.

Trading of US dollar-linked stablecoins vis-à-vis some EME currencies has soared since 2020. Although the US dollar remains the dominant fiat currency, the Turkish lira and the Brazilian real, for instance, accounted for much higher shares in stablecoin trading than in conventional FX trading, as captured by the BIS Triennial Survey (Graph B, left-hand panel).③ Tellingly, trading of stablecoins vis-a-vis these EME currencies gained momentum in early 2020, when the corresponding economies were hard hit by the Covid-19 shock (centre panel). In particular, the share of the Turkish lira increased from 0.3% in January to 11% in April 2020. As the lira further depreciated in 2021, its share picked up from 11% in July to 26% in December 2021. This dwarfs the lira's weight in global FX markets (0.5%).

In addition, trading of risky cryptoassets, such as Bitcoin, also spiked in some EMEs facing depreciation pressure. For EME currencies that have small liquidity pools and are thus not suitable for trading in limit order books on centralised crypto exchanges, the spike surfaced on peer-to-peer (P2P) platforms that facilitate the matching of client

trades (mostly involving Bitcoin).④ In a sign that residents may have tried to avoid losses of purchasing power, stronger depreciation pressure on such currencies went hand in hand with larger volumes of P2P trading in Bitcoin (Graph B, right-hand panel). By contrast, for EME countries whose currencies can be used in centralised exchanges (eg Turkey and Brazil), the P2P volume did not increase substantially, even though their exchange rates were highly volatile.

Cryptoassets made inroads into EMEs with volatile exchange rates — Graph B



AEs = advanced economies; EMEs = emerging market economies.

[1] The share of each currency in the total trading volume of major stablecoins vis-à-vis fiat currencies on exchanges in 2021. The major stablecoins include USDT, USDC, BUSD and DAI. [2] The share of each currency in global FX turnover in the 2019 BIS Triennial Survey. [3] The share of a fiat currency in the total trading volume of major stablecoins vis-à-vis fiat currencies on exchanges. [4] The 15 countries with largest currency depreciation against the US dollar in 2020. The sample covers trading in LocalBitcoins and Paxful from Jan 2019 to Dec 2020.

Sources: Coin Dance; CryptoCompare, CCCAGG; BIS statistics.

The increasing usage of cryptoassets in EMEs, especially during periods of elevated FX volatility, could – over time – contribute to economic instability. Although the degree of cryptoisation thus far remains limited, its growth could ultimately divert away some of the funding of local banking systems. As cryptoisation circumvents restrictions on exchange rates and capital controls, it can limit the effectiveness of domestic monetary policy transmission, in turn posing a threat to monetary sovereignty. In addition, if some cryptoassets were widely adopted as a means of payment, problems with these assets – such as disruptions to stablecoins or risky cryptoasset price crashes – could spill over to payment systems and adversely affect real economic activity. Such risks are further compounded by "unknown unknowns" – in particular due to the lack of transparency about ownership of cryptoassets.

① The views expressed are those of the authors and do not necessarily reflect the views of the BIS. The authors thank Claudio Borio, Stijn Claessens and Nikola Tarashev for helpful comments and discussions. ② IMF, "The crypto ecosystem and financial stability challenges", in "Global Financial Stability Report", 2021. ③ The stablecoin and triennial trading shares refer to 2021 and 2019, respectively. That said, the triennial share has been stable over past decades. ④ Crypto trading can take place in both centralised exchanges (CEXs) or decentralised exchanges (DEXs). Transactions using fiat currencies mostly happen in CEXs. For international currencies, trades mostly take place in large exchanges such as Coinbase and Binance. For other currencies, trades take place mainly on P2P matching platforms such as LocalBitcoins and Paxful.

Iñaki Aldasoro
inaki.aldasoro@bis.org

Sebastian Doerr
sebastian.doerr@bis.org

Haonan Zhou
haonan@princeton.edu

Non-bank lenders in the syndicated loan market[1]

Non-bank lenders are an important source of syndicated credit to non-financial corporates in most regions and industries. Their loan origination, however, is more concentrated by location and sector than that of banks and it is also more volatile. Syndicated loans arranged by non-banks carry a significantly higher spread relative to those by banks, consistent with the pattern that firms borrowing from non-banks are more leveraged and less profitable, ie riskier. Non-banks generally grant a smaller share of their new loans to foreign borrowers than banks do. During domestic financial crises, they reduce this share further, exacerbating the global transmission of shocks.

JEL classification: E51, F34, G21, G23.

The increasing footprint of non-bank financial intermediaries has put them front and centre of policymakers' agendas. While they can contribute to a more diversified and efficient financial system, non-banks can also be a source of instability due to, for instance, liquidity mismatches (Aramonte et al (2021)). With the March 2020 market turmoil serving as a case study, substantial efforts have been made to understand how such instability can unfold and what policy measures can mitigate it (Carstens (2021)).

The reach of non-banks extends beyond financial market conditions. Non-bank lenders represent an important source of funding for non-financial corporates (NFCs) in general (Aramonte and Avalos (2021)) and through syndicated loans in particular (Elliott et al (2019)). As non-banks extend syndicated loans in a highly procyclical fashion (Fleckenstein et al (2021)) and access to syndicated credit affects firm performance (Chodorow-Reich (2014)), their ubiquitous presence could drive real economy developments.

This special feature provides the first systematic overview of global syndicated lending by non-banks and contrasts it with that by banks.[2] It further investigates the role of non-banks in cross-border spillovers during financial crises.

[1] The authors thank Sirio Aramonte, Fernando Avalos, Frédéric Boissay, Claudio Borio, Stijn Claessens, Egemen Eren, Blaise Gadanecz, Ulf Lewrick, Hyun Song Shin, Philip Wooldridge, Youngsuk Yook and Nikola Tarashev for valuable comments and suggestions, and Murphy Pan for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the Bank for International Settlements.

[2] Syndicated lending by banks has been studied extensively (see Güler et al (2021) for a summary).

Key takeaways

- Non-banks' origination of syndicated loans to non-financial firms grew twentyfold from 1990, to $410 billion in 2019, and represents a sizeable share of the total in most regions and sectors.
- Non-banks' syndicated lending is more concentrated across countries and industries than that of banks and it is more volatile. It also carries higher spreads, partly reflecting riskier borrowers.
- In the wake of a crisis at home, non-banks curtail lending to foreign borrowers by more than they do to domestic ones, thereby transmitting shocks across countries.

The main findings are as follows.

First, non-banks play an important role in the syndicated loan market, but their lending patterns differ from those of banks. Non-banks have increased their yearly syndicated lending twentyfold over the past three decades, serving borrowers in all major regions and sectors. Their share in total new syndicated lending fluctuated between 7% and 18% over the same period. Non-bank lending is more concentrated by geographical location and sector than bank syndicated lending. While non-banks' credit provision tends to ebb and flow with that of banks, it is more volatile and contracted more during the Great Financial Crisis (GFC).

Second, loans arranged by non-bank lenders carry materially higher spreads than those arranged by banks. The difference in spreads largely reflects a riskier pool of borrowers and associated risk premia, rather than differences in loan terms.

Finally, when facing domestic financial crises, non-bank arrangers retrench particularly forcefully from abroad. In general, non-banks exhibit a stronger home bias than banks, as foreign borrowers account for a smaller share in their syndicated lending. During a financial crisis in their home country, non-banks further reduce their credit provision abroad, and do so more than banks. Such retrenchment, so far established for banks only (Giannetti and Laeven (2012)), suggests that non-banks transmit financial shocks across countries.

The rest of this article is organised as follows. The first section discusses the main features of syndicated lending and the classification of lenders into banks and non-banks (Box A). The second section documents patterns in non-bank syndicated lending across countries, industrial sectors and over time. The third discusses differences in loan terms and borrower characteristics between banks and non-bank lenders, assessing to what extent they explain loan spreads. The fourth section investigates how non-banks adjust their lending in foreign and domestic markets during domestic financial crises, with details summarised in Box B. The final section concludes with policy considerations.

The syndicated loan market and non-bank lenders

Syndicated loans are an important financing source for non-financial firms. They represent around three quarters of total cross-border lending to NFCs in high- and middle-income countries (Doerr and Schaz (2021)) and are particularly important for

larger firms (Cerutti et al (2015)). Consequently, changes in the supply of syndicated credit influence firm investment and employment (Acharya et al (2018)).[3]

A syndicated loan is granted by a group of financial institutions (the "syndicate") to a single borrower. The lending syndicate includes at least one lead institution (the "lead arranger(s)", sometimes called "underwriter(s)") as well as one or more participants. Lead arrangers negotiate preliminary loan terms and conditions and, upon agreement with the borrower, put together the group of participants to fund parts of the total loan amount. In return, lead arrangers receive an arrangement fee (Gadanecz (2004)).

In the loan's life cycle, lead arrangers typically act as the agent bank and perform due diligence. They ensure screening and monitoring, govern the terms of the loans and enforce covenants. In line with their responsibility as monitors, lead arrangers retain a larger portion of the loan on their balance sheets, while participants often sell their tranches on the secondary market (Sufi (2007)).

This feature analyses loan originations using detailed deal-level data on global syndicated lending from Thomson Reuters' DealScan. The sample period is from 1990 to 2019. Information on loans at origination includes the loan amount, maturity, currency of denomination and interest rate, as well as the identity, type, location and industry code of borrowers and lenders (banks as well as non-banks). All loan amounts are converted to US dollars. To attribute loan portions among members, we use the allocation provided by DealScan or, if this is not available, allocate pro rata. Henceforth, we will refer to the syndicated loan amounts attributed at origination to banks or non-banks as "bank loans" or "non-bank loans", respectively. There is no public information to track loan sales on the secondary market.[4]

We identify non-bank lenders based on information provided by DealScan, in combination with Standard Industrial Classification codes, string search and manual checks. In our sample, non-bank lenders include investment banks (or broker-dealers), finance companies and mutual funds – in line with the categorisation used by the Financial Stability Board (2021).[5] Investment banks and finance companies account for over four fifths of aggregate non-bank syndicated lending.

Non-bank lenders have gained a large footprint in the syndicated loan market and their participation is now comparable with that of banks along important dimensions. The share of all loan facilities with non-bank involvement exceeds one third. Around two fifths of all non-bank lenders active in the syndicated loan market act as lead arrangers, a share similar to that of banks. Likewise, individual members of both types contribute comparable shares to the total syndicated amount on average and extend loans for similar purposes (eg working capital, debt repayment

[3] For the real effects of bank syndicated lending, see also Doerr et al (2018), Hale et al (2020) and Chodorow-Reich and Falato (2022). These papers build on work showing that lender-borrower relationships are sticky and that the costs of switching between lenders are high, especially during downturns (Sette and Gobbi (2015), Bolton et al (2016)).

[4] While such information is important to accurately assess lenders' risk exposures, it is less relevant for understanding patterns in the origination of *new* credit, which is key from the borrower's perspective and is the focus of this special feature. That said, non-banks purchase a significant amount of loans in the secondary market (Aramonte et al (2019)). Accordingly, loan volumes at origination probably represent a lower bound of the ultimate financing provided by non-banks to NFCs.

[5] Broadly speaking, non-bank lenders differ from banks in their funding structure and their lack of access to public backstops. For example, their funding tends to be largely wholesale (Jiang et al (2020), Xiao (2020)) and they are not eligible for deposit insurance. There is, however, no harmonised or universally accepted definition of non-bank lenders.

or capital expenditure). That said, credit lines are more common among banks at origination and term loans are more common among non-banks.

Box A presents further details on the data construction, classification of banks and non-bank lenders, and their role in syndicates.

Box A

Identifying non-bank lenders in the syndicated loan market

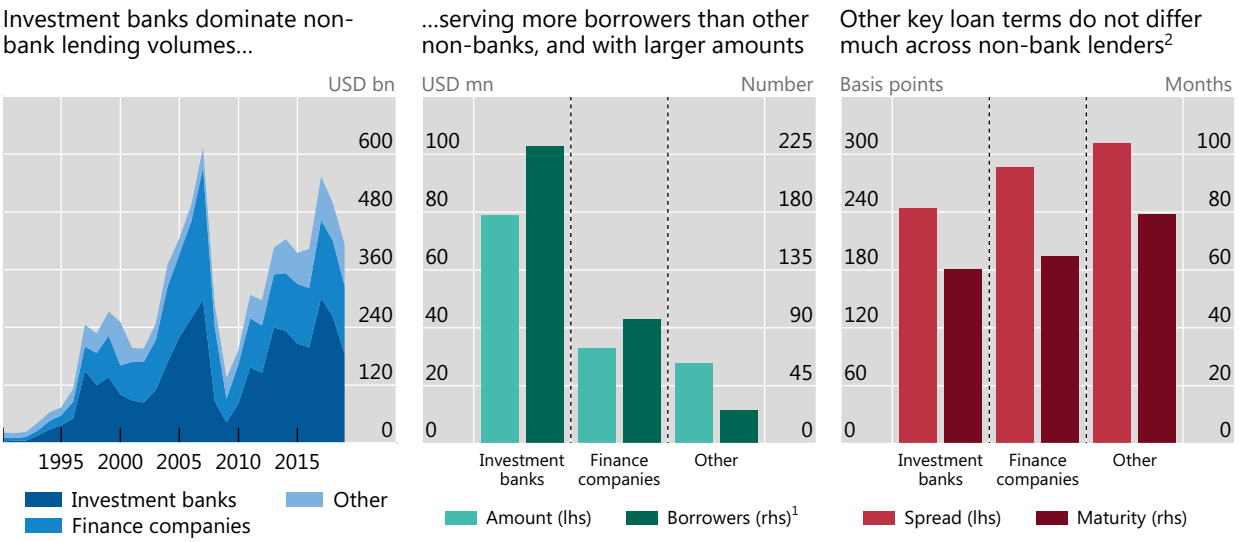
Iñaki Aldasoro, Sebastian Doerr and Haonan Zhou

For the analysis of the syndicated loan market, we categorise lenders into banks and non-banks. This box outlines the two underlying steps.①

First, we build on lender type information provided by DealScan. Consistent with the notion of banks representing deposit-taking institutions, we define bank lenders as commercial banks, classified by DealScan as "African bank", "Asia-Pacific bank", "Eastern European/Russian bank", "foreign bank", "Middle Eastern bank", "mortgage bank", "thrift/S&L", "US bank" or "Western European bank". Non-banks comprise the remaining lenders. Around 20% of lenders, however, are initially unclassified.

In a second step, we improve on this classification by using lenders' Standard Industrial Classification (SIC) sector codes as well as a string search procedure.② In particular, we look for matches with names of major commercial banks, descriptions of activities (such as "bank", "life insurance", "trust" and "securities"), or variants of spelling in different languages (eg "banca", "banco", "banque"). These procedures allow us to categorise around three quarters of the originally unclassified lenders, splitting them roughly equally between the bank and non-bank groups. We allocate the still unclassified lenders, mostly middle-market debt management companies, to the non-bank category. Ultimately, we classify almost 7,500 lenders as non-banks, out of a total of 19,000 lenders.

Different types of non-bank lender in the syndicated loan market — Graph A



The centre and right-hand panels show average results for the full sample (1990–2019).

[1] Number of distinct borrowers in a given year. [2] Spread and maturity are winsorised at the 1st and 99th percentiles. The spread refers to the all-in drawn spread, weighted by loan volume.

Sources: Thomson Reuters DealScan; authors' calculations.

Finance companies and investment banks account for the bulk of non-bank syndicated lending. While only 3% of non-bank lenders are investment banks, these account for around half of the total amount of non-bank lending to NFCs from 1990 to 2019 (Graph A, left-hand panel). This group of non-bank lenders can include, among others, brokerage and securities underwriting firms or an international bank's broker-dealer subsidiary. Finance companies, in turn, comprise 44% of the non-bank lenders and account for 34% of total non-bank lending. This group can include financial institutions that specialise in industrial loans or the financial arms of large companies. Other lenders, such as insurance companies, pension funds and mutual funds, have a small presence in the primary market for syndicated loans in the data. Over the sample period (1990–2019), investment banks served more clients and extended larger loans than did finance companies and other non-bank lenders (centre panel). Loan spreads and maturities were of comparable magnitude across non-bank lender types (right-hand panel).

Non-banks participate in a significant number of syndicated loans, contributing – at the level of individual lenders – similar amounts to syndications as banks, and often acting as lead arrangers. Overall, the share of loan facilities with non-bank involvement is 37%, vs 88% with bank involvement. Individual non-bank syndicate members account, on average, for 19% of the total syndication amount in a given syndicate, vs 17% for banks. On average, 36% of all non-banks active in the syndicated loan market have acted as lead arrangers at least once, compared with 42% for banks. While 72% of all syndicates have only bank lead arrangers, just 7% of all loans are arranged by non-banks exclusively. These patterns are similar across deals involving borrowers in advanced vs emerging market economies (EMEs).

When it comes to the type of loan and loan purpose, patterns are broadly comparable between non-banks and banks. Credit lines comprise 41% and term loans 48% of all non-bank loans, compared with 50% and 40% for banks.③ For both lender types, term loans are more common among EME borrowers. As regards loan purposes, there are no significant differences, with "corporate purposes" and "debt repayment" dominating for both banks and non-banks.

① Prior to the classification, we drop incomplete deals and those involving government-linked lenders. In particular, we drop deals with the status "cancelled", "suspended" or "rumour", and deals with missing information on amounts and loan packages that amend previous deals. We further drop deals involving supranational organisations, governments and development banks based on string matches and SIC codes. In cases where only the aggregate size of the loan is known or for loan facilities with lending shares totalling more than 110%, we impute the lending share of each participant using pro rata splits. ② For instance, we assign lenders with SIC code 6211 ("Security brokers, dealers, and flotation companies"), classified as commercial banks by DealScan, to the non-bank group. This is in line with policy practice (Financial Stability Board (2021)) and academic literature (Elliott et al (2021)). ③ Other types include bridge loans or leases.

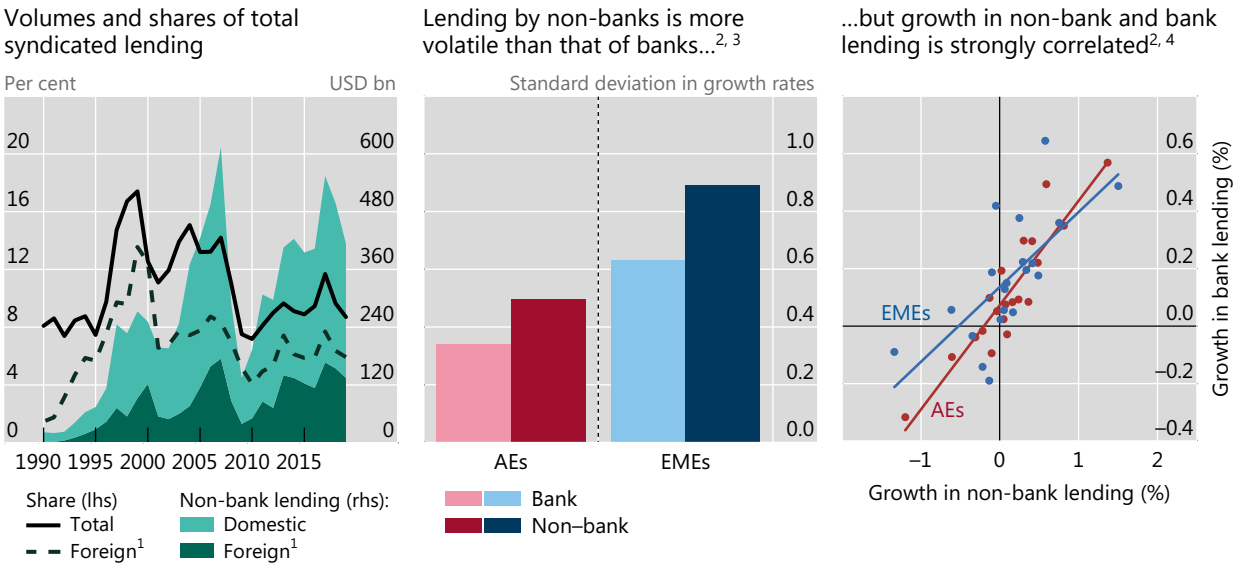
Patterns in non-bank syndicated lending

Non-bank syndicated lending has grown with the overall market, both domestically and internationally. Total new syndicated lending to NFCs increased substantially, from under $300 billion originated in 1990 to around $4,750 billion in 2019. Non-bank lending increased from $20 billion to $410 billion per year over the same period (Graph 1, left-hand panel). Its share of total loan originations steadily increased to around 14% in 2007 but contracted sharply during the GFC. This share trended up again from 2010 to 2019. Foreign loans, ie loans to borrowers located in a jurisdiction other than the lender's home country, follow a similar pattern, albeit at a lower level.

Growth in non-bank syndicated lending is more volatile than that of banks. On average across borrower countries, the standard deviation of the growth in loan origination is almost 60% higher for non-bank than bank loans (Graph 1, centre panel). While the volatility is in general higher for emerging market economy (EME) borrowers than for those from advanced economies (AEs), non-bank lending is more volatile than bank lending in both regions. Higher volatility meant greater procyclicality during the GFC, when non-banks cut their syndicated loan origination by twice as much as banks, in a pattern typical for crisis times (Fleckenstein et al (2021), Aldasoro et al (2022b)).

Non-bank syndicated lending to non-financial corporates

Graph 1



AEs= advanced economies; EMEs= emerging market economies.

[1] A loan is classified as foreign if the location of the lender's headquarters differs from that of the borrower. [2] Data are aggregated to the borrower-country-year level and split by the region of the borrower. The underlying sample covers 1,863 borrower-country-year observations from 119 countries from 1990 to 2019. Loan growth is computed as the difference in the logs of loan origination volumes and is winsorised at the 1st and 99th percentiles. [3] Standard deviation of loan growth from 1990 to 2019, averages across borrower countries within a group, for a given lender type. [4] Binned scatter plot, which enhances readability by grouping observations into equally spaced bins and reporting the average value within each bin; region-specific fitted lines.

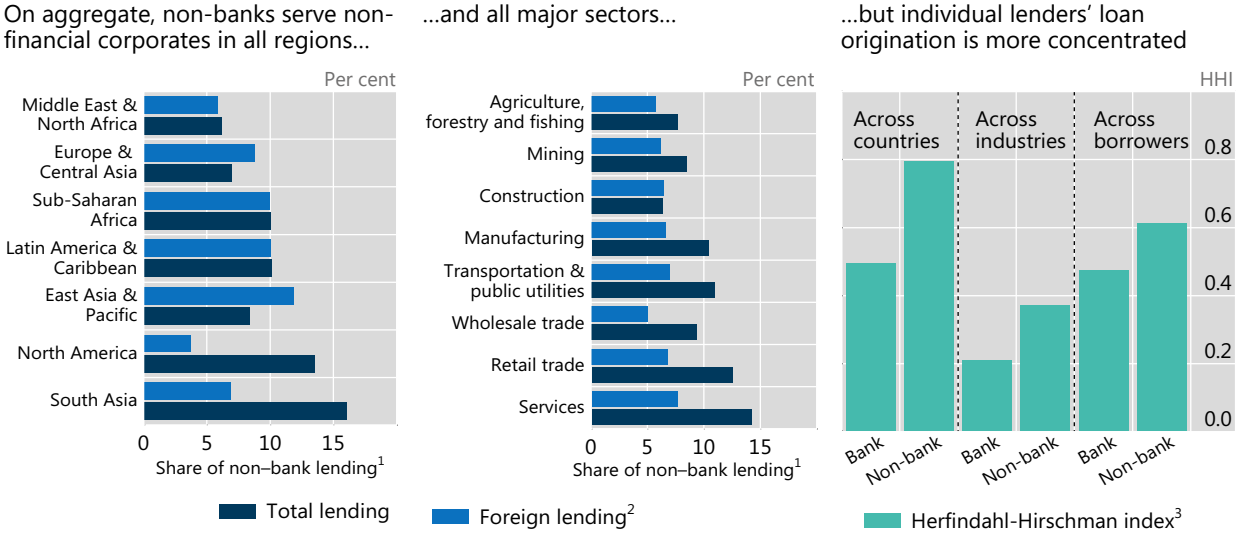
Sources: Thomson Reuters DealScan; authors' calculations.

Differences in volatilities notwithstanding, bank and non-bank lending move in tandem, especially for loans granted to borrowers from AEs. The overall correlation between bank and non-bank loan growth stands at 0.50 on average across borrower countries. For loans granted to NFCs in EMEs, the correlation is 0.36, whereas it is 0.54 in AEs (Graph 1, right-hand panel). Together with the greater volatility in loan originations, this positive correlation casts doubt on the notion that non-banks provide a "spare tyre" for borrowers when banks retrench.

Non-banks serve firms in all regions and sectors. In terms of geographical reach over the full sample period, the share of non-bank loans in total loans is largest in South Asia and that in foreign loans is largest in East Asia and the Pacific (Graph 2, left-hand panel). Among the major economies, the share of syndicated borrowing from non-banks averages 14% for the United States and 3% for China. In terms of sectoral presence, the average share of non-bank loans in total new syndicated lending ranges from 6.4% in the construction sector to 14.2% in services (centre panel).

Despite their global presence, non-banks' origination of loans is more concentrated than that of banks. The average non-bank serves fewer distinct borrowers than the average bank (around 330 vs 740 per year) and does so in a narrower set of regions and sectors. Accordingly, loan origination by non-banks is more concentrated across borrower countries and industries (Graph 2, right-hand panel).

Non-bank lending is pervasive but less diversified than bank lending Graph 2



Average results for the full sample (1990–2019).

[1] Total amount of syndicated loans originated by non-bank lenders over the total origination amount of syndicated loans in the borrower region/industry. [2] A loan is classified as foreign if the locations of the lender parent and the borrower differ. [3] Averaged Herfindahl-Hirschman index (HHI) calculated for each lender across all borrower countries, two-digit borrower industries, and individual borrowers, respectively.

Sources: Thomson Reuters DealScan; World Bank; authors' calculations.

Loan terms and borrower characteristics

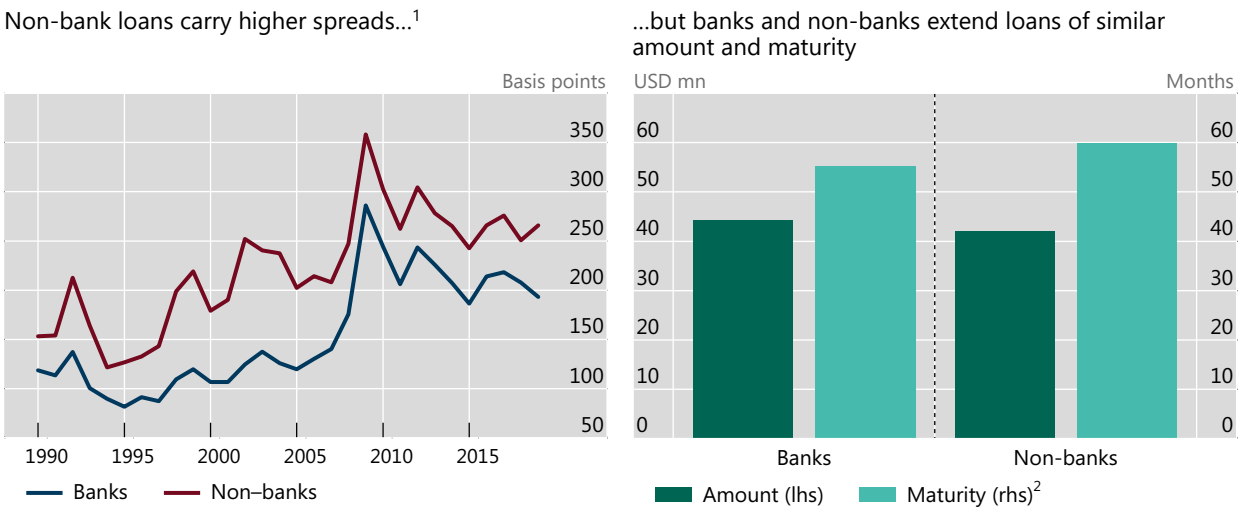
We first provide a comparison of banks' and non-banks' borrower characteristics and syndicated loan terms. Then, motivated by the patterns thus revealed, we zoom in on potential drivers of the notable difference in loan spreads.

Loans with non-bank participation carry materially higher spreads than those with bank participation only. The average all-in spread, defined as the annual spread over Libor, including fees and interests and weighted by loan size, equals 253 basis points on syndicated loans with non-bank involvement, vastly exceeding that on bank-only loans (170 basis points). While average spreads trended upwards until 2010 and receded somewhat since then for both lender types, the difference in loan spreads has remained relatively constant (Graph 3, left-hand panel). These patterns are robust to zooming in on lead arrangers only.

Banks and non-banks originate loans of similar amounts and maturity. The average loan amount granted by banks stands at $44 million, roughly the same as the $42 million granted by non-bank lenders (Graph 3, right-hand panel). The corresponding maturities are also similar, at 60 and 55 months respectively. Again, the patterns persist when considering lead arrangers only.

Non-bank loans carry higher spreads, but are of similar amount and maturity

Graph 3



Average results for the full sample (1990–2019) are shown in the right-hand panel.

[1] "All-in drawn spread", defined as the spread over Libor, including fees and interests. [2] Averages weighted by loan size.

Sources: Thomson Reuters DealScan; authors' calculations.

By contrast, firms borrowing from syndicates with non-bank lenders appear to be riskier.[6] The average firm receiving syndicated credit from non-banks has a lower return on assets, higher leverage and a lower interest coverage ratio than firms obtaining syndicated loans from banks only (Table 1). Unreported tests show that these differences remain material even among firms of similar size and operating in the same location and industry. They are also present when we classify firms by their connection to bank or non-bank lead arrangers.

Firms borrowing from non-banks have lower returns and higher leverage

Table 1

	Assets (USD mn)	Employees ('000)	Interest coverage ratio	Leverage (ratio)	Return on assets (%)
Borrows from banks only	5,180	13.65	22.81	1.92	6.42
Borrows from non-banks	10,703	24.99	12.48	2.61	6.01

The table compares non-financial corporates (NFCs) that borrow only from banks with NFCs that borrow from at least one non-bank lender on the syndicated loan market. Assets are in USD millions. Employees are in thousands. The interest rate coverage ratio is computed as earnings over interest expenses. Leverage is defined as the sum of long-term debt and current liabilities over total equity. Return on assets is defined as operating income net of depreciation over total assets, in per cent. The sample covers 14,443 unique NFCs with 56,295 borrower-year observations in total. The sample period is from 1990 to 2019.

Sources: Chava and Roberts (2008); S&P Compustat; Thomson Reuters DealScan; authors' calculations.

[6] We link the DealScan data set to balance sheet data on listed firms from Compustat Global and North America following the updated matching table of Chava and Roberts (2008). Around 40% of all observations are matched, as not all borrowing firms are covered in Compustat. Firms borrowing from at least one non-bank in a given year account for 19,500 firm-year observations. The small sample of firms borrowing exclusively from non-banks (ca 2,500 observations) exhibits similar patterns in the measures of risk. Among firms with credit ratings, the share rated high-yield is significantly higher for NFCs borrowing from non-banks.

We now examine to what extent loan and borrower characteristics drive the spread differential in a regression analysis. The analysis focuses on lead arrangers as they negotiate loan terms and usually contribute material shares to the syndication amount.

Loan characteristics explain only a small part of the spread differential. We start by recording that the average loan spread on loans with non-bank arrangers is 84 basis points higher than on those without (Table 2, column 1). Accounting for loan amounts, maturity and loan currency narrows the gap only marginally, to 77 basis points (column 2). This is consistent with the earlier finding that loan terms are broadly comparable across lender types.

Borrower characteristics, on the other hand, explain a significant fraction of the higher spread on loans arranged by non-banks. Accounting for borrowers' country and industry as well as the year of origination reduces the difference by one third, to 50 basis points (Table 2, column 3). Further considering differences in borrower characteristics such as size, profitability and leverage halves the remaining difference

Borrower characteristics largely account for higher spreads on non-bank loans

Table 2

	(1)	(2)	(3)	(4)
Dependent variable:	Spread	Spread	Spread	Spread
Non-bank	83.981***	76.832***	49.536**	26.883**
	(20.911)	(19.240)	(19.966)	(11.749)
Loan maturity		37.339***	35.748***	16.066***
		(3.915)	(3.101)	(1.599)
Loan amount		–14.311***	–20.571***	–7.674***
		(2.190)	(1.833)	(1.456)
Size				–23.015***
				(1.068)
Return on assets				–345.909***
				(19.293)
Leverage				5.282***
				(0.200)
Interest coverage ratio				–0.108***
				(0.028)
Currency fixed effects (FEs)	No	Yes	Yes	Yes
Country-industry-year FEs	No	No	Yes	Yes
Number of observations	379,516	379,516	379,516	130,559
R-squared	0.039	0.100	0.483	0.608

Observations are at the lender-borrower-year level and the sample is restricted to lead arrangers. The dependent variable is the all-in spread, defined as the spread over Libor, including fees and interests. It is winsorised at the 1st and 99th percentiles. Column (1) includes the dummy *non-bank*, which takes on a value of one if the lender is a non-bank. Column (2) adds the logarithm of loan maturity in months (*loan maturity*) and the logarithm of loan amount in million US dollars (*loan amount*), as well as currency fixed effects. Column (3) adds borrower country-industry-year fixed effects. Finally, column (4) adds borrower-specific balance sheet controls obtained from Compustat (see the notes of Table 1 for variable definitions). The reduction in sample size in this last column is due to the unavailability of balance sheet data for some of the firms borrowing in the syndicated loan market. Standard errors are clustered at the lender level. ***/**/* indicates statistical significance at the 1/5/10% level. The sample period is from 1990 to 2019.

Sources: S&P Compustat; Thomson Reuters DealScan; authors' calculations.

to 27 basis points (column 4). Thus, borrower riskiness is a key driver of the spread differential.[7]

The remaining difference in loan spreads between bank and non-bank arrangers could be explained by lender-specific factors. For example, a closer lender-borrower relationship has been shown to lead to higher spreads to compensate for better access to credit during shocks (Bolton et al (2016)). Lower geographical diversification has also been associated with higher spreads (Keil and Müller (2020)). Further, a higher market share in a sector could allow lenders to charge relatively higher interest rates (De Jonghe et al (2020)). Exploring these dimensions in the context of non-banks would be an interesting avenue for future work.

Non-banks and the global transmission of shocks

Non-banks' large global footprint could have implications for shock transmission across borders. As the volume of non-banks' syndicated lending expanded, so did the attendant share of credit to foreign borrowers, from 3% for the average lender in the early 1990s to 11% in 2019 (Graph 4, left-hand panel). This share is even higher for larger lenders. A retrenchment of such international presence could have material implications in the borrower countries.

To investigate how non-banks' global lending responds to negative shocks, we analyse whether non-bank lenders exhibit a "flight home" effect. So far established for banks only, this effect refers to banks cutting their lending in foreign markets by more than they do in their domestic market following a financial crisis in their home country (Giannetti and Laeven (2012)). The relative retrenchment has been shown to be stronger for banks with higher exposure to risky clients and less stable funding sources.

Non-banks are likely to exhibit a more pronounced flight home effect relative to banks. Not only do non-banks serve riskier borrowers, but they also rely more on wholesale funding (Jiang et al (2020), Fleckenstein et al (2021)). Such funding is more sensitive to price changes than retail deposits are, and makes lenders – non-banks and banks alike (Aldasoro et al (2022a)) – more vulnerable to negative liquidity shocks (Demirgüç-Kunt and Huizinga (2010), Ivashina and Scharfstein (2010)).

We find that, during a financial crisis in their home country, non-bank lead arrangers reduce the share of loans to foreign borrowers by more than bank lead arrangers.[8] Both banks and non-banks curtail credit to foreign borrowers by more

[7] Results are qualitatively similar when all syndicate participants are included (the coefficient estimates on the dummy variable *non-bank* are 83 basis points, 72 basis points, 50 basis points and 30 basis points in columns 1, 2, 3 and 4, respectively). They are similarly robust in regressions weighted by each lender's contribution to the total syndicated amount (105 basis points, 95 basis points, 66 basis points and 50 basis points in columns 1, 2, 3 and 4, respectively). Re-classifying investment banks as banks results in coefficient estimates of 80 basis points, 69 basis points, 50 basis points and 29 basis points. Finally, comparing loans exclusively arranged by non-banks (7% of all loans) with those arranged by banks only (72%) yields coefficient estimates of 163 basis points, 151 basis points, 115 basis points and 76 basis points. The robust effect of borrower characteristics on spread differentials is in line with evidence for mid-sized US companies (Chernenko et al (2021)).

[8] In terms of total lending, banks and non-bank lenders reduce their loan origination by a respective 3.3% and 5.4% during domestic crises. For the identification of financial crises, we rely on Laeven and Valencia (2020). The two conditions defining a banking crisis are significant signs of financial distress

than to domestic ones, even after controlling for crises in foreign countries. However, while the share of new loans to foreign borrowers declines by 7.3 percentage points for banks, it falls by 18.2 percentage points for non-banks (Graph 4, right-hand panel). Box B provides details of the estimation.

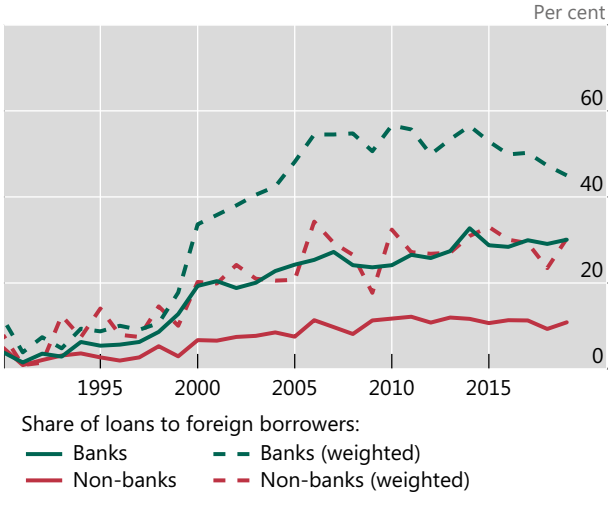
The relative retrenchment is more pronounced for non-bank lending to risky borrowers and among non-banks with less stable funding. Non-banks contract their share of foreign loans by 22 percentage points when considering only the subset of risky borrowers, defined as those obtaining loans with a spread above the yearly industry median. Excluding investment banks, in turn, leads to a decline of 26.5 percentage points. This may reflect the fact that some investment banks tend to have more stable funding than other types of non-bank lender (eg when they are part of a bank holding company).

These findings suggest that non-banks transmit financial shocks across countries, and by more than banks do. As a large literature has found that contractions in syndicated lending reduce firm investment and employment,[9] non-banks' retrenchment is likely to have consequences for the real economy.

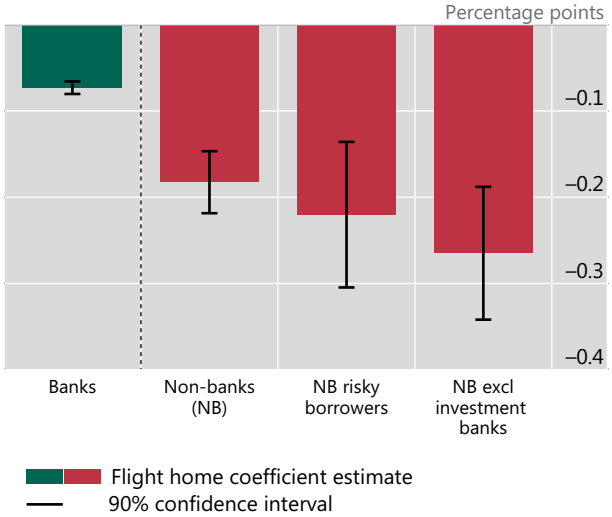
Non-banks have a stronger home bias that strengthens during a domestic crisis

Graph 4

Non-banks increased lending to foreign firms, but less so than banks[1]



During domestic crises, non-banks cut credit to foreign borrowers by more than banks[2]



[1] Average share of new loans extended to foreign borrowers. "Weighted" refers to the weighted average, with weights given by the total syndicated loan amount originated by a lender in a given year. [2] Based on lender parent-borrower country-year level panel regressions for lead arrangers only. The dependent variable captures the share of new loans by lender *l* in country *c* in quarter *t* out of total new syndication by that lender in that quarter. It is regressed against the dummy *foreign loan* that equals one if the location of the arranger's headquarters differs from the location of the borrower, as well as the interaction of *foreign loan* with *crisis lender country* that captures financial crises in the arranger's home country. The displayed coefficients are those on the explanatory variable *foreign loan X crisis lender country*. Regressions control for the effect of borrower country crises on foreign loans as well as the (logarithm of) the lender country-specific loan spread and include time-varying borrower country fixed effects. "Banks" and "non-banks" refer to coefficients obtained from separate regressions for bank and non-bank lead arrangers. "Risky borrowers" focuses on lending by non-bank arrangers to borrowers obtaining loans with a spread above the yearly industry median. "Excl investment banks" excludes investment banks from the sample of non-bank arrangers. The sample period is from 1990 to 2019.

Sources: Laeven and Valencia (2020); Thomson Reuters DealScan; authors' calculations.

in the banking system and significant banking policy intervention measures in response to losses in the banking system.

[9] See above for the real effects of bank syndicated lending. Elliott et al (2019, 2021) and Aldasoro et al (2022b) establish the real effects of non-bank syndicated lending.

Box B

The flight home effect among non-bank lenders

Iñaki Aldasoro, Sebastian Doerr and Haonan Zhou ⓘ

In this box, we investigate the flight home effect (FHE) among non-banks. The FHE refers to the finding in Giannetti and Laeven (2012) that, during financial crises in their home country, lead arranger banks cut lending to foreign borrowers by more than they did to domestic borrowers. Giannetti and Laeven also find that the effect is driven by banks that are more exposed to riskier borrowers and with more volatile funding.

Following the methodology in Giannetti and Laeven, we estimate regressions at the lender parent-borrower country-quarter level. We do so *separately* for bank and non-bank lead arrangers:

$$loan\ share_{lct} = \alpha_1 foreign\ loan_{lc} + \alpha_2 foreign\ loan_{lc} \times crisis\ lender\ country_{lt} + \theta_c + \tau_t + controls + \epsilon_{lct}. \quad (1)$$

The dependent variable captures the share of new loans by lender *l* in country *c* in quarter *t* out of total new syndication by that lender in that quarter. Using the share as a dependent variable has the benefit that it is unaffected by shocks changing the lender's overall supply of loans. Instead, it captures the allocation of a lender's new loans to domestic and foreign markets in response to changes in economic conditions. *Foreign loan* is a dummy variable that equals one if the location of the arranger's headquarters differs from the borrower's, and zero otherwise. *Crisis lender country* captures financial crises in the arranger's home country, obtained from Laeven and Valencia (2020).

The interpretation of the key coefficients is as follows. The coefficient α_1 indicates whether lenders systematically issue a higher or lower share of their new loans to the average foreign country, relative to their home country. The coefficient α_2 captures the FHE. A negative estimate suggests that lenders reduce lending to foreign borrowers relative to domestic borrowers when their home country experiences a crisis. A higher absolute value of α_2 indicates a more pronounced FHE.

The flight home effect is stronger for non-bank lenders

Table B

	(1)	(2)	(3)	(4)	(5)
Sample:	Banks	Non-banks (NB)	NB risky borrowers	NB excl investment banks	NB excl GFC
Dependent variable:	Loan share	Loan share	Loan share	Loan share	Loan share
Foreign loan (FL)	–0.422***	–0.328***	–0.224***	–0.343***	–0.326***
	(0.004)	(0.015)	(0.017)	(0.019)	(0.016)
FL X crisis lender country	–0.073***	–0.182***	–0.220***	–0.265***	–0.178***
	(0.006)	(0.028)	(0.043)	(0.039)	(0.033)
Number of observations	53,987	7,479	5,066	5,205	6,916
R-squared	0.513	0.670	0.643	0.684	0.669

The dependent variable in all regressions is *loan share*, defined as the share of new syndicated loans by lender *l* in country *c* in quarter *t* out of total new syndication by that lender in that quarter. *Foreign loan* is a dummy variable that takes on a value of one if the location of the lender's headquarters differs from that of the borrower, and zero otherwise. *Crisis lender country* refers to a financial crisis in the home country of the lender. All columns include borrower country-time fixed effects, an interaction term of *foreign loan* with the dummy *crisis in borrower country* and the log of the lender-borrower country-specific spread. In column (3), *risky borrowers* are defined as those borrowing at prices above the industry median in any given year. Column (4) excludes investment banks from the group of non-bank lenders. Column (5) excludes the Great Financial Crisis (GFC) from the sample. Standard errors are robust. ***/**/* indicates statistical significance at the 1/5/10% level. The sample period is from 1990 to 2019 and focuses on lead arrangers only.

Sources: Laeven and Valencia (2020); Thomson Reuters DealScan; authors' calculations.

The allocation of new loans could also be affected by crises in borrower countries, and more broadly by changes in demand. We control for the differential effect of borrower country crises on foreign loans directly by interacting *foreign loan* with a dummy for crisis years in borrower countries, which implies that the coefficient α_2 reflects relative changes in lending to foreign countries after accounting for the effects of crises there. To account for demand shocks and borrower risk, regressions include time-varying borrower country fixed effects, and control for the (logarithm of) the median lender country-specific loan spread. However, we cannot fully account for (unobservable) changes in borrowers' loan demand, which could also be affected by crises outside the borrower country. Estimated coefficients hence reflect lender characteristics, but also differences in the pool of borrowers within a country. That said, a domestic financial crisis is likely to have a stronger effect on the performance – and hence loan demand – of domestic borrowers compared with foreign borrower countries, implying an attenuation bias in the estimates.

Results in Table B show that the FHE is stronger for non-bank arrangers. Column (1) first shows a FHE among lead arrangers that are banks, with estimates quantitatively similar to those in Giannetti and Laeven. In column (2) we estimate the same specification for non-bank arrangers. As indicated by the point estimate of α_1, the average difference in the shares of new loans between foreign and domestic countries is larger for banks than non-banks (42.2 percentage points vs 32.8 percentage points). More importantly, the FHE is stronger for non-bank arrangers (α_2 of 18.2 percentage points vs 7.3 percentage points for banks). In column (3) we show that the FHE becomes more pronounced when considering only the subset of riskier borrowers, defined as those obtaining loans with a spread above the yearly industry median. Column (4) shows that results strengthen further when excluding investment banks, which could have more stable funding than other non-banks. Finally, the results are also robust to excluding the Great Financial Crisis in column (5).②

① The views expressed in this box are those of the authors and do not necessarily reflect those of the BIS. ② In unreported regressions, we find that the existence of a stronger flight home effect for non-banks is also robust to the exclusion of the euro zone crisis, as well as the exclusion of different regions and countries that are home to a significant number of non-bank lenders (eg Japan, the United Kingdom and the United States).

Conclusion

Policymakers have so far mostly focused on the role of non-banks during severe market stress. Yet, non-banks are also important providers of credit to non-financial corporates across the globe. Indeed, this feature finds that, relative to banks, non-banks lend to a riskier pool of borrowers. To the extent that such firms have limited access to financing (Chernenko et al (2021)), non-bank lenders contribute to a more diversified and efficient financial system. That said, the global footprint of non-bank lenders may be a destabilising force. Not only is their credit provision more volatile, possibly reflecting their greater reliance on wholesale funding, but it is also more concentrated than that of banks. The resulting procyclicality of non-bank lending warrants continued analysis, as does the tendency of non-bank lenders to transmit shocks across borders to a larger extent than banks do.

References

Acharya, V, T Eisert, C Eufinger and C Hirsch (2018): "Real effects of the sovereign debt crisis in Europe: evidence from syndicated loans", *Review of Financial Studies*, vol 31, no 8, pp 2855–96.

Aldasoro, I, J Caparusso and Y Chen (2022a): "Global banks' local presence: a new lens", *BIS Quarterly Review*, March, pp 47–59.

Aldasoro, I, S Doerr and H Zhou (2022b): "Non-bank lending during financial crises", working paper.

Aramonte, S and F Avalos (2021): "The rise of private markets", *BIS Quarterly Review*, December, pp 69–82.

Aramonte, S, S J Lee and V Stebunovs (2019): "Risk taking and low longer-term interest rates: evidence from the US syndicated term loan market", *Journal of Banking & Finance*, forthcoming.

Aramonte, S, A Schrimpf and H S Shin (2021): "Non-bank financial intermediaries and financial stability", *BIS Working Papers*, no 972, October.

Bolton, P, X Freixas, L Gambacorta and P Mistrulli (2016): "Relationship and transaction lending in a crisis", *Review of Financial Studies*, vol 29, no 10, pp 2643–76.

Carstens, A (2021): "Non-bank financial sector: systemic regulation needed", *BIS Quarterly Review*, December, pp 1–6.

Cerutti, E, G Hale and C Minoiu (2015): "Financial crises and the composition of cross-border lending", *Journal of International Money and Finance*, vol 52, pp 60–81.

Chava, S and M Roberts (2008): "How does financing impact investment? The role of debt covenants", *Journal of Finance*, vol 63, no 5, pp 2085–121.

Chernenko, S, I Erel and R Prilmeier (2021): "Why do firms borrow directly from nonbanks?", working paper.

Chodorow-Reich, G (2014): "The employment effects of credit market disruptions: firm-level evidence from the 2008–09 financial crisis", *Quarterly Journal of Economics*, vol 129, no 1, pp 1–59.

Chodorow-Reich, G and A Falato (2022): "The loan covenant channel: how bank health transmits to the real economy", *Journal of Finance*, vol 77, no 1, pp 85–128.

De Jonghe, O, H Dewachter, K Mulier, S Ongena and G Schepens (2020): "Some borrowers are more equal than others: bank funding shocks and credit reallocation", *Review of Finance*, vol 24, no 1, pp 1–43.

Demirgüç-Kunt, A and H Huizinga (2010): "Bank activity and funding strategies: the impact on risk and returns", *Journal of Financial Economics*, vol 98, no3, pp 626–50.

Doerr, S, M Raissi and A Weber (2018): "Credit-supply shocks and firm productivity in Italy", *Journal of International Money and Finance*, vol 87, no 10, pp 150–71.

Doerr, S and P Schaz (2021): "Geographic diversification and bank lending during crises", *Journal of Financial Economics,* vol 140, no 3, pp 768–88.

Elliott, D, R Meisenzahl, J-L Peydro and B Turner (2019): "Nonbanks, banks and monetary policy: US loan-level evidence since the 1990s", working paper.

Elliott, D, R Meisenzahl and J-L Peydro (2021): "Nonbank lenders as global shock absorbers: evidence from US monetary policy spillovers", working paper.

Financial Stability Board (2021): *Global monitoring report on non-bank financial intermediation*, December.

Fleckenstein, Q, M Gopal, G Gutierrez Gallardo and S Hillenbrand (2021): "Nonbank lending and credit cyclicality", working paper.

Gadanecz, B (2004): "The syndicated loan market: structure, development and implications", *BIS Quarterly Review*, December, pp 75–89.

Giannetti, M and L Laeven (2012): "The flight home effect: evidence from the syndicated loan market during financial crises", *Journal of Financial Economics*, vol 104, no 1, pp 23–43.

Güler, O, M Mariathasan, K Mulier and N Okatan (2021): "The real effects of banks' corporate credit supply: a literature review", *Economic Inquiry*, no 59, pp 1252–85.

Hale, G, T Kapan and C Minoiu (2020): "Shock transmission through cross-border bank lending: credit and real effects", *Review of Financial Studies*, vol 33, no 10, pp 4839–82.

Ivashina, V and D Scharfstein (2010): "Bank lending during the financial crisis of 2008", *Journal of Financial Economics*, vol 97, no 3, pp 319–38.

Jiang, E, G Matvos, T Piskorski and A Seru (2020): "Banking without deposits: evidence from shadow bank call reports", working paper.

Keil, J and K Müller (2020): "Bank branching deregulation and the syndicated loan market", *Journal of Financial and Quantitative Analysis*, vol 55, no 4, pp 1269–303.

Laeven, L and F Valencia (2020): "Systemic banking crises database II", *IMF Economic Review*, vol 68, pp 307–61.

Sette, E and G Gobbi (2015): "Relationship lending during a financial crisis", *Journal of the European Economic Association*, vol 13, no 3, pp 453–81.

Sufi, A (2007): "Information asymmetry and financing arrangements: evidence from syndicated loans", *Journal of Finance*, vol 62, no 2, pp 629–68.

Xiao, K (2020): "Monetary transmission through shadow banks", *Review of Financial Studies*, vol 33, no 6, pp 2379–420.

Iñaki Aldasoro
inaki.aldasoro@bis.org

John Caparusso
john.caparusso@bis.org

Yingyuan Chen
ychen@imf.org

Global banks' local presence: a new lens[1]

Banks operate internationally through networks of branches and subsidiaries, also known as foreign banking offices (FBOs). Newly collected system- and entity-level data across two dozen host countries confirm stylised facts on these entities' balance sheets and establish new ones. Subsidiaries, which resemble local banks in their focus on domestic currency and retail business, have reduced their share of FBO assets over the past decade, in favour of branches, which are tailored to flexibly provide international services. This shift may raise financial stability concerns, not least because branches' asset growth has been more responsive than subsidiaries' to financial and economic conditions outside host jurisdictions. Judging by the evolution of liquidity and intragroup positions, host supervisors have influenced branches' operations in advanced economies but less so in emerging market ones.

JEL classification: F30, G15, G21.

International banks develop and maintain their customer networks through local offices in several host countries. These foreign banking offices (FBOs) take two forms: subsidiaries and branches. The choice between the two reflects the holding company's global business model. A model focused on corporate and investment banking delivers international services through branches that are largely wholesale-funded and legally part of the parent, thus reporting to the parent's supervisors in the home country. By contrast, a multinational retail bank tends to rely on locally incorporated and supervised subsidiaries that behave much like the domestically headquartered banks of the host country, not least in their reliance on retail funding. The characteristics of each type – the flexibility and responsiveness of branches, and the stable local relationships of subsidiaries – have important implications for the transmission of stress across borders.

This feature contributes to the understanding of *global* banks' *local* presence, focusing on structural and behavioural differences between foreign branches and subsidiaries as reflected in their balance sheets. It does so by combining the aggregate perspective of the BIS international banking statistics (IBS) with a novel database that includes standardised, detailed balance sheet histories of FBOs in 24

[1] The authors thank Claudio Borio, Stijn Claessens, Marc Farag, Bryan Hardy, Patrick McGuire, Hyun Song Shin, Nikola Tarashev and Philip Wooldridge for valuable comments and suggestions, and Swapan-Kumar Pradhan and Max Yarmolinsky for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the Bank for International Settlements or the International Monetary Fund (IMF), its Executive Board, or IMF management.

Key takeaways

- The share of foreign banking offices in host banking system assets has remained stable since 2010, with shifts from advanced to emerging market economy parents – mostly Chinese – and from subsidiaries to branches.
- Branches pose higher risks to host countries than subsidiaries do, because of more volatile asset growth, greater responsiveness to home country conditions, and weaker control by host authorities.
- The recent rise in branches' liquidity ratios in advanced economies and the broader decline in their intragroup positions suggest a tightening of host authorities' control.

host jurisdictions from advanced economies (AEs) and emerging market economies (EMEs). We use these data to complement previous analyses of FBOs that relied on either more granular single-country or less specific multi-country data.

Our main contribution is threefold. First, based on the new database, we validate the commonly held view that branches and subsidiaries have distinct balance sheet structures. Previously established for just a handful of individual countries, our confirmation of this stylised fact underscores two points: subsidiaries' balance sheets resemble those of local banks; and branches rely more on fickle wholesale funding and hold relatively large intragroup positions.

Second, we document two new stylised facts. While FBOs' combined share of host country banking assets has been stable over the past decade, this masks two underlying shifts: the gains by FBOs headquartered in EMEs – especially China – at the expense of their AE peers; and the decline of subsidiaries' share in FBO assets, in both AE and EME hosts. In addition, using entity-level information, we show that subsidiaries are less profitable as a group than local peers. This may help explain the reduction in global banks' reliance on subsidiaries.

Finally, we use the new data to confirm and refine previous findings on the higher volatility of branch assets and to study trends in FBO liquidity ratios. Not only are branches' assets and loans more volatile than those of subsidiaries, but they are also particularly responsive to home country financial and economic conditions. It is therefore unsurprising that several host prudential authorities have long expressed a preference for subsidiaries, and a few have actively adopted measures to "ring-fence" branch activities. Using newly constructed liquidity indicators and data on branch intragroup positions, we present evidence that authorities have recently tightened constraints on branches in AE hosts, although less so in EME hosts.

The feature is structured as follows. The first section reviews the relationship between the types of FBO and the corresponding balance sheets. It includes a box with a high-level overview of the new FBO database. The second documents broad patterns regarding the presence of FBOs in host country banking systems. The third refines earlier findings on the volatility of foreign banking offices. The fourth reviews liquidity across FBOs and intragroup funding trends for branches. The final section concludes with policy considerations.

International business models and balance sheet structures

Banks' international business models fall into two stylised types: centralised global and decentralised multinational. These vary by customer and product focus, funding

model (eg, wholesale versus retail) and the choice between branches or subsidiaries for local presence in foreign countries (CGFS (2010)).

A *centralised global* bank caters mainly to financial institutions and multinational corporates with services such as trade finance, treasury management and transaction banking that span currencies and jurisdictions. It funds itself in wholesale markets and holds significant positions in US dollars or other major currencies. It manages capital, credit and liquidity centrally, and operates through a limited number of financial hubs. If a local presence is required, this model favours branch entities. Branches are legally and financially embedded within their parent and are overseen primarily by the parent's home authority. Less encumbered by local rules and oversight, these branches manage credit and funding in a way that caters largely to the parent banks' broader needs. This may include the transfer of liquidity to and from other nodes in the bank's global network. As a flip side to this flexibility, branches are typically excluded from the host country's deposit insurance scheme and therefore have limited access to local retail deposits.

The *decentralised multinational* model, on the other hand, focuses on local currency credit provision in multiple countries. It relies mainly on local funding in host jurisdictions and operates mainly through locally incorporated and capitalised subsidiaries.[2] These entities are regulated primarily by local authorities and submit to the oversight of, and restrictions on, the transmission of resources away from the host country. In return, they are granted access to domestic insured deposits (McCauley et al (2010), Cerutti et al (2007), Fiechter et al (2011)).

Extensively documented mostly for FBOs in the United States and the overseas offices of US parents, these stylised characterisations apply more broadly. A newly constructed balance sheet database, spanning 24 host jurisdictions (box), reveals that

Box

A new database on foreign banking offices

Iñaki Aldasoro, John Caparusso and Yingyuan Chen ⓘ

This box summarises a new database on foreign banking offices (FBOs) in 24 host jurisdictions. To produce histories of the country-level aggregate balance sheets of these FBOs as well as, for comparison, those of local peers, the database combines aggregate and entity-level information. Data are presented on a locational basis – ie from the perspective of host jurisdictions – but office balance sheets are also linked to those of parent banking groups and their home jurisdictions. The standardised balance sheet information is sufficiently granular to measure liquidity ratios, loan and deposit positions, capital (for subsidiaries) and (in nine countries) "due from and to" intragroup balances (Table A1). The quarterly time series provide nearly complete coverage from Q4 2008 (with earlier data in many countries) until Q4 2020. Source data are reported in local currency and are converted to US dollars using end-of-period exchange rates.

The database combines "top-down" (by authorities) and "bottom-up" (by entities) financial disclosures. Some balance sheet series are aggregates by office type, as reported by country authorities (Table A2, represented by R). Others are constructed from bottom-up aggregation of entity-level reporting (captured by B). This information is sourced from balance sheets for 503 branches and 253 subsidiaries in eight advanced and 16 emerging market economies. In some countries, balance sheet items for specific entity categories are derived as the difference between reported totals at the system level and known values for other segments (denoted by D).

[2] The key exceptions to local funding are the periodic yet infrequent equity capital injections from and distributions to subsidiaries' parent entities.

Stylised balance sheet structure

Table A1

Assets	**Liabilities and equity**
Liquid assets and cash from central bank	Due to banks and central banks
Interbank	Short-term wholesale funding
Loans	Deposits (excluding interbank deposits)
Intragroup assets ("due from")	Intragroup liabilities ("due to")
Marketable securities	Other liabilities
Other assets	Equity

Actual balance sheets in the database are more granular than shown in this table, which consolidates less important items and those for which breakdowns are unavailable in some countries.

Source: Authors' elaboration.

This database complements a rich body of data and associated empirical literature on international banking. The BIS international banking statistics, a key resource in this literature, are a long-standing, geographically broad and increasingly rich data set. However, they are reported at the aggregate country level and provide relatively short histories for local offices and broad balance sheet groupings. The other core resource is a set of databases that focus on foreign entities in the United States and the overseas operations of US banks (Cetorelli and Goldberg (2011, 2012), Fillat et al (2018)). These are supplemented by single-country work on FBO behaviour for a handful of jurisdictions (see eg Hills et al (2015), Turtveit (2017) and Wong et al (2014)). Some offer long histories with granularity but are limited to a single host economy and a narrow cohort of international banks.

Sources and estimation methodology for each system segment, by host country

Table A2

	Total	Domestic banks	FBO total	FBO: branches	FBO: subsidiaries
AU	R	D	S	R/B	R/B
BE	R	R/D	B	R	B
BG, BR, CH, CL, HK, ID, PH & ZA	R	D	S	B	B
CA	S	R	R	B	B
CZ, DE, HU, PL & TW	R	D	S	R	B
GB	R	R	R	D	B
JP	R	R	R	D/B	B
KR & TH	R	D	S	R/B	B
IN	R	D	R	R/B	.
TR	R	D	R	B	B
PA & US	R	D	R/S	B	B

B = aggregated from bottom-up reporting of individual financial institutions; D = derived as the difference between a reported system total and calculated values for one or more segments; FBO = foreign banking office; R = reported by national authorities; S = summation of the totals for two segments of a system.

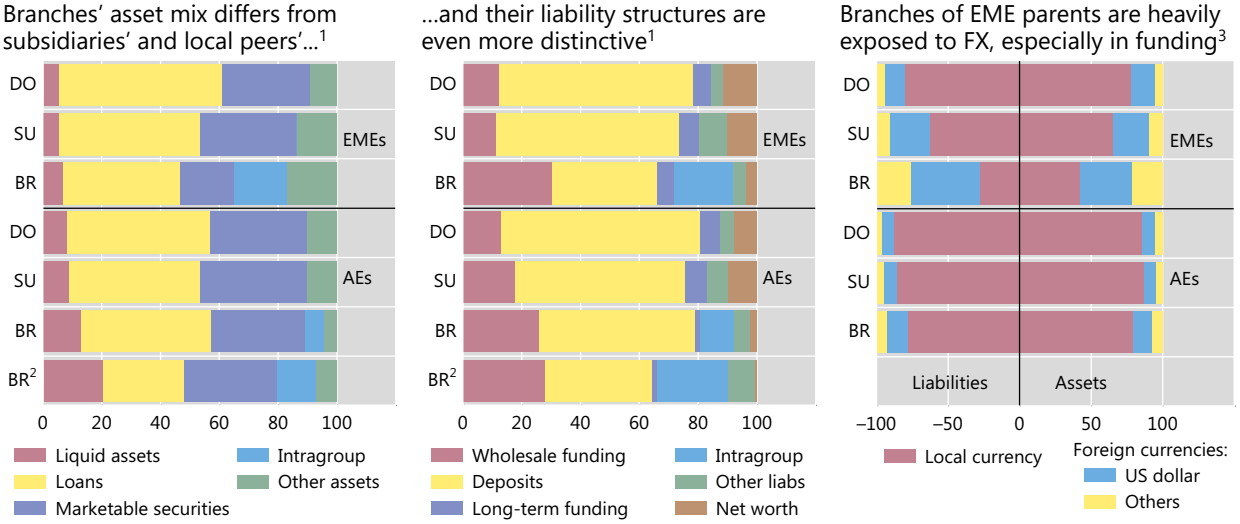
Sources: National central banks and supervisors; CEIC; Haver Analytics; S&P Capital IQ; authors' calculations.

① The views expressed in this box are those of the authors and do not necessarily reflect those of the BIS.

these patterns prevail across both AEs and EMEs (Graph 1, left-hand and centre panels).[3] Local banks and subsidiaries of foreign banks have a similar structure of assets and liabilities, notably a focus on customer lending (rather than interbank, securities and derivatives exposures) and a heavy reliance on retail deposit funding. By contrast, branch balance sheets have large intragroup positions and a greater reliance on wholesale funding than foreign subsidiaries or local banks. This is especially the case in AE host countries other than the United Kingdom.[4] In addition, data from the BIS IBS, which allow for a system-level currency split that is not available in the bank-level database, document branches' larger foreign currency positions, especially on the funding side (right-hand panel).

Balance sheet structures: international and domestic banks

By type of bank and host country group, as of Q4 2020; in per cent — Graph 1



AEs = advanced economies; BR = foreign bank branches; DO = domestic (local) banks; EMEs = emerging market economies; FX = foreign exchange; SU = foreign bank subsidiaries.

[1] Based on the 24 countries in the foreign banking office database described in the box. Only nine countries report gross intragroup balances, and a 10th reports net intragroup balances. [2] Excluding branches located in the United Kingdom. [3] Based on BIS international banking statistics. Local and foreign currencies are the perspective of the host countries; does not include data for banks located in Bahrain, Brazil, Curaçao, Guernsey, Jersey, Mexico, Panama, Singapore, the United Kingdom and the United States; branches or subsidiaries in Japan and Norway; branches in Bermuda, Malaysia and Russia; and subsidiaries in Greece, India and Saudi Arabia.

Sources: National central banks and supervisors; CEIC; Haver Analytics; S&P Capital IQ; BIS locational banking statistics (by residence); authors' calculations (see box).

[3] Throughout this feature, calculations of average shares are on a volume-weighted basis, with balances for each country expressed in US dollars at current exchange rates. The stylised facts and results presented are robust to accounting for exchange rate valuation effects.

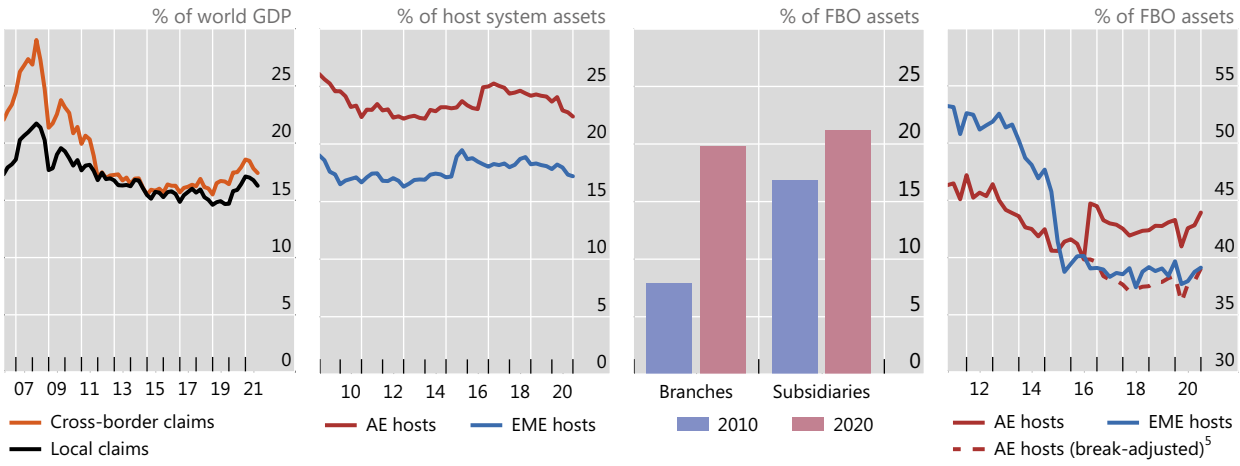
[4] The balance sheets of foreign branches in the United Kingdom differ sharply from those in other countries, with a far higher proportion of deposits (around 70% of liabilities, compared with about 40% in the United States and Germany and 22% in Japan). The probable reason is that, until recently, retail deposits in foreign branches of banks headquartered in the European Economic Area were insured by their home country deposit insurance scheme. With access to such insurance, many branches in the United Kingdom developed local deposit and lending relationships resembling those of subsidiaries or local banks (Hoggarth et al (2013)).

Foreign banks' local presence: stable overall, mix evolving

On the surface, the local presence of FBOs has remained stable. Below the surface, however, two significant shifts in assets have taken place: from AE- to EME-headquartered FBOs (mainly Chinese); and from subsidiaries to branches.

International banks have maintained their local presence in host countries over the past decade. Indeed, the remarkable and well documented rise and fall in banks' international positions around the Great Financial Crisis (GFC) captures mainly the ebbs and flows in cross-border credit (Graph 2, first panel).[5] Over this period, global banks maintained the breadth of their geographic presence (Aldasoro et al (2022), Cerutti and Zhou (2017), Claessens and van Horen (2014), McCauley et al (2019)). Indeed, aggregate BIS data suggest that, as a group, FBOs' local claims remained rather stable despite the decline in foreign credit in the wake of the GFC. The refined perspective afforded by the FBO database also suggests that the share of FBOs in host country banking system assets has remained stable across both AE and EME hosts (Graph 2, second panel).

FBO resilience masks two shifts: the rise of EME banks and decline of subsidiaries — Graph 2



AEs = advanced economies; EMEs = emerging market economies; FBO = foreign banking office.

[1] Based on the BIS consolidated banking statistics. [2] Based on the new database of foreign banking office balance sheets across 24 host jurisdictions. [3] On a host country group (locational) basis. [4] Share of banks with parents headquartered in EMEs. Based on data from four advanced and 12 emerging market economy jurisdictions that report office-level data, aggregated by bank parent nationality. [5] Adjusting for the break in Q3 2016, which arose from the formation of intermediate holding companies for foreign bank operations in the United States.

Sources: National central banks and supervisors; IMF, *World Economic Outlook*; CEIC; Haver Analytics; S&P Capital IQ; BIS consolidated banking statistics (on a guarantor basis); authors' calculations (see box).

[5] These developments are the cornerstone of a "banking deglobalisation" narrative that suggests a diminished role for banking in international capital flows (Forbes et al (2016)). The precipitous post-GFC decline in cross-border credit was due mostly to banks headquartered in a handful of European jurisdictions.

The broad stability of international banks' local presence masks two important underlying developments within FBOs. The first relates to the significant gains by the FBOs of banks headquartered in EMEs (Cerutti et al (2018)). Between 2010 and 2020 and across 16 host jurisdictions reporting office-level data, the share of these banks' branches in total FBO assets rose from 8% to 20% (Graph 2, third panel). The increase was from 17% to 21% in the case of subsidiaries. To be sure, this is partly explained by the well documented retreat of AE banks – especially European ones – from foreign banking, including through FBOs (McCauley et al (2019)). But it also reflects the overall growth and development of EME banking systems and the emergence of large EME-headquartered banks with regional or global aspirations.

The increasing share of EME banks in FBO assets mainly reflects the outward expansion of Chinese banks. This expansion sought primarily to facilitate trade and investment flows rather than to establish retail franchises, a direction that favoured the development of branch networks. Accordingly, Chinese banks' share of total branch assets in our sample rose to 14% by end-2020, from below 4% a decade earlier, in line with their greater share of total cross-border lending. These banks' share of total subsidiary assets across host countries remained stable at about 3%.[6]

The second structural development in the composition of FBO assets is the shift from subsidiaries to branches, in both AE and EME host countries. Subsidiaries' share in total FBO assets in AE hosts declined by 2.4 percentage points over the decade ending in 2020. This occurred despite a jump of almost 5 percentage points in Q3 2016 that reflects the formation of intermediate holding companies for foreign banks' various operations in the United States (Graph 2, fourth panel). Adjusting for that break, the decline in the share of subsidiaries would amount to about 7.3 percentage points. In EME hosts, the subsidiaries' share of FBO assets fell 14.1 percentage points over the same period. The mirror image of these developments is the corresponding rise in the share of branches across AE and especially EME hosts. This shift might have implications for credit volatility, as discussed in the next section.

The relative decline of subsidiaries might reflect trends in financial performance. Subsidiaries have faced important headwinds in their local business, a key part of their business model. For one, local banking margins have fallen in many economies, particularly EMEs. In addition, foreign subsidiaries compete for customers against domestic peers with greater local scale and, in many countries, improving services. This might underlie the persistently lower returns of subsidiaries (Graph 3, left-hand panel, dashed versus solid lines).

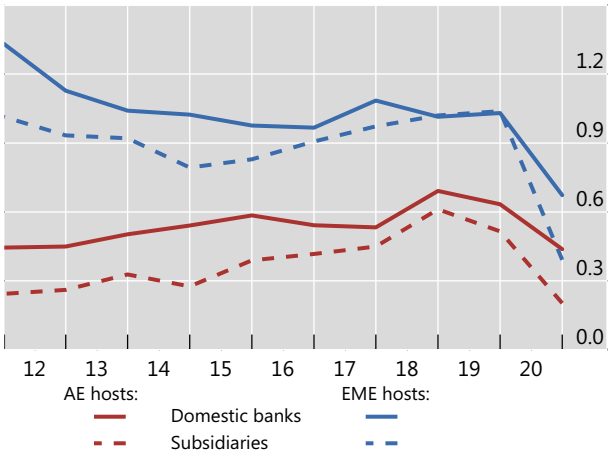
To be sure, a subsample of global systemically important banks suggests that subsidiaries still generate higher returns than their parents (Graph 3, right-hand panel). However, the differential appears to have narrowed in recent years, partly reflecting the reduction of penalties and other charges booked at headquarters (Caparusso et al (2019)). Perhaps in response to prospects for future relative performance erosion, several large global banks have recently announced plans for subsidiary divestitures.

[6] These patterns remain when the comparison is with respect to the parents. Between end-2010 and end-2020, branches' share of parents' consolidated assets rose from 1.3% to 2.9% for the banks in the sample. Over the same period, subsidiaries' share remained flat at 1.5% of total consolidated assets.

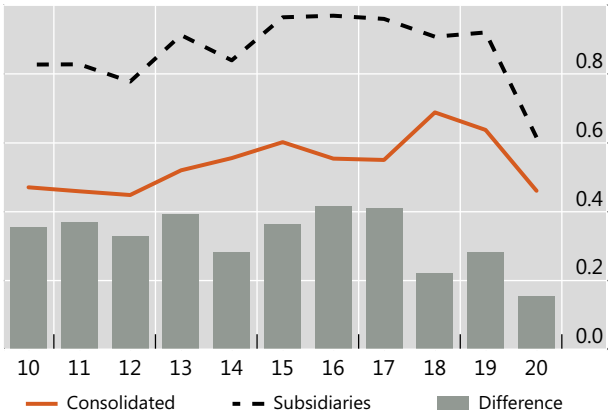
Entity profitability: subsidiaries, local peers and parents

Return-on-assets, by entity type; in per cent — Graph 3

Foreign subsidiaries are consistently less profitable than their local peers…[1]



…but remain more profitable than their consolidated parent (for a subsample of G-SIBs)[2]



G-SIBs = global systemically important banks.

[1] Based on data from eight advanced and 15 emerging market economies. [2] Based on data from 323 subsidiaries and 23 G-SIBs (the corresponding parents).

Sources: CEIC; Haver Analytics; S&P Capital IQ; authors' calculations (see box).

Credit volatility and host/home conditions

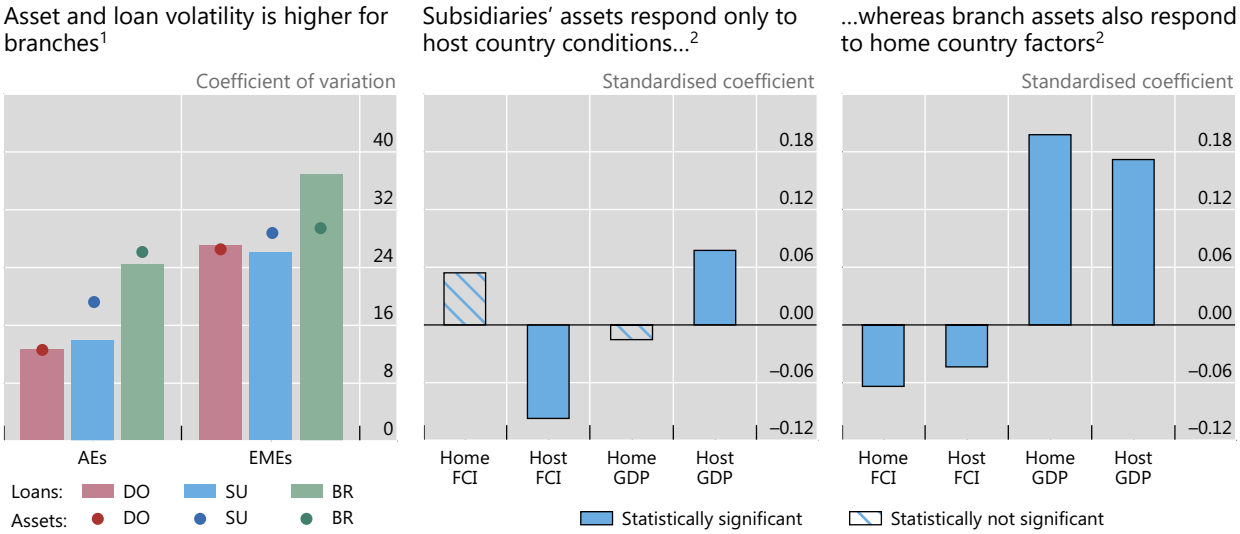
FBOs can be a source of strength for the countries that host them but may also contribute to stress. While they can enhance competition and add to the volume and diversity of financial services, they may also exacerbate credit volatility through their strong responsiveness to developments outside host jurisdictions. The literature has found that this responsiveness is more pronounced for branches, in part due to their higher reliance on wholesale funding (Albertazzi and Bottero (2013), Danisewicz et al (2017), de Haas and van Lelyveld (2010), Jeon et al (2013), McGuire and von Peter (2016)).

Evidence based on the new cross-country bank-level database is consistent with the notion that branches are less stable in their lending than subsidiaries. We see this by comparing the volatility of branches' loan growth with that of subsidiaries.[7] While subsidiaries resemble local banks, the loan volatility of branches is about 75% and 41% higher than that of subsidiaries in AE and EME hosts, respectively (Graph 4, left-hand panel). This difference is statistically significant. A similar picture emerges for total assets, although the difference between branches and subsidiaries becomes statistically not significant.

[7] The data include local and cross-border lending, without distinction.

FBOs' positions: volatility and response to financial conditions

Graph 4



AEs = advanced economies; BR = foreign bank branches; DO = domestic (local) banks; EMEs = emerging market economies; SU = foreign bank subsidiaries.

The sample for all analyses runs from Q1 2009 to Q4 2020 and includes data on the 24 host countries in the database.

[1] Simple average of the coefficient of variation of loans and total assets; based on quarter-on-quarter changes. [2] Coefficient estimates (centred and standardised for comparability) from panel regressions based on quarterly data aggregated at the country level. The dependent variable is the year-on-year (yoy) growth in total assets for subsidiaries (centre panel) and branches (right-hand panel). The explanatory variables include the yoy changes in home and host country financial condition indices (FCI) and the growth in real GDP in home and host jurisdictions, as well as time and host-home country pair fixed effects. The FCI is computed by the IMF and includes information on real short-term interest rates, spreads (interbank, term, sovereign local debt, sovereign dollar debt, corporate local currency debt, corporate dollar debt), equity prices, equity volatility, debt-weighted exchange rates and real house prices.

Sources: National central banks and supervisors; IMF; CEIC; Haver Analytics; S&P Capital IQ; authors' calculations (see box).

The evolution of assets also shows that subsidiaries are sensitive to host country developments, whereas branches are more tightly linked to conditions abroad. Subsidiaries' assets respond to local conditions – both financial, as proxied by an index of financial conditions, and real, as proxied by real GDP growth (Graph 4, centre panel). However, they appear relatively insensitive to parent country conditions, in line with their greater reliance on local funding, exposure to local credit risk and stronger legal and regulatory insulation from their parents. Branch asset growth, by contrast, is more sensitive to home country financial and economic conditions, while also being affected by host country conditions (Graph 4, right-hand panel). This suggests that branches pose a higher risk of transmitting foreign shocks, consistent with the findings of Avdjiev et al (2019).

Branch liquidity management and host supervision

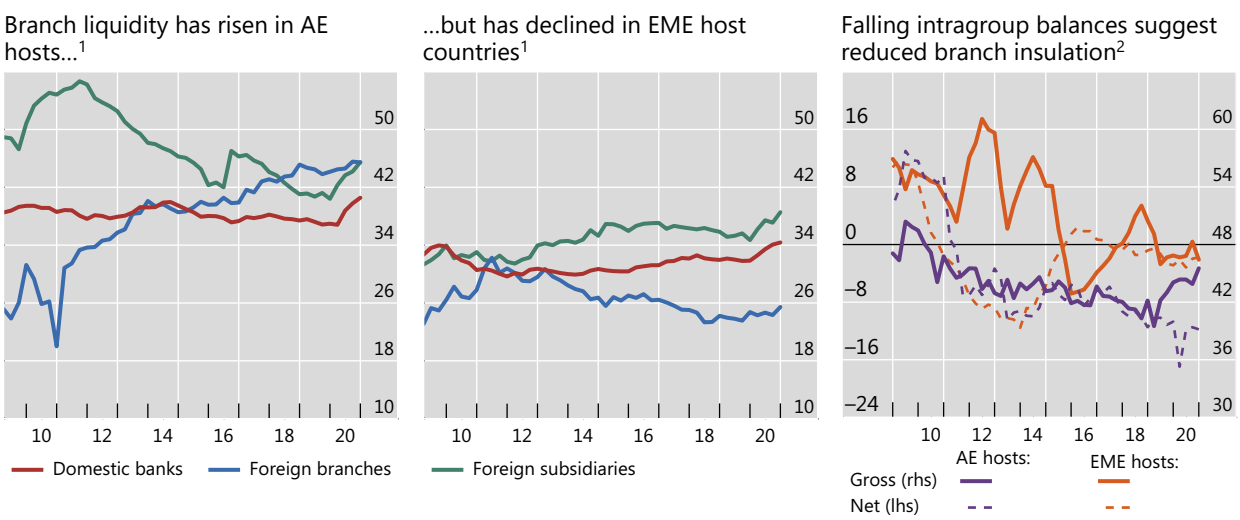
Several host authorities have expressed concern about the behaviour of branches (Faykiss et al (2013), Turtveit (2017)). In addition to branches' responsiveness to home country conditions and the greater procyclicality of the wholesale funding they rely on, host supervisors have limited influence over branches' balance sheets. Hosts are typically not the primary supervisors for branches, nor do they generally receive standard supervisory information on the global strength and risk profiles of branch parents.

Reflecting these concerns, in recent years some host supervisors appear to have introduced measures to tighten control over branch operations. While these are often informal and difficult to observe directly,[8] effective measures should leave their imprint on FBO balance sheets. For one, pressures to tighten control over branches' liquidity positions should result in higher liquidity ratios. In addition, supervisory measures could also be reflected in reduced intragroup borrowing and lending, hence containing the transmission of shocks between branches and their parents and affiliates.

Trends in liquidity ratios suggest that AE host supervisors have exerted greater influence on foreign branches than that exerted by EME hosts. Foreign branches in AEs went from having lower liquidity ratios than both foreign subsidiaries and local banks in 2010, to having the highest ratios by 2020 (Graph 5, left-hand panel).[9] Branches in EMEs, by contrast, have cut their liquidity ratios over the past decade, while foreign subsidiaries have maintained them at low levels (Graph 5, centre panel).

Liquidity management indicators for branches, subsidiaries, and local peers

In per cent — Graph 5



AEs = advanced economies; EMEs = emerging market economies.

[1] Based on new FBO database and expressed as liquid assets divided by total assets for each group. Liquid assets include cash and central bank reserves, plus marketable securities. [2] Based on FBO database for branches only. Gross intragroup balance is defined as intragroup assets plus intragroup liabilities, divided by the sum of total assets and liabilities. Data from Australia, Canada, Chinese Taipei. Hong Kong SAR, Indonesia, Japan, the Philippines, South Africa and the United States. Net positions are computed as gross intragroup assets minus intragroup liabilities, as a share of total assets. The net positions additionally include data from Thailand.

Sources: National central banks and supervisors; CEIC; Haver Analytics; S&P Capital IQ; authors' calculations (see box).

[8] This includes both formal and informal measures. Explicit initiatives, including liquidity rules and ring-fencing of assets into subsidiaries (sometimes referred to as "structural subsidiarisation"), have been enacted in only a few jurisdictions, primarily the United States and the European Union.

[9] This development may also partly reflect the introduction of the Liquidity Coverage Ratio (LCR) along with the Basel III reforms. The LCR applies to internationally active banks on a consolidated basis, although jurisdictions are free to apply it at a subconsolidated level should they wish to do so.

Given their limited cross-border reach, host authorities closely watch the scale of branches' intragroup liquidity management. For the few host jurisdictions that report branches' intragroup balances in the FBO database,[10] gross intragroup positions have declined on average relative to FBOs' total balance sheets (Graph 5, right-hand panel). This general trend – which is similar in both AEs and EMEs – is consistent with an attenuation of international branch networks, perhaps reflecting stricter host supervision. The sharp decline in branches' *net* intragroup assets, particularly in AE host countries, may indicate increased funding from parents or affiliates in other jurisdictions. Alternatively, it may reflect the desire of host authorities to insulate the local office from the credit risk of its parent and other overseas affiliates.

Conclusion

The footprint and behaviour of international banks' various FBOs remain key to understanding global bank business models, capital flows and the cross-border transmission of financial stress. Analysts have long understood that branches and subsidiaries differ in their strategic purpose and behaviour, and their response to and amplification of stress in the international financial system.

The database introduced in this feature provides a new lens for studying global banks' local presence. Branches and subsidiaries have long coexisted, although the weight of subsidiaries has declined somewhat in relative terms. Differences between the balance sheet structures of branches and subsidiaries hold across a broad set of AEs and EMEs, reflecting the fundamentally distinct strategic roles of the two forms of international presence. Branches are more volatile providers of credit than subsidiaries, responding more strongly to conditions in home countries. Even though policy measures can be difficult to detect in the data, empirical patterns suggest that AE host supervisors are effectively tightening controls on branches, with evidence for EME hosts more mixed.

Ultimately, bank strategies and public policy should aim to strike an appropriate balance between the benefits and risks of global banks' integration. While periods of financial stress underscore the attractiveness of preventive ring-fencing, the optimal level of integration over a complete financial cycle is still not clear (Claessens (2019), FSB (2019)). However, more granular information, available to both home and host regulators, could allow a better balance between the efficiency of operations and risk mitigation. Two important steps forward in this respect are the development and publication of contingency plans for the resolution of complex international banking groups, and banks' (confidential) contributions to cross-border exposure databases. Standardised information on the positions of banking groups' foreign subsidiaries and branches would represent a further advance.

[10] Nine jurisdictions report gross positions (ie both "due from" and "due to" related offices) and one jurisdiction reports only net positions.

References

Albertazzi, U and M Bottero (2013): "The procyclicality of foreign bank lending: evidence from the global financial crisis", Bank of Italy, *Working Papers*, no 926.

Aldasoro, I, B Hardy and M Jager (2022): "The Janus face of bank geographic complexity", *Journal of Banking & Finance*, vol 134, January.

Avdjiev, S, U Aysun and R Hepp (2019): "What drives local lending by global banks?", *Journal of International Money and Finance*, vol 90, pp 54–75.

Caparusso, J, Y Chen, P Dattels, R Goel and P Hiebert (2019): "Post-crisis changes in global bank business models: a new taxonomy", *IMF Working Papers*, WP/19/295.

Cerutti, E, G Dell'Ariccia and M Martinez Peria (2007): "How banks go abroad: branches or subsidiaries?", *Journal of Banking & Finance*, vol 31, no 6, pp 1669–92.

Cerutti, E, C Koch and S Pradhan (2018): "The growing footprint of EME banks in the international banking system", *BIS Quarterly Review*, December, pp 27–36.

Cerutti, E and H Zhou (2017): "The global banking network in the aftermath of the crisis: is there evidence of de-globalization?", *IMF Working Papers*, WP/17/232.

Cetorelli, N and L Goldberg (2011): "Liquidity management of U.S. global banks: internal capital markets in the great recession", *NBER Working Papers*, no 17355.

——— (2012): "Banking globalization and monetary transmission", *Journal of Finance*, vol 67, no 5.

Claessens, S (2019): "Fragmentation in global financial markets: good or bad for financial stability?", *BIS Working Papers,* no 815.

Claessens, S, and N van Horen (2014): "Foreign banks: trends and impacts", *Journal of Money, Credit and Banking*, vol 46, no s1, February.

Committee on the Global Financial System (CGFS) (2010): "Funding patterns and liquidity management of internationally active banks", *CGFS Papers*, no 39.

Danisewicz, P, D Reinhardt and R Sowerbutts (2017): "On a tight leash: does bank organizational structure matter for macroprudential spillovers?", *Journal of International Economics*, vol 109, pp 174–94.

De Haas, R and I van Lelyveld (2010): "Internal capital markets and lending by multinational bank subsidiaries", *Journal of Financial Intermediation*, vol 19, pp 1–25.

Faykiss, P, G Grosz and G Szigel (2013): "Transforming subsidiaries into branches – should we be worrying about it?", *MNB Occasional Papers*, no 106.

Fiechter, J, I Otker-Robe, A Ilyina, M Hsu, A Santos and J Surti (2011): "Subsidiaries or branches: does one size fit all?", *IMF Staff Discussion Note*, no 11/14.

Fillat, J, S Garett and A Smith (2018): "What are the consequences of global banking for the international transmission of shocks? A quantitative analysis", *NBER Working Papers*, no 25203.

Financial Stability Board (FSB) (2019): "FSB Report on Market Fragmentation", June.

Forbes, K, D Reinhardt and T Wieladek (2016): "Banking de-globalization: a consequence of monetary and regulatory policies?", in "Macroprudential policy", *BIS Papers*, no 86, pp 49–56.

Hills, R, J Hooley, Y Korniyenko and T Wieladek (2015): "International banking and liquidity risk transmission: lessons from the United Kingdom", Bank of England, *Staff Working Papers*, no 562.

Hoggarth, G, J Hooley and Y Korniyenko (2013): "Which way do foreign branches sway? Evidence from the recent UK domestic credit cycle", Bank of England, *Financial Stability Papers*, no 22.

Jeon, B, M Olivero and J Wu (2013): "Multinational banking and the international transmission of financial shocks: evidence from foreign bank subsidiaries", *Journal of Banking and Finance*, vol 37, pp 952–72.

McCauley, R, P McGuire and G von Peter (2010): "The architecture of global banking: from international to multinational?", *BIS Quarterly Review*, March, pp 25–37.

McCauley, R, A Bénétrix, P McGuire and G von Peter (2019): "Financial deglobalisation in banking?", *Journal of International Money and Finance*, vol 94, pp 116–31, June.

McGuire, P and G von Peter (2016): "The resilience of banks' international operations", *BIS Quarterly Review*, March, pp 65–78.

Turtveit, L (2017): "Branches of foreign banks and credit supply", *Norges Bank Economic Commentaries*, no 3.

Wong, E, A Tsang and S Kong (2014): "Implications of liquidity management of global banks for host countries – evidence from foreign bank branches in Hong Kong", *HKIMR Working Papers*, no 21/2014.

Gabriela Nodari
gabriela.nodari@bis.org

Daniel Rees
daniel.rees@bis.org

Phurichai Rungcharoenkitkul
phurichai.rungcharoenkitkul@bis.org

Global growth: drivers and post-pandemic prospects[1]

As the global economy emerges from the disruptions of the Covid-19 pandemic, attention is turning to growth prospects. We project growth over the next two decades by modelling supply-side drivers at the country and industry levels for 33 advanced economies (AEs) and emerging market economies (EMEs). Our analysis suggests that, on pre-pandemic labour productivity growth trends, the global economy would grow by roughly 2.7% per year, driven by EMEs. This outcome is subject to a degree of uncertainty. We quantify the growth impact of three scenarios: persistent pandemic-induced structural changes, a housing market-induced recession and a green energy transition. Our analysis underscores the importance of structural reforms and policies to reinvigorate the supply-side drivers of growth.

JEL classification: C54, E27, O47.

The Covid-19 pandemic has had an extraordinary economic impact. The first half of 2020 saw the largest decline in economic activity in almost a century, while the fastest recovery in several decades took place over the subsequent 18 months. The virus remains a significant risk to public health, and many countries face considerable challenges, particularly emerging market economies (EMEs) and developing countries. Nevertheless, a path out of the pandemic is gradually emerging. This naturally raises the question of how global growth will evolve after the enormous disruptions wrought by the pandemic.

In this special feature, we propose a framework for analysing GDP growth and projecting it into the future. We split GDP growth into the sum of aggregate employment growth and labour productivity growth. Taking a medium-run focus, we link employment growth to working age population growth and decompose labour productivity growth into two trend components: country-specific and industry-specific ones.

We then put the framework to work. We first show that the components can explain most of the variation in aggregate labour productivity growth in both advanced economies (AEs) and EMEs over recent decades.

[1] The authors thank Frederic Boissay, Claudio Borio, Stijn Claessens, Deniz Igan, Richhild Moessner, Benoît Mojon, Hyun Song Shin, Nikola Tarashev and Christian Upper for helpful comments and discussions, and Burcu Erik for excellent research assistance. 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

- Absent policy intervention to reverse pre-pandemic trends in labour productivity growth, global GDP annual growth could slow to 2.7% in the years ahead.
- Pandemic-induced shifts in working arrangements and an orderly climate transition could provide a modest boost – of about 1% each – to GDP levels, but may require significant resource reallocation.
- A housing bust or a disorderly climate transition represent large downside risks to GDP levels – of up to 10% in some countries – with EMEs being most vulnerable.

We then turn to the future and examine possible scenarios for the years 2024–40. Our benchmark is a growth projection in which pre-pandemic trends reassert themselves. Importantly, this is not a forecast or an assessment of the most likely future path of economic activity. Rather, it anchors the analysis in well understood past patterns.

Around that benchmark, we consider additional scenarios that could disrupt pre-pandemic trends. In one such scenario, pandemic-induced shifts in labour productivity persist beyond the health emergency period. Another features a recession triggered by a sharp reversal in house prices, particularly in the context of stretched asset valuations and looming interest rate increases. In the final one, the transition to a low-carbon economy poses novel opportunities, as well as challenges. For each scenario, we consider two alternative cases that further highlight the range of possible outcomes.

We report four main findings. First, if pre-pandemic productivity growth trends reassert themselves, global growth could average roughly 2.7% per year over the next two decades – around 1 percentage point lower than the average in the 2010s. Second, there are considerable differences across countries in terms of pandemic-induced employment and labour-productivity shifts. Those that can take advantage of remote work technologies could see their GDP levels rise permanently by 1% above the benchmark path. In countries that cannot do so, output could be as much as 10% below the benchmark. Third, a repeat of recent housing busts – which caused a protracted decline in labour productivity growth and a shift in employment patterns – could permanently lower GDP levels by 5–10% on average across countries, and by almost 15% in China. Fourth, the climate transition presents both opportunities and risks. An orderly transition, whereby green technology receives timely financing and is productivity-enhancing, would have only modest short-run costs, and it would ultimately raise GDP levels by 1% by 2040. But if the transition is disorderly – with green investment lagging behind financial market expectations – GDP could undershoot the benchmark projections by 3% by 2040.

The rest of the paper is structured as follows. We first lay out the analytical framework and use it to review global growth in the lead-up to the Covid recession. We then outline a set of benchmark growth projections that assume a continuation of the pre-Covid trends. Next, we examine the output implications of three scenarios. The final section reviews the key lessons from the analysis.

A framework for identifying growth drivers

Throughout the paper, we examine growth drivers, in the past as well as in the future, using a common framework. We first decompose country-level GDP growth into the contributions that come from aggregate labour productivity – including both capital deepening and total factor productivity (TFP) – and employment:[2]

$$\begin{matrix}\text{GDP}\\ \text{growth}\end{matrix} = \begin{matrix}\text{Labour}\\ \text{productivity growth}\end{matrix} + \begin{matrix}\text{Employment}\\ \text{growth}\end{matrix} \qquad (1)$$

We further decompose aggregate labour productivity growth into four parts (equation (2)). The first is a country-specific factor, assumed to be common to all industries in a given country. The second is a set of industry-specific factors, assumed to be common across countries for a given industry. We assume that the country- and industry-specific factors are uncorrelated. The third is the share of each industry in a country's overall employment, which determines the influence of industry-specific factors on aggregate labour productivity growth. The fourth is a residual. As this component explains a small share of productivity growth, we do not discuss it in our analysis.

$$\begin{matrix}\text{Labour}\\ \text{productivity growth}\end{matrix} = \begin{matrix}\text{Country-specific}\\ \text{factor}\end{matrix} + \sum \begin{matrix}\text{Industry-specific}\\ \text{factor}\end{matrix} \times \begin{matrix}\text{Industry}\\ \text{employment share}\end{matrix} + \text{Residual component} \qquad (2)$$

Intuitively, the country-specific factor captures the evolution of economy-wide growth drivers such as the quality of institutions and human capital. The industry-specific factors reflect global technological advancements within individual industries, which are assumed to be accessible to and exploited by all countries.

We recover the components of GDP growth using a combination of data and model-based inference. We observe aggregate employment growth and industry employment shares directly. To uncover country- and industry-specific factors, we also use data on labour productivity by industry and an econometric model (see box).[3]

Pre-pandemic growth drivers

The global economy grew at a robust pace in the decade before the pandemic. Between 2010 and 2019, growth averaged 3.7%, slightly above the previous two decades (Graph 1, left-hand panel).

EMEs were the engine of global growth. On average, they expanded by 5.3% in the 2010s – by 4.1%, excluding China – and accounted for around three quarters of annual world GDP growth. Although EMEs' growth slowed slightly from the very rapid

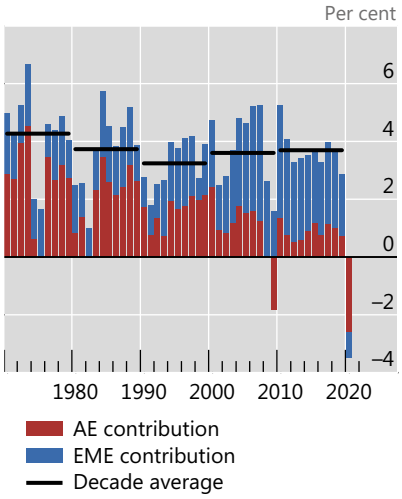
[2] We focus on labour productivity, rather than capital deepening and TFP in isolation because industry-level capital stock and TFP data are not available for many countries in our sample, particularly EMEs.

[3] We estimate the country- and industry-level factors using industry-level labour productivity growth data for 16 AEs (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States) and 17 EMEs (Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Korea, Morocco, Mexico, Malaysia, Peru, the Philippines, Thailand, Turkey, Vietnam and South Africa).

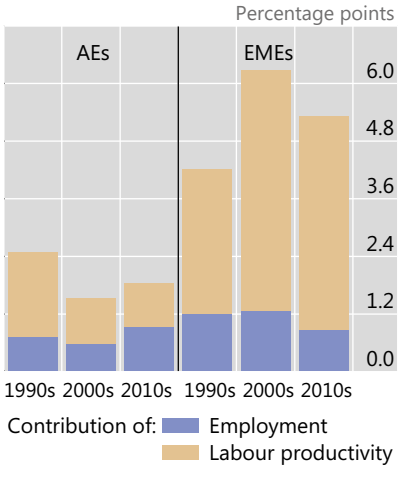
Recent developments in global GDP growth

Graph 1

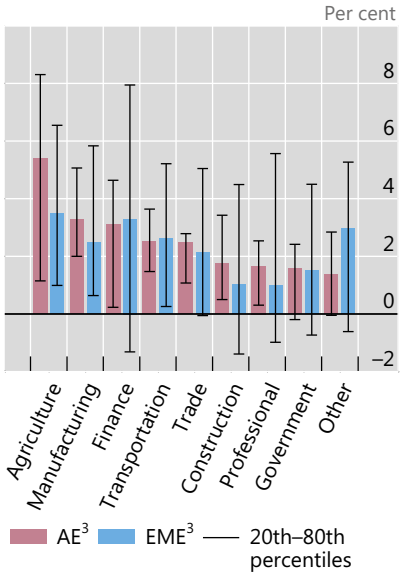
EMEs have driven global growth in the 2000s[1]



Labour productivity drove growth in EMEs, employment was key in AEs[2]



Industry productivity growth is similar across country groups



AEs= advanced economies; EMEs= emerging market economies.

[1] World GDP growth calculated for a sample of 20 AEs and 23 EMEs, regional weighted averages based on GDP and PPP exchange rates. AE and EME contributions calculated as the change in their respective GDP levels in a given year divided by world GDP in the previous year. [2] Decade averages calculated for a sample of 20 AEs and 23 EMEs, weighting countries by GDP at PPP. Employment and labour productivity contributions calculated according to the formula $\Delta y_t = \Delta e_t + \Delta lp_t$ where Δy_t is GDP growth, Δe_t is employment growth and Δlp_t is labour productivity growth. [3] Median across 16 AEs and 17 EMEs of country-level average annual growth rates between 2010 and 2017.

Sources: de Vries et al (2021); Feenstra et al (2015); EU KLEMS database; national data; authors' calculations.

pace of the 2000s, their contribution to world GDP growth increased because EMEs accounted for a larger share of the global economy. Labour productivity improvements explain the bulk of EME growth since the turn of the century, with employment gains playing a small and diminishing role (Graph 1, centre panel).

For AEs, the 2010s marked another decade of subdued growth. While GDP expanded slightly faster than in the 2000s, this was entirely due to faster employment growth, as workers who lost their jobs during the Great Financial Crisis (GFC) were gradually reabsorbed into the workforce. In fact, AEs' labour productivity growth was even lower than in the 2000s and only a fifth of that in EMEs. Looking further back, AEs' labour productivity in the 2010s expanded at just half of its pace in the 1990s.

Differences in labour productivity growth between AEs and EMEs were less apparent at the industry level. Simple median productivity growth rates by industry were similar between AEs and EMEs over the 2010s (Graph 1, right-hand panel, bars). In both country groups, productivity grew relatively fast in agriculture, manufacturing and finance, and more slowly in construction and many service industries.[4] Having a larger share of their workforces employed in fast productivity growth industries was one reason why EMEs saw faster aggregate labour productivity growth than AEs.

[4] Given the known difficulties in measuring finance industry output, labour productivity growth rates in that industry should be viewed with a degree of caution.

Box

Estimating the industry- and country-level components of labour productivity

This box explains how we estimate the industry- and country-level contributions to labour productivity growth. We use a state-space model, consisting of two sets of equations. The first – the *measurement* equations – relate observable industry labour productivity growth to unobserved industry- and country-specific factors. For a given industry, i, and country, c, pair (eg manufacturing in Germany) these equations take the form:

(1) $\Delta lp_{i,c,t} = \phi_{c,t} + \gamma_{i,t} + \varepsilon_{i,c,t}$

where $\Delta lp_{i,c,t}$ is the growth of labour productivity in industry i and country c in year t, $\phi_{c,t}$ is the component of labour productivity growth that is assumed to be common to all industries in country c and $\gamma_{i,t}$ is the component of labour productivity growth in industry i that is assumed to be common to all countries. We additionally assume that the country- and industry-specific factors are uncorrelated with each other. As these estimated growth factors include only common developments across countries and industries, they tend to evolve smoothly over time, capturing the slow-moving, or "trend", component of labour productivity growth.

The second set of equations – the *state* equations – govern the evolution of the industry- and country-specific factors. We assume that these factors follow random walks:

(2) $\phi_{c,t} = \phi_{c,t-1} + \eta_{c,t}$

(3) $\gamma_{i,t} = \gamma_{i,t-1} + \eta_{i,t}$

except for the manufacturing industry, whose industry-specific factor follows a white noise process:①

(4) $\gamma_{man,t} = \eta_{man,t}$

The random walk assumption is common in the literature that estimates unobserved components of macroeconomic time series, and reflects the stylised fact that productivity growth exhibits considerable year-to-year volatility and persistent changes in its mean (eg the well known increase in US productivity growth in the 1990s and decline in the 2010s).② The normalisation for manufacturing allows us to pin down the levels of the other country and industry factors, so that the γ's and ϕ's can be interpreted as country- and industry-specific factors *relative* to that in the manufacturing industry. We chose the manufacturing industry because it accounts for a material share of economic activity in most countries in our sample and because productivity growth is likely to be measured more accurately in manufacturing than in service industries.

We estimate the growth factors using annual data from 1996 to 2019 for a sample of 16 AEs and 17 EMEs.③ For most of the AEs, we source country- and industry-level labour productivity data from the EU KLEMS database.④ For EMEs, we source productivity data from the GGDC/UNU-WIDER Economic Transformation Database (de Vries et al (2021)). In years where country-level labour productivity is unavailable from these sources, we augment the data with information from the Penn World Tables (Feenstra et al (2015)). We estimate the model's parameters using a Bayesian approach that combines information from the data with off-model information about their likely values.⑤ With the estimated parameter values in hand, we recover estimates of the country- and industry-growth factors using the Kalman smoother.

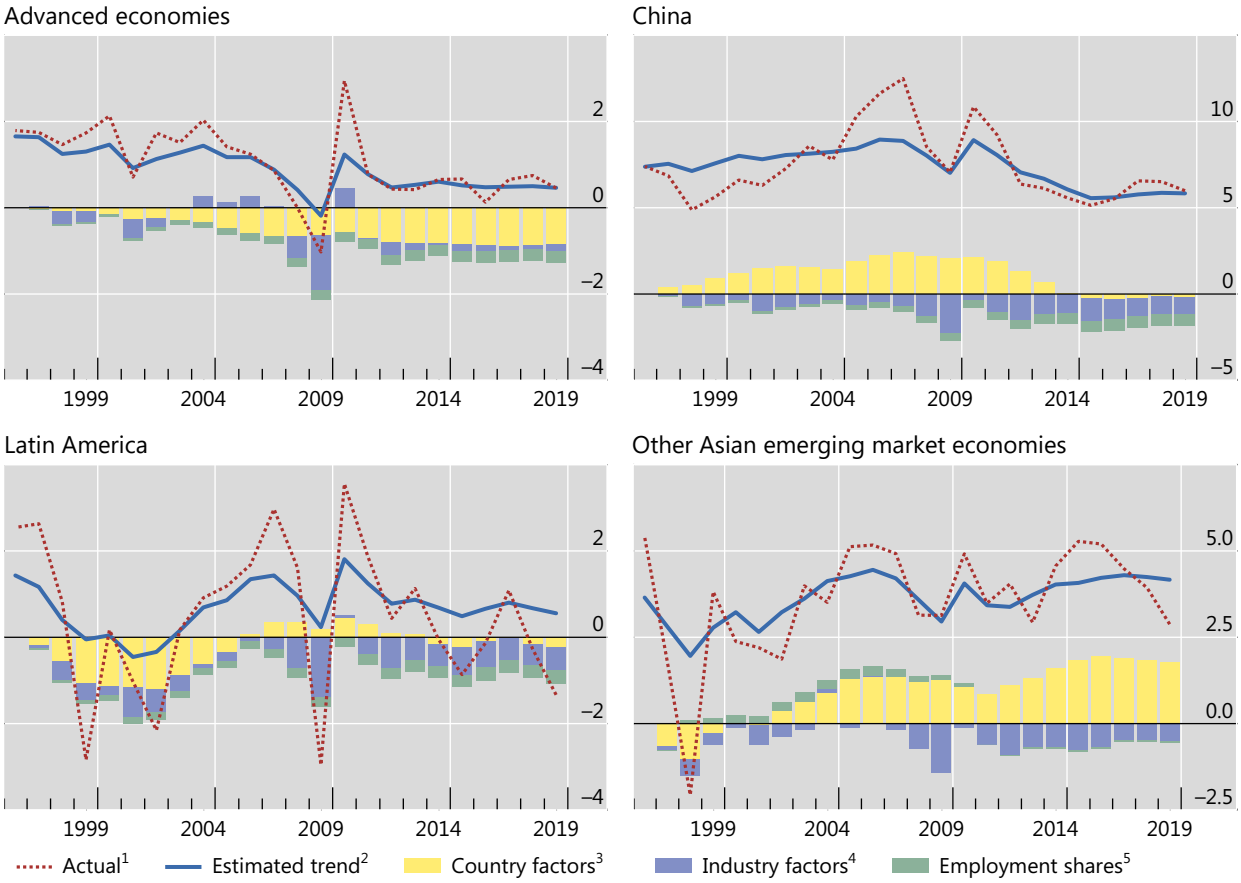
① Without this normalisation we could not distinguish between a given path of $\gamma_{i,t}$ and $\phi_{c,t}$ and an alternative where all values of γ were one unit higher and all values of ϕ were one unit lower. ② For a similar approach, see D Reifschneider, W Wascher and D Wilcox, "Aggregate supply in the United States: recent developments and implications for the conduct of monetary policy", *IMF Economic Review*, vol 63, no 1, 2015. ③ The industry-level data end in 2017 for most countries. We augment the model with aggregate labour productivity growth data to estimate the country-specific factors in 2018 and 2019. ④ The exceptions are Australia, Canada and Switzerland, where we recover industry-level labour productivity data from national sources. ⑤ The specific "prior information" that we apply to the estimates is unrestrictive and the posterior distribution of the model's parameters is in most cases determined overwhelmingly by information in the data.

Next, we study the determinants of changes in labour productivity growth over time according to equation (2) above. To do this, we first recover the aggregate labour productivity growth trend for each country as the sum of the estimated country- and industry-specific components (weighting each industry by its employment share). We then attribute a part of the evolution of these trends to one of the three drivers: (i) the country-specific component; (ii) the industry-specific components; and (iii) the industry employment shares. The attribution to one specific driver is achieved by fixing the other two drivers at their levels in 1996, the year in which our sample begins. We perform the attribution for country groups, and for China alone. We describe labour productivity developments until 2019, the eve of the Covid-19 pandemic.

Country-specific factors accounted for the bulk of the labour productivity growth slowdown in AEs since the mid-1990s (Graph 2, top-left panel, red and blue

Drivers of trend labour productivity growth vary by region

In per cent — Graph 2



[1] Regional averages calculated as a weighted average of observed total labour productivity of each individual country, based on GDP and PPP exchange rates. [2] Estimates of trend labour productivity at the country level stem from the formula: $\Delta\widetilde{lp}_{c,t} = \phi_{c,t} + \sum_{i=1}^{I} s_{ict}\gamma_{it}$, where $\Delta\widetilde{lp}_{c,t}$ is trend labour productivity growth in country c and year t, $\phi_{c,t}$ is the country-specific factor in country c, s_{ict} is the employment share of industry i and γ_{it} is the industry-specific factor in industry i. [3] GDP-weighted average of the contribution of country factors to changes in trend labour productivity growth since the start of the sample. [4] GDP-weighted average of the contribution of industry factors to changes in trend labour productivity growth since the start of the sample. [5] GDP-weighted average of the contribution of changes in industry employment shares to labour productivity growth since the start of the sample.

Sources: Feenstra et al (2015); national data; authors' calculations.

lines).[5] On their own, these factors accounted for 70% of this slowdown (yellow bars). Industry factors oscillated from year to year, but accounted for little of the steady downwards drift (purple bars). Changes in employment composition exerted a small drag on labour productivity growth because employment grew faster in industries with lower productivity growth (green bars).

Country-specific factors were also important in EMEs (Graph 2, top-right, bottom-left and bottom-right panels). In China, they accounted for all of the rise in trend labour productivity growth from the mid-1990s to 2010, and for about three quarters of the subsequent decline. Similarly, in Latin America they explained most of the movements in overall productivity growth in the 1990s and 2000s, with a smaller impact in the 2010s. In other Asian EMEs, country-specific factors have drifted up and account for most of the rise in trend productivity growth in the 2010s.

Turning to industry-specific factors, we find that they were more important in EMEs than in AEs. These factors generally weighed on EMEs' productivity growth. Had they stayed at their initial level, overall productivity growth in other Asian EMEs and Latin America would have been around 0.5–0.6 percentage points higher on an annual basis. In China, the fall in labour productivity growth due to industry-specific factors was even larger, at 1 percentage point.

Differences in employment composition explain why industry-specific factors were a bigger drag on productivity growth in EMEs than in AEs. Particularly important in this respect is EMEs' large share of agricultural employment, which is much higher than AEs'. For a typical EME with an agricultural employment share of 25%, the 1.7 percentage point decline in the agriculture-specific growth factor over the sample lowered aggregate productivity growth by 0.5 percentage points on an annual basis. This compares with less than 0.1 percentage points in most AEs, where agricultural employment shares are closer to 2% of the workforce. For similar reasons, EMEs' larger employment share in manufacturing and smaller share in professional services also help explain the difference in the evolution of trend productivity growth between the two groups of countries.

A benchmark global growth projection

We now use our framework to lay out a benchmark projection for global growth over 2024–40, assuming that pre-pandemic labour productivity growth trends reassert themselves.[6] This projection should not be taken as a forecast or an assessment of the most likely future path of economic activity. Indeed, we simply use it as a reference point when we explore alternative scenarios.

For any projection, we need to make assumptions about the evolution of employment growth, country-specific factors, industry-specific factors and industry employment shares. For the benchmark, we base employment growth on country-level working age population growth forecasts (United Nations (2019)). We translate these into employment growth by assuming that labour force participation rates

[5] The blue "trend" lines are a smooth version of the red "actual" path of labour productivity growth, confirming that the residual component accounts for little of the medium-run variation in labour productivity growth.

[6] There are two reasons for our choice of a projection period. First, we seek to exclude the unprecedented developments in labour productivity since the onset of Covid, which we assume will subside by 2024. Second, we judge two decades to be the longest period over which we can have confidence in our demographic assumptions.

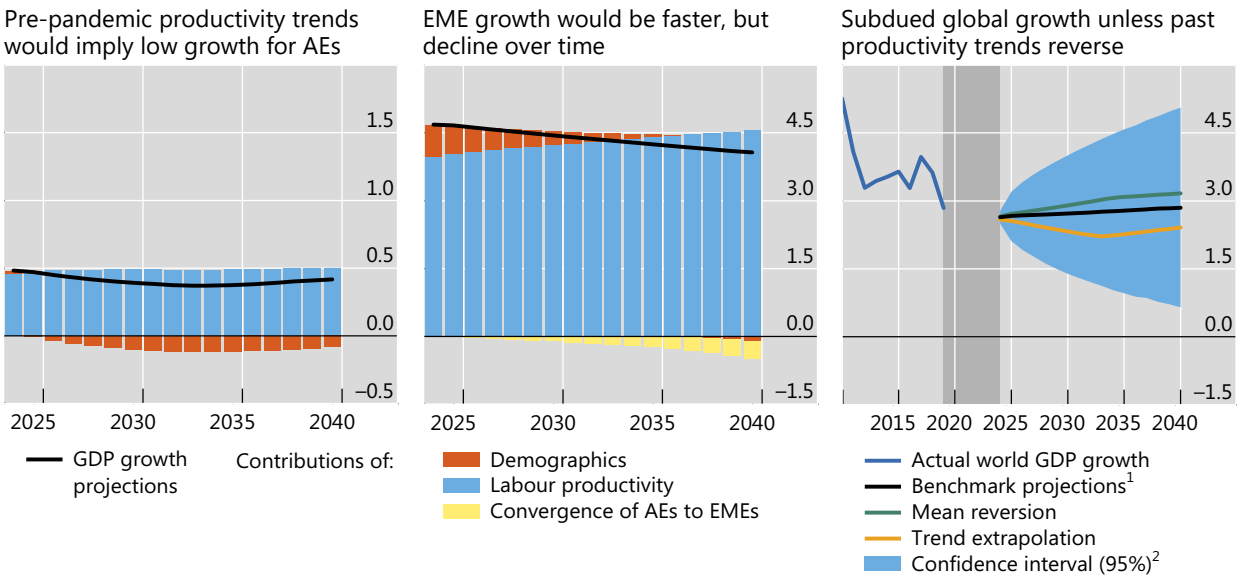
remain at their 2019 levels over the projection period. This assumption reflects a judgment about two opposing forces. On the one hand, population ageing is expected to depress labour force participation over the medium run.[7] On the other hand, participation rates increased by more than anticipated in many countries during the 2010s and the forces driving these increases could still be at work, including shifts in social norms and policies that encourage later retirement.[8]

For AEs, we assume that country- and industry-specific factors of labour productivity growth remain at their latest estimated trend values as of 2019 throughout the benchmark projection.[9] Likewise, we hold the employment shares in each country fixed at their last pre-pandemic values.

For EMEs, we impose the same assumption but make one departure to reflect the well documented stylised fact that labour productivity growth in EMEs slows to that of AEs as their respective per capita incomes converge. Based on past relationships, we lower the country-specific productivity growth factor in individual EMEs by 0.25 percentage points for every 10% reduction in their per capita income gap with the United States.[10]

Benchmark growth projections

In per cent — Graph 3



AEs= advanced economies; EMEs= emerging market economies.

[1] World growth calculated as: $\Delta Y_{t+h}^{World} = \sum_c^C s_{c,t+h}(\Delta\widetilde{lp}_{c,t+h} + \Delta N_{c,t+h})$, where $s_{c,t+h}$ is the weight of country c in global GDP at time $t+h$, $\Delta\widetilde{lp}_{c,t+h}$ is the projected trend productivity growth rate, and $\Delta N_{c,t+h}$ is its projected working age population growth. [2] Based on 5,000 simulations of the country- and industry-specific growth factors. For each simulation, we calculate the implied path of global GDP, keeping the other assumptions as for the benchmark projections.

Sources: United Nations; national data; authors' calculations.

[7] This reflects changes in the working age population, with the share of the working age population aged over 55 (who typically have lower participation rates) increasing. See Hornstein et al (2018).

[8] See Lowe (2021) and Powell (2021).

[9] The estimated *trend* component differs from *actual* labour productivity growth in 2019, which includes a residual term that we assume equals zero throughout the projection period.

[10] Referring to average AE per capita income would leave our results almost unchanged.

In the benchmark, AEs face sobering growth prospects once the post-pandemic growth rebound has played out by 2024. Projected annual GDP growth for AEs as a whole is below 0.5% in coming decades, compared with 1.9% in the 2010s (Graph 3, left-hand panel). This is largely the result of our low labour productivity growth assumption (blue bars). Added to this is a projected slowdown in employment growth due to population ageing or outright declines in many countries (orange bars).

The benchmark growth projection for EMEs is higher, although annual growth also declines from around 4.7% in 2024 to 4% by 2040 (Graph 3, centre panel). This is below EMEs' 5.3% growth rate in the 2010s. Two factors contribute to this slowdown. The first is a substantial decline in the contribution of employment growth – from 0.7 percentage points in 2024 to –0.1 percentage points in 2040 (orange bars). The second is the decline in productivity growth as per capita income in fast-growing EMEs converges with that of AEs (yellow bars). These are only partly offset by faster-growing countries taking up a larger share of world GDP.

Taken together, these projections point to average global GDP growth of 2.7% over the coming decades (Graph 3, right-hand panel, black line). This is in line with global growth in 2019 but well below the 3.7% average growth rate in the 2010s.

The benchmark projection is just one illustrative path for global growth, ie one in which low pre-pandemic labour productivity growth would persist. Alternatively, if the country-specific labour productivity factors gradually increased from their 2019 levels to their historical means, the projected annual AE GDP growth would almost double from the benchmark level to around 0.8%. Meanwhile, EME GDP growth would also increase by 0.3 percentage points, driven mainly by China. Overall, reflecting the growing share of EMEs, annual global GDP growth would rise to 3.2% by 2040 (Graph 3, right-hand panel, green line). Conversely, if pre-pandemic declines in the country-specific factors seen in the period 2014–19 continue after the pandemic, labour productivity growth would fall further in most AEs and in some larger EMEs, including China. In this case, annual global GDP growth would be about 0.4 percentage points lower than the benchmark, at 2.4% by 2040 (right-hand panel, yellow line).

Alternative growth scenarios

In this section, we examine three scenarios of plausible economic developments that could occur in the coming years and assess their GDP impact. The first scenario involves persistent pandemic-induced structural shifts and scarring effects. The second is one in which the lengthy housing market booms experienced by many countries turn into busts. The third explores the transition to a low-carbon economy. Constructing the scenarios requires new assumptions about the key inputs into our framework, which we summarise qualitatively below (Table 1).

Assumptions underpinning scenarios[1] Table 1

Scenarios		Country-specific factors	Industry-specific factors	Industry employment shares	Aggregate employment growth
1. Covid-induced structural changes	(a) Reallocation		↑↓	↑↓	
	(b) Scarring		↓		
2. Housing bust	(a) Financial crisis	↓	↓	↑↓	
	(b) Recession	↓ (short-lived)	↓	↑↓	
3. Green energy transition	(a) Orderly		↝	↝	↝
	(b) Disorderly		↝ (stronger)	↝ (stronger)	↝ (stronger)

[1] A single arrow ↓ indicates a decline in the factor (for third and fourth columns, in at least one industry and no increase in other industries). A double arrow ↑↓ indicates a "reallocation" shift, with some industry-specific factors or employment shares rising while others are falling. A curly arrow ↝ indicates a pattern of dynamic adjustment, with some factors undershooting benchmark initially, before rising above it.

Source: Authors.

Covid-19-induced structural changes

The pandemic's economic impact could persist long after the health emergency passes. In some countries, the pandemic may steer labour persistently away from high-contact service industries (eg accommodation) towards others that adapt well to remote working and are less exposed to structural demand shifts (eg professional services such as scientific research or consulting). This may increase aggregate productivity. But for economies less able to leverage remote-work technologies, the economic scars from the pandemic could be more disruptive and pervasive.

We consider two cases to illustrate these possibilities.[11] In the first, the pandemic continues to induce partially offsetting cross-industry shifts in labour productivity growth and labour reallocation, as was the case in the United States and other AEs during the first 21 months of the pandemic. Calibrating the scenario to this experience, we assume an initial boost to annual labour productivity growth – in information and communication (by 4.6 percentage points), manufacturing (2.8 percentage points), professional services (1.8 percentage points) and finance (1.6 percentage points) – which fades over five years (Graph 4, left-hand panel).[12] By contrast, we assume that transportation and accommodation see lower initial labour productivity growth (of –5 and –0.3 percentage points, respectively), with the decline waning over the same period. In parallel with these productivity shocks, we also assume a temporary 1 percentage point reduction in the employment share of the accommodation sector (a "Great Reallocation" shock), which we redistribute equally among the finance, professional services, trade, public and health industries.

This scenario raises output in most economies, particularly those with large employment shares in industries where labour productivity rose during the pandemic (Graph 4, right-hand panel, blue bars). In quantitative terms, however, the output gains are relatively modest, as productivity slowdowns in some industries offset gains in others. Overall, world GDP would be 1% higher than the benchmark by 2040.

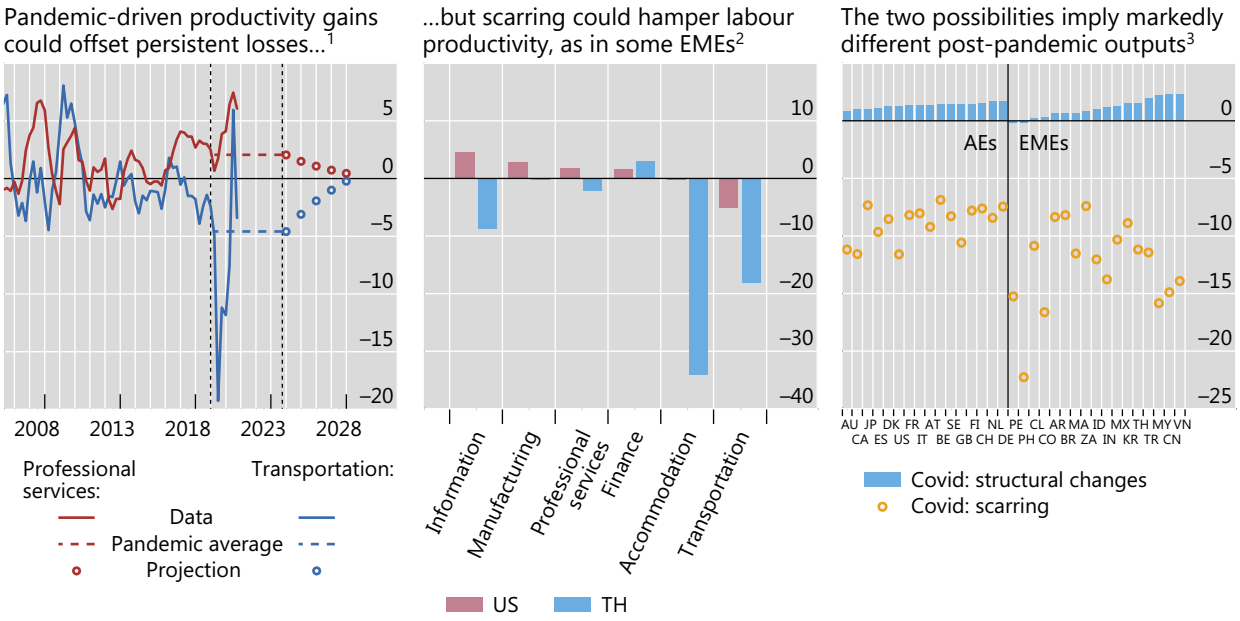
[11] Both cases assume that the health consequences of the pandemic have largely played out by 2024.

[12] Shifts in labour productivity and employment could be influenced by temporary lockdowns and policy measures, including furlough schemes. Averaging over the pandemic period focuses on the more persistent elements.

Scenarios based on assumed post-pandemic structural shifts

In per cent

Graph 4



[1] Labour productivity growth for selected industries. Solid lines are based on US data; dashed lines are the average estimated industry-specific factors during the pandemic (Q1 2020–Q3 2021); circles are projection of industry-specific factors. [2] Labour productivity growth for selected industries, averages over Q1 2020–Q3 2021, for the United States and Thailand. [3] Differences in GDP levels as of 2040 relative to benchmark projections. "Covid: structural changes" ("Covid: scarring") scenario assumes that industry-specific factors and the corresponding labour reallocations are equal to their estimated average levels for the United States (Thailand) during the pandemic, taking five years to revert to their levels in the benchmark projection.

Sources: EU KLEMS database, national data; authors' calculations.

The second case assumes widespread adverse labour productivity shocks as a result of the pandemic, replicating the experience of some EMEs. Based on Thai data, we lower labour productivity growth in the same industries considered above, except for finance (Graph 4, centre panel), and hold labour shares constant at their 2019 levels. As before, we assume that the shocks dissipate over five years. This broad-based labour productivity growth slowdown, representing the persistent "scarring" effects of the pandemic, would lead to substantial GDP losses. By 2040, GDP for the average country would be 10% below the benchmark (Graph 4, right-hand panel). Lost human capital from education interruptions, not accounted for in the scenario, could amplify the output costs, particularly in EMEs.

Housing boom gone bust

The second scenario is a disruptive end to the global housing boom. This risk has gained relevance due to the extended house price appreciation seen in many jurisdictions during the pandemic, coinciding with the prospect of higher interest rates (see Igan et al (2022)). Many past housing busts were followed by subdued economic growth, amplified by financial deleveraging and debt overhang.

We draw on two housing boom-bust episodes to build the scenario: the GFC in the United States and the 2011 crisis in Spain. In the decade after the GFC, the estimated country-specific labour productivity growth factor for the United States fell

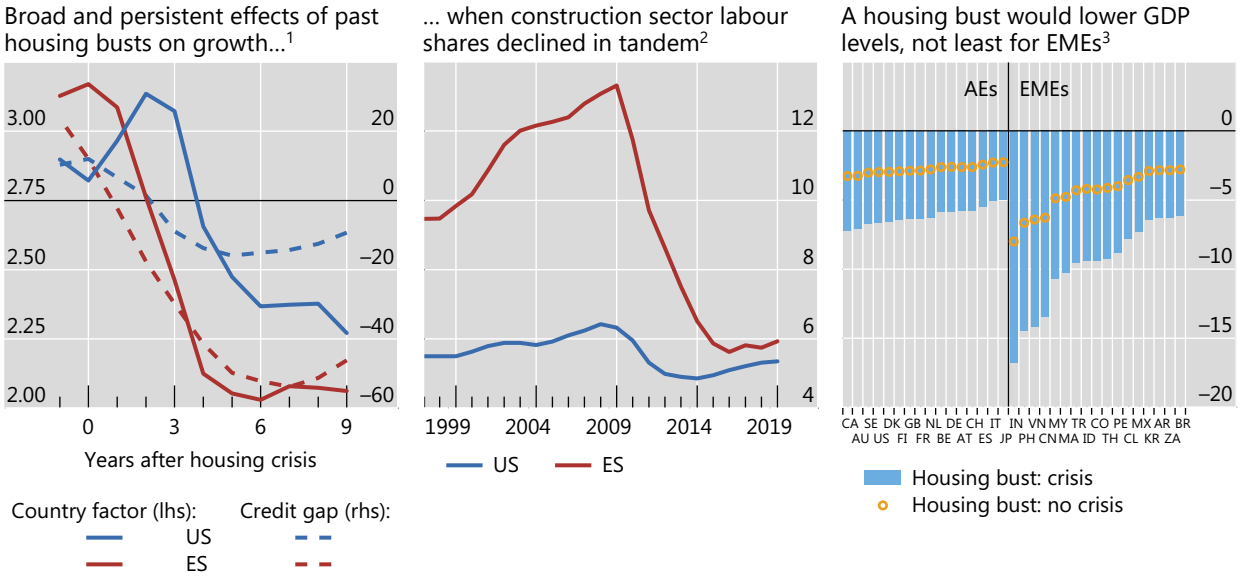
by 1 percentage point (Graph 5, left-hand panel).[13] Similarly, the country-specific factor for Spain declined by more than 1 percentage point after its 2011 crisis, bottoming out only six years later. The accompanying collapse in bank lending, depicted in the panel by movements in credit gaps, highlights the role of balance sheet overhang in creating these persistent economy-wide effects. Sluggish growth recoveries went hand in hand with construction industry adjustments, including a protracted fall in the industry's employment share of 30–50% (Graph 5, centre panel), and a decline in annual labour productivity growth of around 0.6 percentage points.

We consider two calibrations with varying degrees of financial amplification. The first "crisis" case mimics the severity of recent housing crises and assumes that country-specific factors decline by 1 percentage point starting in 2024, taking five years to bottom out and seven more years to return to benchmark. It also assumes shocks to the construction industry in line with historical experience: a 0.6 percentage point fall in labour productivity growth and a 30% fall in the industry's employment share. Relative to the benchmark, this case lowers GDP in AEs by 5% on average by 2040 (Graph 5, right-hand panel, blue bars). The impact in EMEs is more varied, reflecting differences in the size of construction industries and the greater loss of output in faster-growing economies as a result of the same shocks. The impact ranges from 5% in large Latin American countries such as Brazil and Argentina to almost 15% in major Asian economies such as China and India.

Scenarios based on housing boom gone bust

In per cent

Graph 5



[1] Country-specific factors are model estimates of trend labour productivity growth for the United States and Spain. Credit gaps are the deviations from credit-to-GDP from long-term trends. Year 0 corresponds to 2007 for the United States and 2010 for Spain. [2] Labour shares in the construction sector. [3] Differences in GDP levels as of 2040 relative to benchmark projections. "Housing bust: crisis" assumes that the country-specific factors decline at the same pace as the recent crisis episodes, troughing after five years and taking seven more years to recover to the benchmark rates. "Housing bust: no crisis" assumes shorter downturn and recovery periods of two and three years respectively.

Sources: EU KLEMS database; BIS; national data; authors' calculations.

[13] Construction cycles also affect labour productivity through cross-sectoral labour reallocation (Borio et al (2016)).

This experience guides our second "no-crisis" case, in which more resilient banking systems post-GFC help avert a financial crisis and mitigate banks' balance sheet overhang even as the housing industry undergoes a tumultuous adjustment.[14] We assume shocks of the same sizes as the crisis scenario, but a shorter contraction and faster recovery for the country-specific factors, taking two and three years respectively. The adverse effect on GDP is now smaller (Graph 6, right-hand panel, yellow circles), more in line with regular recessions.

A green energy transition

The final scenario involves the transition to a greener economy. This transition could involve a number of developments including (i) significant investment to replace "dirty" energy sources with greener alternatives; (ii) changes in industry-level productivity growth, depending on whether green technology is more or less productive than the alternative; and (iii) changes in risk premia as investors look to reduce their exposure to carbon-intensive firms and industries.[15] To account for these rich economic forces, we follow a two-stage approach. First, we use a multi-industry structural model (based on Rees (2020)) to translate the underlying economic forces behind the scenarios into a sequence of industry-specific factors and employment shares, and changes in aggregate employment. Next, we use these estimates in our framework to determine the GDP implications.

To illustrate the inherent uncertainty of the transition, we explore two cases.[16] In an orderly transition, the need for green energy investment is met in a timely manner and this raises productivity in the energy industry as well as in industries that use energy as an input. In a disorderly transition, by contrast, clean-energy technology lags behind investors' aspirations and governments' objectives, which ends up depressing productivity in a persistent manner, particularly in the energy industry.

The orderly transition involves modest short-run costs and persistent long-run gains. Labour productivity growth in carbon-intensive industries, particularly energy, initially declines as "brown" technologies are abandoned and the benefits of new investment are slow to materialise (Graph 6, left-hand panel). Overall, this lowers GDP by around 1–2%, relative to the benchmark projections (centre panel). By 2030 however, the transition toward green energy is largely complete, and labour productivity growth increases in all industries – led by the green energy industry. By 2040, GDP is 1% higher on average (Graph 6, right-hand panel).

[14] We also assume no overhang effects from high household debt and construction oversupply, which could amplify the housing busts even if the banking system is not at risk.

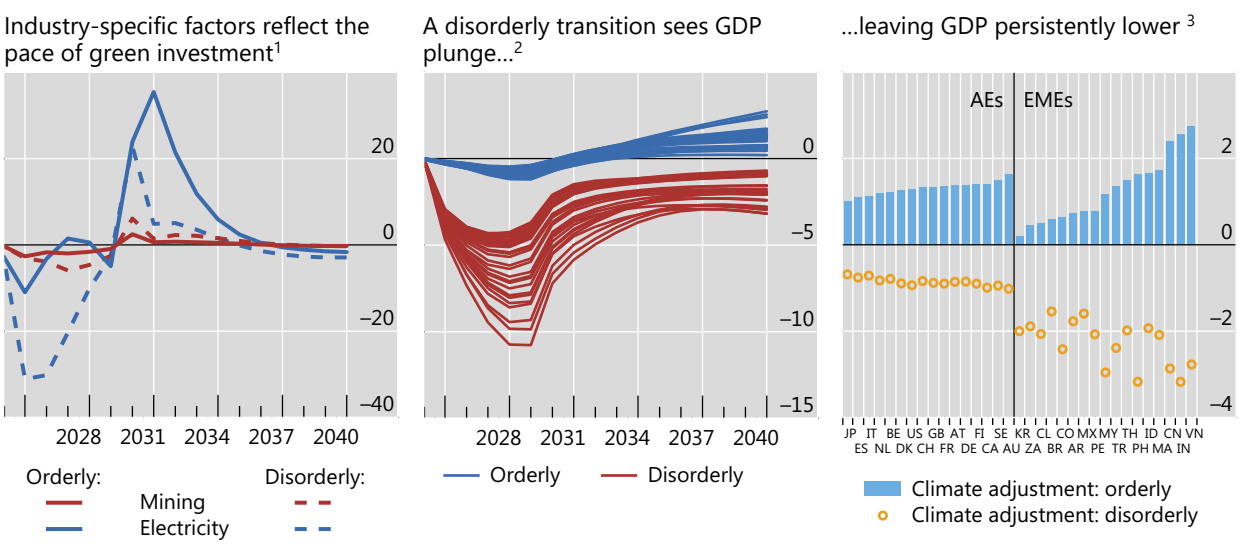
[15] This could be for reputational reasons (Bolton and Kacperczyk (2021), Scatigna et al (2021)).

[16] We consider only the "transition risks" associated with tackling climate change. Accounting for "physical risks" would require us to model carbon emissions and their climate implications, which is beyond the scope of this article. To the extent that both cases lead to lower carbon emissions, the scenarios may understate the benefits to GDP growth. We also abstract from fiscal policy implications.

Scenarios based on green energy transition: orderly and disorderly

In per cent

Graph 6



[1] Estimates of industry-specific factors – under two scenarios – from a multi-sector structural model (Rees (2020)). [2] Projected GDP level paths for all 33 countries, under the two scenarios. [3] Differences in GDP levels as of 2040 relative to benchmark projections.

Sources: Rees (2020); national data; authors' calculations.

The disorderly transition entails significant costs. A rapid shutdown of carbon-intensive energy sources, without readily available green replacements, causes a short-run contraction of almost 30% in the energy industry's labour productivity. This prompts a sharp reduction in output of between 5–10% in the first five years, relative to the benchmark. As the initial slump in energy investment is assumed to hinder technological progress in that industry, some of the decline in output is permanent – by 2040, output is still 1% below the benchmark projections in AEs, and 2–3% lower in EMEs.

Policy implications

Our analysis has several policy implications. First, it highlights the urgent need to accelerate structural reforms to provide a boost to aggregate supply. Without such measures, the dual headwinds of sluggish labour productivity growth and population ageing could weigh on GDP growth in both AEs and EMEs over the medium term. Slower growth, in turn, would have wide-ranging macroeconomic implications – not least for debt sustainability, macroeconomic stabilisation policy, inflation and therefore for monetary policy, which would have to deal with a more challenging environment.

Second, our analysis suggests that countries have scope to enhance productivity growth regardless of their industrial structure. Indeed, country-wide factors have historically mattered more for aggregate productivity growth than industry-specific ones. This suggests that economy-wide measures, such as improvements in institutional quality and human capital, can persistently boost labour productivity growth, even in economies geared towards seemingly less productive industries.

Third, measures to promote labour market flexibility and resource reallocation are also likely to be beneficial. More agile economies would be more resilient in the face of large economic disruptions, such as those associated with the Covid-19 pandemic discussed in our scenario analysis, and in some cases may even benefit from the attendant shifts in consumer preferences.

Finally, the scenario analysis also underscores the importance of guarding against downside risks. Improving financial resilience against a house price correction and forestalling housing market overheating requires coordinated monetary, fiscal and macroprudential policy action. Promoting an orderly green transition, and the major resource reallocation it implies, requires a broad policy strategy, including international coordination. Lack of progress on these fronts could come at a high cost.

References

Bolton, P and M Kacperczyk (2021): "Do investors care about carbon risk?" *Journal of Financial Economics*, vol 142, no 2, pp 517–49.

Borio, C, E Kharroubi, C Upper and F Zampolli (2016): "Labour reallocation and productivity dynamics: financial causes, real consequences", *BIS Working Papers*, no 534.

de Vries, G, L Arfelt, D Drees, M Godemann, C Hamilton, B Jessen-Thiesen, A Kaya, H Kruse, E Mensah and P Woltjer (2021): "The Economic Transformation Database (ETD): content, sources and methods", *WIDER Technical Note*, 2/2021.

Feenstra, R, R Inklaar and M Timmer (2015): "The next generation of the Penn World Table", *American Economic Review*, vol 105, no 10, pp 3150–82.

Hornstein, A, M Kudlyak and A Schweinert (2018): "The labor force participation rate trend and its projections", *FRBSF Economic Letter*, 2018–25.

Igan, D, E Kohlscheen and P Rungcharoenkitkul (2022): "House prices during and after the pandemic: drivers and risks", mimeo.

Lowe, P (2021): "The labour market and monetary policy", speech to the Economic Society of Australia (QLD), 8 July.

Powell, J (2021): "Getting back to a strong labour market", speech at the Economic Club of New York, 10 February.

Rees, D (2020): "What comes next?", *BIS Working Papers*, no 898.

Scatigna, M, D Xia, A Zabai and O Zulaica (2021): "Achievements and challenges in ESG markets", *BIS Quarterly Review*, December, pp 83–97.

United Nations, Department of Economic and Social Affairs, Population Division (2019): *World Population Prospects 2019*, online edition, rev 1.