Global Debt Report 2025

Financing Growth in a Challenging Debt Market Environment

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FINANCING GROWTH IN A CHALLENGING DEBT MARKET ENVIRONMENT

OECD
BETTER POLICIES FOR BETTER LIVES

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Foreword

This is the second edition of the OECD's annual Global Debt Report. It examines developments of global policy relevance in sovereign and corporate bond markets. The report includes two standing chapters on sovereign borrowing (Chapter 1, the Sovereign Borrowing Outlook) and corporate debt markets (Chapter 2), and, this year, two thematic chapters on sovereign bond markets in emerging market and developing economies (Chapter 3) and debt financing for the climate transition (Chapter 4). The report draws from unique OECD data as well as original analyses of commercial and publicly available data.

Chapter 1 analyses sovereign bond market developments during the period from 2007 to 2025 with a focus on OECD countries. It looks at borrowing requirements and funding strategies; debt-to-GDP ratio dynamics; borrowing costs and yield curve shapes; interest payments and refinancing risks; and the effects of quantitative tightening on the investor base and market liquidity. This chapter draws on responses to the OECD 2024 Survey on Primary Market Developments, the OECD 2024 Survey on Liquidity in Government Bond Secondary Markets, and the 2024 annual survey on the borrowing needs of OECD governments. It also benefits from the contributions of members of the OECD Working Party on Debt Management. The chapter does not cover supranational or sub-sovereign bond markets.

Chapter 2 studies dynamics in corporate debt markets in light of ongoing macro-financial developments. It covers recent trends in corporate borrowing from markets and looks at shifts in the globalisation and concentration of corporate bond markets. The chapter aims to identify globally relevant issues for corporate access to finance, financial stability and market functioning.

Chapter 3 analyses sovereign bond markets in emerging market and developing economies amid tighter monetary conditions, with a focus on low and lower-middle income countries. It is based on central government bond debt data, and examines issuance trends, borrowing costs, foreign market access and credit rating developments, concluding with an outlook.

Chapter 4 examines the financing needs for transitioning to a low-carbon economy, focusing on corporate debt. It aims to identify changes needed in corporate debt markets to enable companies in the energy sector to undertake the investments necessary for the climate transition. While the analysis is global, there is particular emphasis on the role of capital markets in mobilising climate finance in emerging market and developing economies.

Comments and questions should be addressed to the Capital Markets and Financial Institutions Division of the OECD Directorate for Financial and Enterprise Affairs by e-mail at GlobalDebtReport@oecd.org.

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Editorial

Global debt markets are facing a transformation. During the past fifteen years, they have played a key role in supporting the recovery from this century's two global crises – the 2008 financial crisis and COVID-19 pandemic – continuously providing capital to support companies and governments, helping prevent deeper recessions. But the world now needs to do more than just recover from crises. Wide-ranging macro-trends, demographic and climate-related, require an unprecedented level of investment, much of which will be debt-financed.

Our world has already shifted to a new paradigm in terms of debt levels, with governments and companies borrowing approximately USD 10 trillion more from markets every year compared to the pre-COVID period (2015-19) – greater than the combined GDP of Germany and Japan. Meanwhile, despite inflation falling back towards target and monetary policy generally loosening in 2024, interest payments continue to rise, as record levels of bonds issued at low rates need to be refinanced. Long-term rates also reached their highest levels in nearly 20 years in several major markets in 2024, as future macro-financial prospects have been reassessed. Many markets have also experienced greater volatility, reflecting increased uncertainty, an unprecedented level of debt supply and a more price-sensitive investor base.

While global markets have so far shown resilience to all of this, there are vulnerabilities in the system. The persistence of high long-term rates in core markets complicates the landscape for corporate and emerging market borrowers in particular, as investors can once more secure real returns in traditional safe assets.

The world in which debt markets operate is also changing rapidly. As governments and corporates seek to meet rising investment needs, in particular in the energy sector, they must navigate an environment shaped by slowing economic growth, heightened geopolitical risk and competing priorities for public and private funding. Difficult choices already have to be made. With each cent raised through debt markets costing more, these decisions become trickier still.

The second edition of the Global Debt Report comes at this critical juncture. Over four chapters, it analyses sovereign bond markets in OECD and emerging market and developing economies, corporate debt markets globally, and debt financing for the climate transition.

Policy makers around the world face an important and challenging task in ensuring the sustainability of debt trajectories while financing the investments needed to increase competitiveness and support long-term growth. This report leverages original data and analysis to support them in this endeavour.

Carmine Di Noia

Director for Financial and Enterprise Affairs, OECD

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Abbreviations and acronyms

AEs	Advanced economies
ATM	Average term-to-maturity
ATR	Average term-to-refixing
BoC	Bank of Canada
BoE	Bank of England
BoJ	Bank of Japan
BTP	Buono del Tesoro Poliennale
CAD	Canadian dollar
CAGR	Compound annual growth rate
CBI	Climate Bonds Initiative
CBS	Climate Bonds Standard
CCUS	Carbon capture, utilisation, and storage
CLO	Collaterized Loan Obligation
COVID-19	Coronavirus disease (COVID-19)
CPI	Consumer Price Index
DMO	Debt Management Office
DFN	Debt-for-nature swaps
ECB	European Central Bank
EBITDA	Earnings before interest, taxes, depreciation, and amortisation
EMDEs	Emerging Market and Developing Economies
ESG	Environmental, Social and Governance
ETF	Exchange Traded Fund
EU	European Union
EUR	Euro
FDI	Foreign Direct Investment
FRN	Floating Rate Note
FX	Foreign exchange
G7	Group of Seven
G20	Group of Twenty
GBP	Great Britain pound
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GHG	Greenhouse gases
GSS	Green, Social and Sustainability
HICs	High-income countries
ICMA	International Capital Market Association
IEA	International Energy Agency
IMF	International Monetary Fund
IPPC	Intergovernmental Panel on Climate Change
ISAE	International Standard on Assurance Engagements
ISIN	International Securities Identification Number
JGB	Japanese government bond
JPY	Japanese yen
KPI	Key Performance Indicator
LAC	Latin America and the Caribbean
LBO	Leveraged Buyout

LICs	Low-income countries
LMICs	Lower-middle income countries
LSEG	London Stock Exchange Group
MENA	Middle East and North Africa
MMF	Money Market Fund
NA	OECD National Accounts
NZE	Net Zero Emissions
OATs	Obligations Assimilables au Trésor
OECD	Organisation for Economic Co-operation and Development
OEF	Open-Ended Fund
PDM	Public debt management
PE	Private equity
PEPP	Pandemic Emergency Purchase Programme
PSPP	Public Sector Purchase Programme
QE	Quantitative Easing
QT	Quantitative Tightening
RIC	LSEG Identification Code
SDRs	Special Drawing Rights
SLB	Sustainability-Linked Bond
SLR	Supplementary Leverage Ratio
SNA	System of National Accounts
SNG	Subnational government
SPT	Sustainable Performance Target
SSA	Sub-Saharan Africa
T-bill	Treasury bill
TBAC	Treasury Borrowing Advisory Committee
TRBC	The Reference Data Business Classification
UK	United Kingdom
UMICs	Upper-middle income countries
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States dollar
WPDM	OECD Working Party on Debt Management
YTM	Yield-to-maturity

ISO Codes

ARG	Argentina	EST	Estonia	JPN	Japan	SAU	Saudi Arabia
AUS	Australia	FIN	Finland	KOR	Korea	SVK	Slovak Republic
AUT	Austria	FRA	France	LVA	Latvia	SVN	Slovenia
BEL	Belgium	DEU	Germany	LTU	Lithuania	ESP	Spain
BRA	Brazil	GRC	Greece	LUX	Luxembourg	ZAF	South Africa
CAN	Canada	HUN	Hungary	MEX	Mexico	SWE	Sweden
CHL	Chile	ISL	Iceland	NLD	Netherlands	CHE	Switzerland
CHN	China	IND	India	NZL	New Zealand	THA	Thailand
COL	Colombia	IDN	Indonesia	NOR	Norway	TUR	Türkiye
CRI	Costa Rica	IRL	Ireland	PER	Peru	GBR	United Kingdom
CZE	Czechia	ISR	Israel	POL	Poland	USA	United States
DNK	Denmark	ITA	Italy	PRT	Portugal		

Executive summary

Global debt markets face a difficult outlook. The pre-2022 dynamics of low rates and central bank support did not return in 2024. Bond yields in several key sovereign markets rose despite policy rates falling, while both sovereign and corporate indebtedness increased. This combination of higher costs and higher debt risks restricting capacity for future borrowing at a time when investment needs are greater than ever. Past borrowing, a legacy of the 2008 financial crisis and the COVID-19 pandemic, has been used primarily to facilitate recovery, leaving many long-term investment needs unaddressed. Meanwhile, certain corporate and emerging market issuers are finding market access highly challenging, complicating the mobilisation of funding. Against this difficult backdrop, which includes heightened geopolitical and macro-economic uncertainty, debt markets must meet the complex challenge of financing long-term, sustainable growth.

Sovereign and corporate borrowing rose in 2024 and looks set to continue rising in 2025.

Governments and companies borrowed USD 25 trillion globally from markets in 2024, nearly triple the amount in 2007. This increase is largely the legacy of the 2008 global financial crisis and the COVID-19 pandemic, in response to which large fiscal support packages, mainly funded via debt markets, helped avoid deeper recessions. Stricter banking rules and regulations to promote the use of market-based financing have also encouraged companies to rely more on bond markets. In 2024, sovereign and corporate bond debt together exceeded USD 100 trillion globally.

After a temporary dampening effect of inflation on debt-to-GDP (defined based on central government marketable debt), these ratios have begun growing again in several OECD countries. In the OECD on aggregate, it rose from 82% (USD 54 trillion) in 2023 to 84% (USD 55 trillion) in 2024. This figure is projected to grow further to 85% (USD 59 trillion) in 2025, more than 10 percentage points higher than in 2019 and nearly double the 2007 level.

Sovereign bond issuance in OECD countries is projected to reach a record USD 17 trillion in 2025, up from USD 16 trillion in 2024 and USD 14 trillion in 2023. Borrowing from markets has also increased sharply among emerging market sovereigns. Bond issuance rose from around USD 1 trillion in 2007 to over USD 3 trillion in 2024. Outstanding debt levels in emerging markets neared USD 12 trillion in 2024, up from USD 4 trillion in 2007.

The outstanding global stock of corporate bond debt also resumed its long-term growth path in 2024, following two years of inflation-induced real-term reductions that temporarily halted over 20 years of consecutive increases. At the end of 2024, global corporate bond debt amounted to USD 35 trillion, alongside USD 25 trillion of syndicated loans and at least USD 1.6 trillion of private credit.

Higher borrowing costs raise refinancing risks for sovereign and corporate issuers.

Today's outstanding debt stock does not reflect the prevailing cost of new borrowing. Largely a legacy of the low-interest rate period, most outstanding debt carries a cost that is much lower than current market rates, and likely to be lower than the cost of borrowing going forward. At the end of 2024, over half of OECD sovereign debt, 30% of emerging market sovereign debt, 63% of investment grade corporate debt, and 74% of non-investment grade corporate debt had interest costs below the prevailing market rates.

As this debt is refinanced at higher rates, costs will increase. At the end of 2024, real ten-year yields were higher than both 2015-19 averages and 2023 levels in all but one OECD country with available breakeven

inflation data. 2024 was also the first year since the initial occurrence in 2015 that no OECD country issued a bond with a negative yield. As a result, government interest payment to GDP ratios increased in about two-thirds of OECD countries in 2024, reaching 3.3% on aggregate, an increase of 0.3 percentage points compared to 2023. This means spending on interest payments is greater than government expenditure on defence in the OECD on aggregate.

Increases in interest payments tend to be gradual, since the total outstanding debt has been issued and will mature over decades. Nonetheless, between 2021 and 2024, interest costs to GDP increased from the lowest to highest level in the last 20 years, reflecting the speed of recent changes. Almost 45% of OECD countries' sovereign debt will mature by 2027. This includes one-third of fixed-rate debt, 60% of which was issued before the post-2022 tightening cycle. This high near-term refinancing profile is partly a result of the increased issuance of treasury bills and the shortening of average maturities by certain large OECD issuers in the past few years. The equivalent share of outstanding debt maturing in the next three years in emerging markets is almost 40%. Low-income and high-risk countries face the greatest refinancing risks, with over half of their debt maturing during this period and more than 25% in 2025 alone.

Roughly one-third of all outstanding corporate bond debt will also mature by 2027, and the weighted cost is lower than end-2024 reference yields in every year until then, meaning corporate interest expenditure will increase unless yields fall sharply.

Since 2008, corporate bond issuance has grown significantly above trend, but corporate investment has not. Cumulative bond issuance by non-financial companies between 2009 and 2023 was USD 12.9 trillion higher than the pre-2008 trend, similar to the size of the entire current US corporate bond market. Meanwhile, corporate investment was USD 8.4 trillion lower. Rather than productive investment, much debt in recent years has instead been used to fund financial operations like refinancings (mentioned in 72% of prospectuses with non-generic use of proceeds information between 2000 and 2021, weighed by issue amount) and shareholder payouts (in 9% of prospectuses). This suggests existing debt is unlikely to "pay itself off" through returns on productive investment.

The dynamics sustaining current levels of investor demand for debt might not continue.

Central banks continued to withdraw from debt markets through quantitative tightening in 2024. If current levels of debt are to be maintained, either existing investors will need to buy more debt or new, likely more price-sensitive, investors will need to enter the market, which could increase volatility. Trends in 2024 suggest that households and foreign investors are taking up the reduced holdings of central banks. In OECD economies, central bank holdings of domestic sovereign bonds fell from 29% of total outstanding debt in 2021 to 19% in 2024, while domestic households' share grew from 5% to 11%, and that of foreign investors from 29% to 34% over the same period.

The availability of sufficiently large and sustained foreign demand depends on the level and functioning of international financial flows. However, geopolitical tensions and trade uncertainties may lead to rapid changes in risk aversion that could in turn disrupt certain international portfolio flows. In corporate markets, shocks might be amplified by high levels of concentration across the issuer, investor and portfolio levels.

Achieving net-zero will require substantial increases in public and private investment.

The transition to net-zero is happening in this environment of high debt levels and high interest costs. The path to net-zero will look very different depending on whether the public or private sector finances most of the investment. In a scenario where the public sector provides the additional financing to meet investment requirements, the public debt-to-GDP ratio would rise by 25 percentage points in advanced economies and by 41 percentage points in the People's Republic of China (China) by 2050. In emerging markets other than China, it would rise by 16 percentage points by 2040, beyond which further fiscal expansion may not be sustainable, necessitating more support from advanced economies.

If the private sector finances most of the investment, corporate borrowing would grow substantially, requiring the rapid development of capital markets. This is especially critical for bond markets for energy companies in emerging markets other than China, which would need to grow at an annual rate of 17% between 2024 and 2035, i.e. quadrupling in size in less than ten years.

In all three scenarios analysed in this report, energy sector corporate bond debt in emerging markets grows at about twice the rate of projected GDP, while it expands in line with GDP in advanced economies. If the private sector makes most of the investment and market-based financing levels in emerging markets converge with those in advanced economies, the bond debt of energy companies in emerging markets other than China would grow more than three times faster than projected GDP. These scenarios underscore the immense challenge of leveraging debt markets for the transition to a low-carbon economy. However, they also reaffirm the private sector's potential role in driving this transformation. To enable this, financial regulation reforms will be essential, particularly to enhance capital market development in emerging markets.

If growth rates for public and private investment in the climate transition continue in line with recent trends, advanced economies will not be aligned with the Paris Agreement goals until 2041. The situation is even more difficult for emerging markets other than China, which would face a cumulative investment shortfall of USD 10 trillion to meet the Paris Agreement goals by 2050.

When every cent raised via debt markets costs more, quality investments must be prioritised.

Current shifts in debt markets are happening at a time when countries are increasingly focusing on enhancing their competitiveness through investments in infrastructure, the climate transition and digitalisation, including AI, as well as increasing defence spending. Given current conditions, meeting these needs will require sustained efforts to use debt markets as strategically as possible.

Despite a sharp rise in borrowing in recent years, corporate default rates have remained relatively low, and no major economy has defaulted or undergone significant debt restructuring. However, debt trajectories in recent years cannot be ignored. Many governments will likely need a combination of greater fiscal prudence, structural reforms to boost growth, and greater efficiency in public spending. Meanwhile, several sovereigns are shortening the maturity of their issuance to manage the supply of duration to markets, which can amplify already heightened refinancing risks. Issuers will need to remain flexible to meet demand where it exists but also limit risks in their debt portfolios.

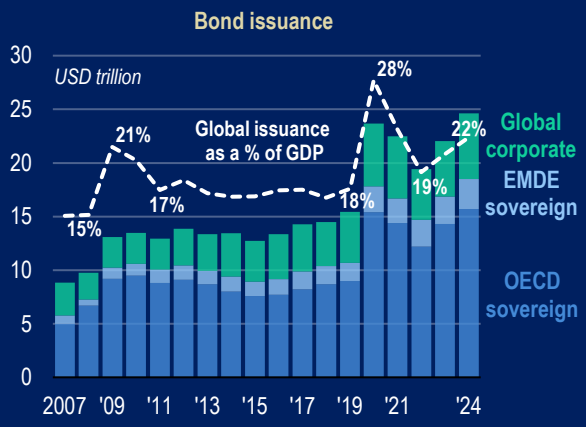
Having used the low-rate era to prioritise financial operations, the link between corporate investment and borrowing has been partly severed. This impacts future growth prospects and therefore the ability to meet upcoming refinancing needs. Corporates will need to prioritise borrowing for spending that enhances productive capacity to better ensure the long-term sustainability of their debt, and governments should ensure they have the right incentives to do so.

Emerging markets need to develop their local capital markets to support growth and provide greater financial resilience. Those with larger domestic markets who borrow predominately in their own currency have fared better, while those with smaller markets who mainly borrow in foreign currencies are more exposed to changes in monetary policy elsewhere. Higher policy rates in the United States and the strength of the US dollar in the last few years have been particularly punishing for these issuers.

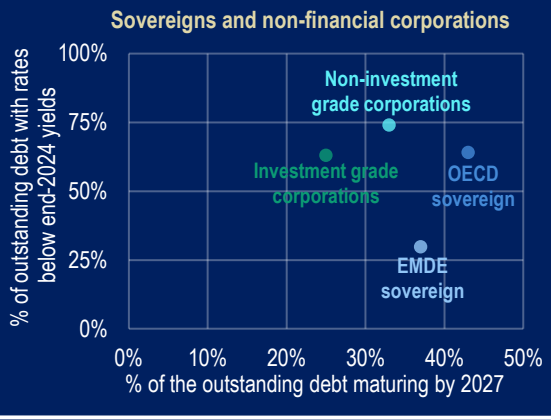
Finally, debt markets will play a critical role in financing the climate transition. Scenario analyses, which take into account key variables such as the growth of climate mitigation investments, international climate finance for developing countries, and foreign direct investment, underscore the impracticality of overreliance on either the public or private sector alone for this purpose.

Infographic 1. Key facts and figures

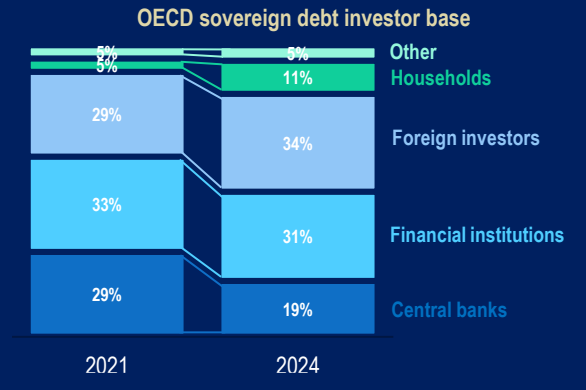
Sovereign and corporate borrowing rose in 2024



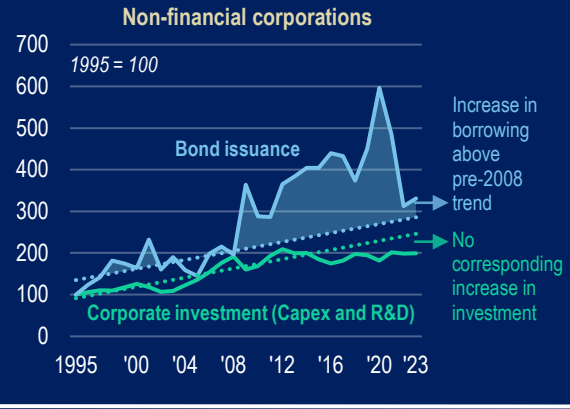
Most outstanding debt carries lower costs than current yields, with large refinancing needs in the near-term



As central banks withdraw from bond markets, households and foreign investors have replaced them



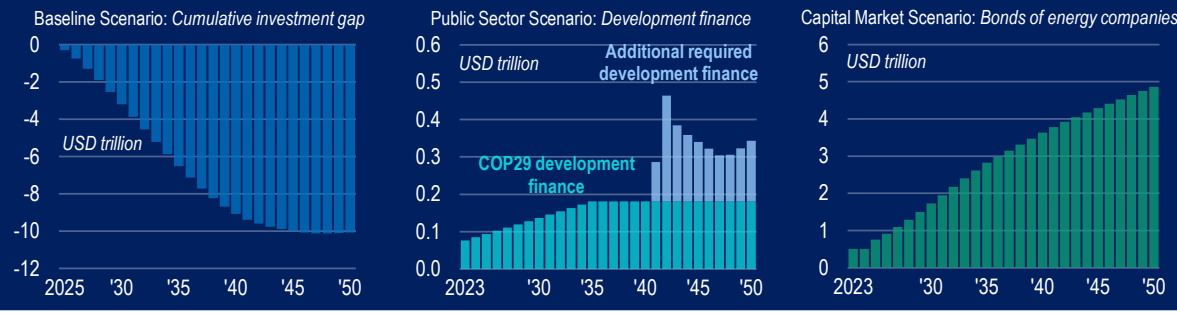
Increased corporate borrowing has not been associated with increased investment



Developing capital markets in emerging economies is key for the transition to a low-carbon economy

At current growth rates, emerging markets other than China would face a cumulative climate transition investment shortfall of USD 10 trillion by 2050 to meet the Paris Agreement goals. If the public sector fills this gap, advanced economies would need to go beyond the climate finance commitments agreed at COP29. Alternatively, if the private sector plays a leading role, bond markets for energy companies in emerging markets would need to quadruple within the next decade.

Emerging market and developing economies



1 Sovereign borrowing outlook

Sovereign bond issuance in OECD countries continued to rise in 2024, albeit at a slower pace compared to 2023. Increased borrowing needs and high borrowing costs have driven interest payments to a higher share of GDP in 2024. These two factors, combined with slowing nominal GDP growth, contributed to the first increase in the central government marketable debt-to-GDP ratio since 2020.

Meanwhile, the supply of bonds needing to be absorbed by the market accelerated as central banks continued to scale back their holdings, leading to increased reliance on a more price-sensitive investor base. Overall, market liquidity has improved, but volatility remains elevated amid heightened geopolitical risks and macro-financial uncertainty.

Introduction

This chapter explores developments in sovereign debt in OECD countries between 2007 and 2025. It analyses borrowing needs, outstanding debt trends, issuance strategies, borrowing costs, interest payments and their impact on debt dynamics, changes in investor bases amid quantitative tightening (QT), and liquidity in sovereign bond markets. This chapter draws mainly on responses from OECD Debt Management Offices (DMOs) to surveys on the marketable debt of central governments, primary market developments and liquidity in secondary government bond markets. It provides data up to 2023, with 2024 estimates and 2025 projections as of December 2024. The methodology can be found in Annex 1.A.

Key findings

- **Sovereign debt issuance in OECD countries reached nearly USD 16 trillion in 2024, up from USD 14 trillion in 2023, and is projected to rise to USD 17 trillion in 2025**. With increased treasury bill issuance in recent years, refinancing needs are expected to hit USD 13 trillion in 2025, nearly 80% of gross borrowing. Meanwhile, net borrowing in 2025 is projected to remain around 2024 levels, at around USD 3 trillion, double the pre-pandemic average.
- **Outstanding sovereign bond debt in OECD countries is projected to reach nearly USD 59 trillion in 2025, up from USD 55 trillion in 2024 and USD 54 trillion in 2023**. The aggregate debt-to-GDP ratio rose for the first time since 2020, to 84% in 2024, up from 82% in 2023. It is projected to grow further to 85% in 2025 as higher fiscal deficits and rising effective interest rates offset growth and inflation effects.
- **Borrowing through treasury bills will comprise half of market borrowing in 2024-25**, exceeding the ten-year average by 10 percentage points. Meanwhile, the share of inflation-linked bonds issued in 2024 remained below pre-pandemic levels for 13 of 18 regular issuers.
- **Borrowing costs on fixed-rate bonds remained at nearly 4% in 2024, compared to 2% in 2022 and less than 1% in 2021 and 2020**. Yields across OECD countries' sovereign curves moved unevenly, with short-term rates declining more than long-term rates, with the widening term spreads raising the cost of managing refinancing risks for sovereign issuers.
- **The interest payments-to-GDP ratio in OECD countries rose from an average of 3.0% in 2023 to 3.3% in 2024.** As of 2024, one-third of fixed-rate debt in OECD countries will mature by 2027, 60% of which was issued before 2022. Refinancing this debt could raise interest payment-to-GDP ratios further, by an average of 0.2 percentage points.
- **Central banks' holdings of domestic sovereign bonds declined from a peak of USD 15 trillion in 2021 to USD 12 trillion in 2024, and are projected to drop by USD 1 trillion in 2025.** This resulted in a higher supply of bonds needing to be absorbed by markets, stretching investor appetite for long-dated bonds in some countries.
- **Foreign investors and households have taken on a larger share of government debt as central bank holdings decrease.** In 25 countries, which accounted for 90% of OECD debt in 2024, central bank holdings of domestic sovereign bonds fell from 29% in 2021 to 19% in 2024, while households and foreign investors' shares grew from 5% to 11% and 29% to 34%, respectively.
- **While liquidity in sovereign bond markets has improved, volatility remains above pre-pandemic levels.** Primary dealers have supported market liquidity, but limited warehousing capacity may pose challenges, particularly during periods of heightened market stress.

Borrowing requirements and outstanding debt trends

Gross borrowing and outstanding debt are expected to rise further in 2025

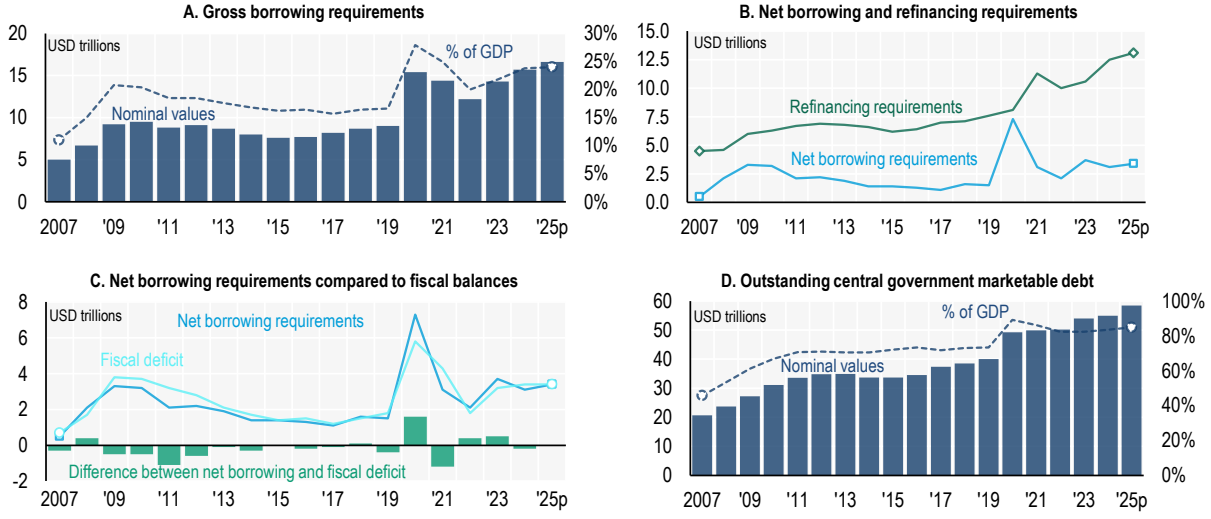
Gross borrowing requirements (i.e. borrowings from the bond markets) in the OECD area are projected to rise further in 2025 but at a slower pace than in the previous two years (Figure 1.1, Panel A). After peaking during the pandemic, borrowing declined to USD 12 trillion in 2022, before rising to over USD 14 trillion in 2023, and reached nearly USD 16 trillion in 2024. It is projected to reach USD 17 trillion in 2025. In real terms, growth in gross borrowing is projected to slow from 13% in 2023 to 7% in 2024 and 6% in 2025,[1] reflecting a stabilisation in borrowing relative to OECD GDP at 24% in 2024-25, up from 20% in 2022 and 22% in 2023. This level remains seven percentage points of GDP above the pre-pandemic average due to higher net borrowing and refinancing requirements.[2]

Higher refinancing requirements are driving the expected increase in gross borrowing for 2024-25 (Figure 1.1, Panel B). They are projected to gradually move from USD 11 trillion in 2023 to around USD 13 trillion in 2025. This increase is due to higher treasury bill (T-bill) issuance in 2023-24, including the refinancing of greater T-bill issuance, done in response to the pandemic, with outstanding T-bill stocks still exceeding their pre-pandemic levels.

On the other hand, net borrowing is estimated to have declined from nearly USD 4 trillion in 2023 to USD 3 trillion in 2024, and is projected to remain around this level in 2025. This is still significantly higher than pre-pandemic levels. In real terms, the 2025 net borrowing level will be close to double the pre-pandemic average of less than USD 2 trillion.[3] This elevated borrowing reflects slower output growth compared to the pre-pandemic period, reducing tax revenues, alongside increased spending pressures from interest payments, defence, population ageing and the energy transition (OECD, 2024[1]).

Figure 1.1. Gross borrowing, net borrowing, refinancing requirements and outstanding debt levels

Gross borrowing and debt levels are set to increase in 2024-25, with net borrowing still exceeding pre-pandemic levels and refinancing requirements hitting a record high



Note: 2024 values are estimations, and "2025p" denotes projections.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

Net borrowing has largely mirrored fiscal deficits since 2022, suggesting that bond issuances are having a marginal impact on cash balances (Figure 1.1, Panel C).[4] This contrasts with 2020, when net borrowing significantly exceeded fiscal needs as governments increased liquidity buffers, unsure of the precise fiscal impacts of lockdown measures, and with 2021, when excess liquidity from 2020 was drawn down, reducing net borrowing during the year. While these cash balance movements in 2020 and 2021 represented the general trend in most OECD countries, variations in cash balance movements across countries can be substantial, driven by differing liquidity risk management policies and objectives (Box 1.1).

The growth of outstanding central government marketable debt (stock of outstanding bonds) slowed in 2024 compared to 2023, but is projected to speed up again in 2025. (Figure 1.1, Panel D). The debt stock increased by USD 4 trillion in 2023 (compared to 2022), reaching USD 54 trillion, and rose to USD 55 trillion in 2024. It is projected to rise further to USD 59 trillion in 2025. The slower growth in 2024 reflects both declining net borrowing needs and the appreciation of the US dollar against other OECD currencies in 2024, reducing the outstanding debt in USD terms for other OECD countries.

The debt-to-GDP ratio in OECD countries reached 84% in 2024, rising by more than one percentage point from 2023. It is projected to rise further to 85% in 2025. The increase in 2024 was the first since 2020, reflecting slower projected GDP growth of around 2% annually during this period, compared to over 4% in 2022-23, when the economy was recovering from the pandemic. A more detailed analysis of debt-to-GDP dynamics is provided in the section on “Interest payments and their impact on debt-to-GDP ratio dynamics”.

Net borrowing as a share of GDP remains above pre-pandemic levels in most countries

Analysing OECD aggregate movements obscures significant variation among countries, as a few large issuers dominate these trends. Specifically, the top five issuers — the United States, Japan, France, Italy and the United Kingdom — accounted for over 85% of gross borrowing in OECD countries in 2024, with the United States alone representing over two-thirds of the total.[5]

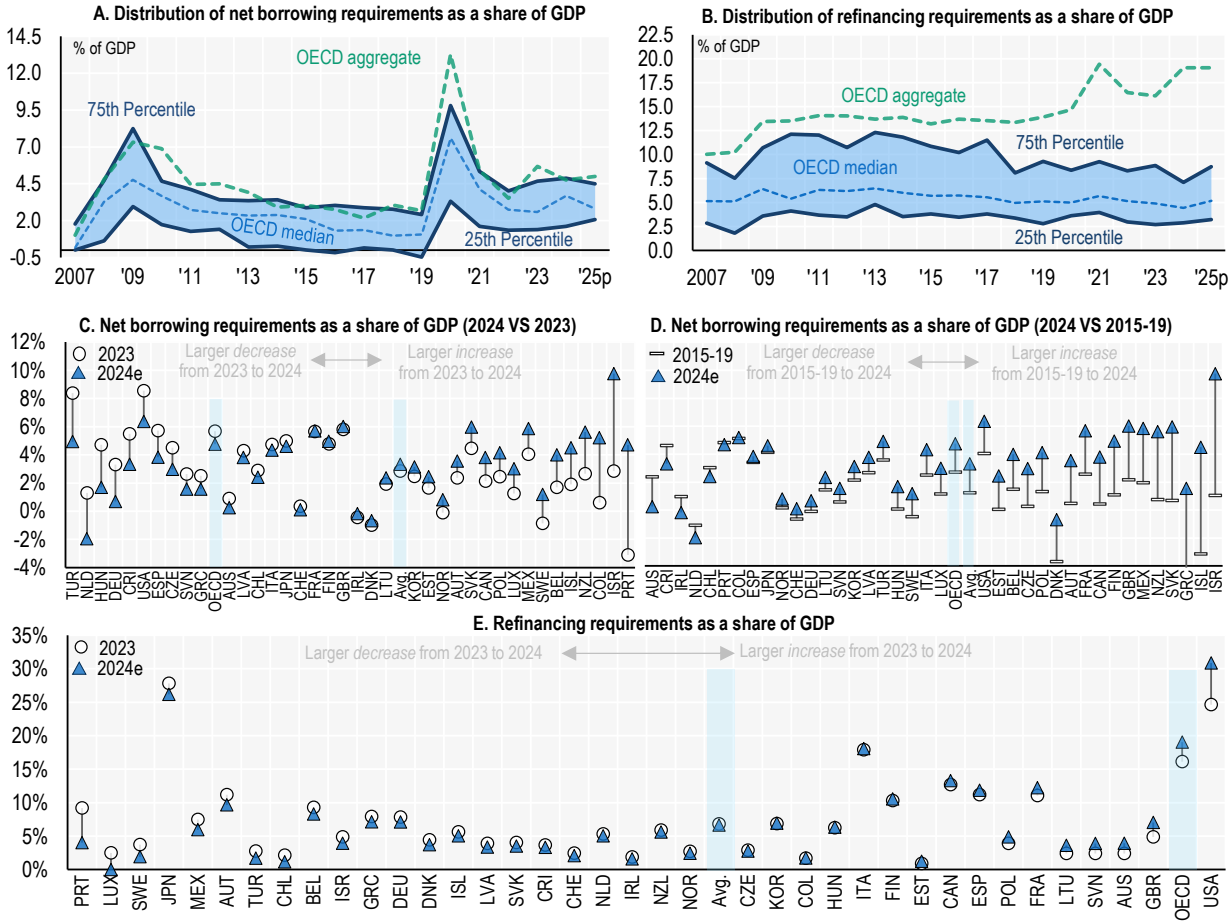
In terms of net borrowing-to-GDP ratios, the OECD aggregate declined in 2024 compared to 2023, despite increasing in more than half of OECD countries during this period (Figure 1.2, Panel A). Among them, the largest increases are seen in Portugal (due to rising indexed pension expenditure and tax cuts), Israel (amid the conflict in the Middle East), and Colombia (owing to utilities and diesel subsidies, and tax exemptions) (OECD, 2024[1]). Net borrowing-to-GDP ratios declined in 16 countries, including large issuers such as Germany, Italy, Japan and the United States (Figure 1.2, Panel C), driving the OECD aggregate movement.

Importantly, in most OECD countries, the net borrowing-to-GDP ratio remains higher compared to pre-pandemic levels. Notably, only 6 out of 38 OECD countries – Australia, Chile, Costa Rica, Ireland, the Netherlands and Portugal – had lower levels in 2024 compared to their 2015-19 average (Figure 1.2, Panel D). Both the average and median net borrowing-to-GDP ratios in the OECD rose by approximately two percentage points from 2015-19 to 2024, reflecting the continuation of higher fiscal needs across members in the period following the pandemic.

Unlike net borrowing requirements, the OECD aggregate refinancing requirements as a share of GDP are increased in 2024, but to have declined in most member countries (Figure 1.2, Panels B and E). Refinancing requirements tend to be more stable than net borrowing, as they are shaped by the debt maturity portfolio, which is a result of decades of issuances. As such, significant movements in a few large issuers disproportionately impact the aggregate. For example, the United Kingdom and the United States shortened their issuance profile in 2023-24, a period of higher net borrowing for both, leading to an increase in the refinancing needs-to-GDP ratio of over two and six percentage points, respectively.

Figure 1.2. Net borrowing and refinancing requirements

As a share of GDP, net borrowing declined and refinancing requirements remained largely stable from 2023 to 2024 in most OECD countries



Note: 2024 values are estimations, and "2025p" denotes projections. The OECD aggregate in Panels A and B and the OECD in Panels C, D and E refer to the sum of all OECD countries' borrowing requirements divided by the sum of OECD countries' GDP.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

While the OECD refinancing requirements as a share of GDP grew in 2024, only 15 countries saw an increase, including major issuers such as France, Italy, the United Kingdom and the United States. Declines in refinancing requirements exceeding two percentage points of GDP occurred in Luxembourg and Portugal.

Box 1.1. Government cash buffer trends and cash management practices in selected countries

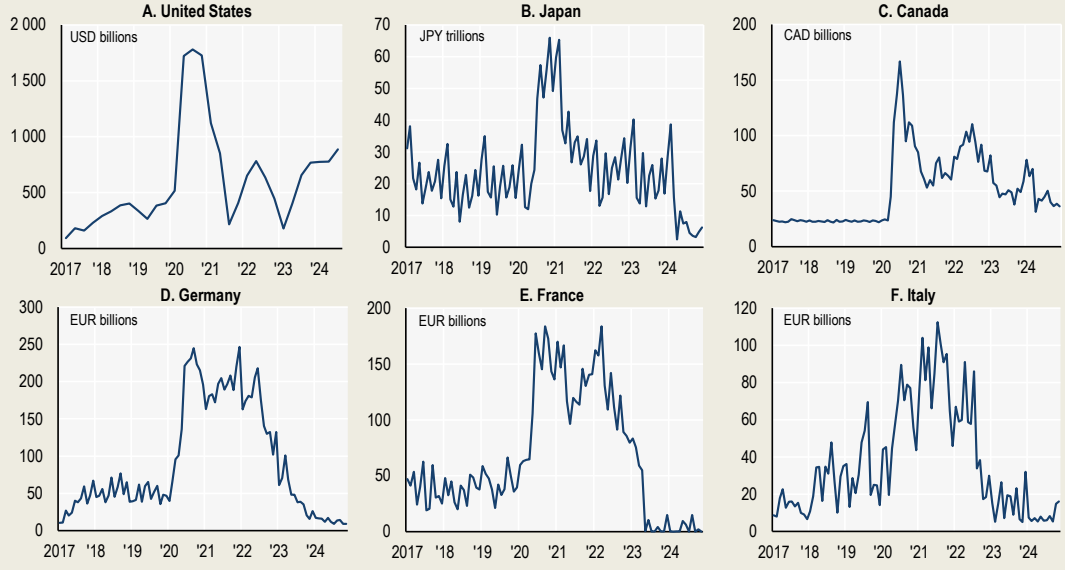
Debt and cash management interact in many ways and are often managed by the same government agency to ensure close co-ordination. As most countries have marked seasonal cash flow patterns, debt management offices select debt issuance and maturity dates to match these, minimising fluctuations in cash balances. Thus, cash management considerations are important for debt management.

The main goal of cash management is to ensure that the government meets its payment obligations. One of the main tools used to meet this objective is the maintenance of a cash buffer, a targeted cash balance held with the central bank. This can serve as insurance against liquidity risks, enabling issuers to meet obligations if cashflows differ from projections or market access is disrupted.

Cash management policies and practices vary significantly depending on certain factors, such as the agreements in place between the treasury and the central bank, the risk appetite of the issuer and the depth of local money markets. For example, Canada and the United States hold surplus cash as central bank deposits, targeting 7 and 23 days of net cash flows respectively. Some countries hold cash deposits at commercial banks and invest in short-term liquid assets. For example, several euro area countries hold negligible cash deposits at their national central banks, partly due to the relatively high margin between short-term market and deposit rates in recent years. In Italy, as of 2024, the cash invested by the treasury in the market was more than double the country's central bank cash deposits.

Figure 1.3 illustrates the changes in central bank cash deposits for selected countries. At the start of the COVID-19 pandemic, sovereign issuers overborrowed as insurance against the uncertain fiscal impacts of lockdowns, with cash balances sharply increasing from Q1 2020. In G7 countries, combined cash balances neared USD 3 trillion at the height of the COVID-19 period, up from around USD 1 trillion just a few months prior. As economies recovered and cashflows stabilised, countries generally returned to pre-pandemic practices, and combined G7 cash balances fell back to around USD 1 trillion from 2022 onwards.

Figure 1.3. Central bank cash deposits in selected countries between 2017-24



Note: The charts include quarterly data for the United States and monthly data for other countries.
Source: Bank of Canada, Bank of Japan, European Central Bank and Federal Reserve; OECD (2025[2]), Managing Government Cash: A Review of Practices in OECD Countries, OECD Publishing, Paris, https://doi.org/10.1787/7675eb58-en.

Issuance plans and strategies

Treasury bills continued to account for nearly half of OECD borrowing

Issuance strategies refer to the breakdown of gross borrowing by instrument type and maturity. The primary goal of debt managers is to minimise long-term borrowing costs while controlling risks. Short-term instruments and those with variable rates typically have lower long-term costs but heighten refinancing or interest rate risks, while long-dated fixed-rate instruments mitigate these risks at a higher cost. Additionally, not all issuance strategies are feasible as they are conditioned on market demand, with different investors typically active in a certain segment of the yield curve. Thus, to balance costs and risks and to be able to fund all the borrowing requirements, sovereign issuers often diversify their issuances across a range of maturities and instrument types.[6]

The fixed-rate issuance share in OECD countries is expected to remain below 50% in 2024-25, the second lowest level since 2008, with the lowest seen in 2023 (Figure 1.4, Panel A). The fixed-rate share stayed above 55% throughout 2009-19, before decreasing in 2020, during the height of the pandemic.

Despite the sharp rise in the share of T-bill issuance from the pre-pandemic average of 36% to 49% in 2024, significant increases occurred in only approximately one-quarter of OECD countries (Figure 1.4, Panel B). The share rose by more than 5 percentage points in 10 countries during this period but fell by more than or nearly 5 percentage points in 9 others. In both groups, the average change was around 15 percentage points. Therefore, the main driver of the higher overall T-bill issuance share is the size of issuers in these groups, with the two largest (Japan and the United States) issuing higher shares of T-bills in 2024 compared to 2015-19 averages, reflecting a recent change in their issuance strategies (TBAC, 2024[3]; Government of Japan, 2024[4]).

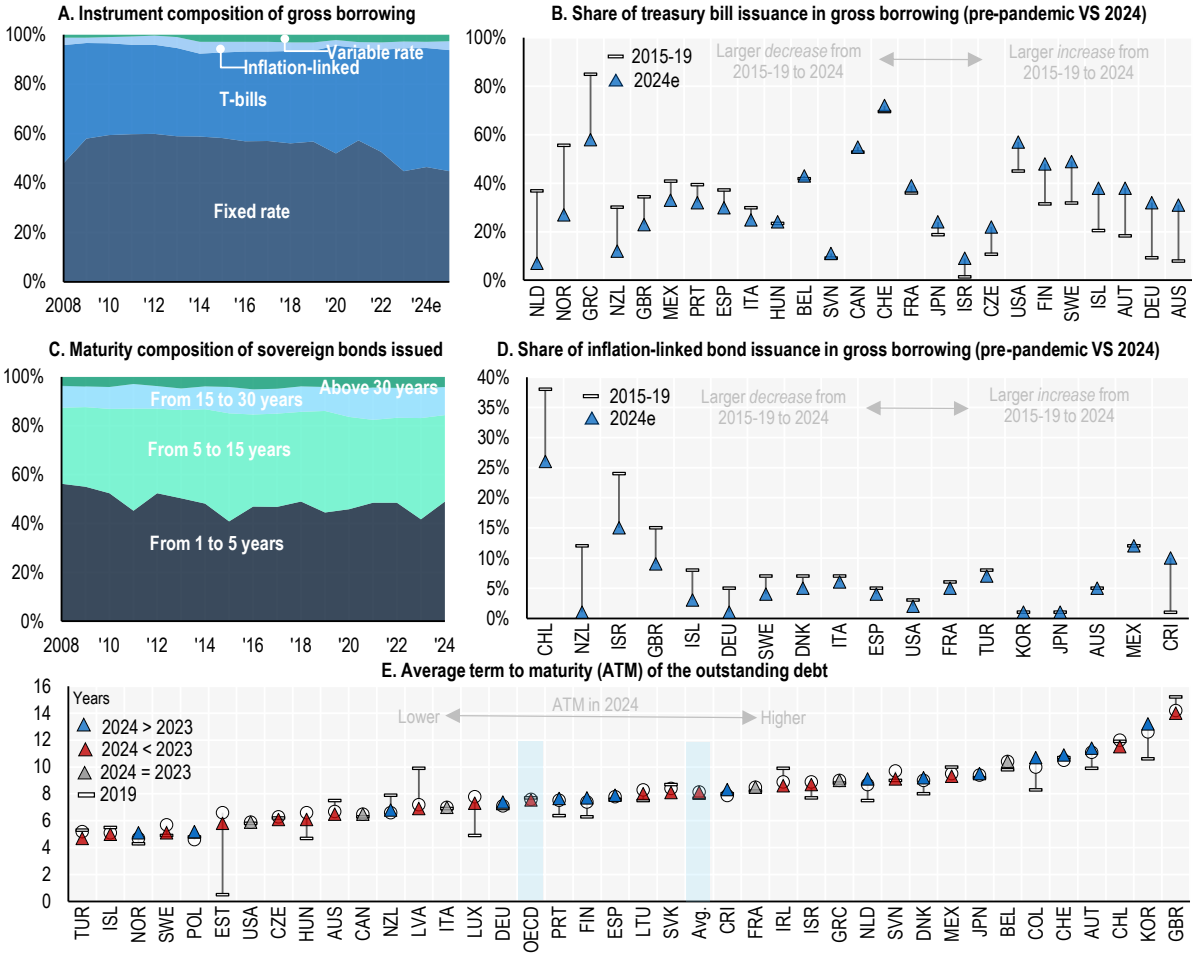
One factor prompting some sovereign issuers to increase the T-bill issuance share is the current environment of heightened fiscal, geopolitical and macro-financial uncertainties (see Box 1.2). Sovereign issuers often maintain a regular and predictable issuance framework with frequent, similarly sized auctions across the yield curve. To preserve this predictability, unexpected funding needs are often met through T-bills, avoiding abrupt changes in long-term debt issuance that could affect liquidity premiums. Therefore, T-bills are particularly useful in providing more flexibility, which is needed in the current environment.

A second factor driving increased T-bill issuance is the capacity of the market to absorb short-duration instruments. Historically, depressed term spreads have made low-duration securities attractive, offering relatively high returns with less risk. As such, investors can use T-bills to mitigate risks in a rapidly shifting macro-financial environment without necessarily compromising on returns. Additionally, quantitative tightening and high borrowing levels significantly increase the supply of bonds and the duration risk to be absorbed by markets. In this environment, shifting issuance toward T-bills not only leverages demand for short-duration instruments but also helps limit elevated term premiums, which can potentially reduce the cost of issuing conventional bonds.

In some countries, the relative attractiveness of short-term instruments is also supported by regulatory factors. For instance, in the United States, a Money Market Fund reform has driven structural demand for T-bills (TBAC, 2024[3]).[7] In Japan, life insurance companies' demand for long-term bonds has decreased due to progress made in meeting regulatory requirements (Bank of Japan, 2024[5]).

Figure 1.4. Instrument composition of gross borrowing and average term to maturity of outstanding debt

The treasury bill share of borrowing has increased while the inflation-linked share has declined since the pandemic



Note: "2024e" denotes estimations. Panels B and D only include countries regularly issuing T-bills and inflation-linked bonds, respectively. In Panel E, "Avg." represents the simple average, while "OECD" denotes the average weighted by the outstanding debt stock.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

The downsides of greater T-bill issuance include increased refinancing needs and interest rate risk. Managing larger refinancing needs may require larger liquidity buffers to guard against potential market access disruptions, which may generate costs through term premiums.[8] Additionally, T-bills amplify interest payment volatility, as a larger share of debt is refinanced annually at prevailing market rates. Hence, determining the optimal level of T-bill issuance involves balancing the risks of heightened refinancing and interest rate exposure against the benefits of typically lower cost and lower duration. This balance evolves based on market conditions and expectations, supply-demand dynamics, monetary and fiscal policies, and the macro-financial outlook.

Another important trend in 2024 was the decline in the issuance share of inflation-linked bonds compared to pre-pandemic levels (Figure 1.4, Panel A). Inflation-linked and variable-rate bonds together accounted for 5% of gross borrowing in 2024, down from around 7% during 2015-19.[9] The share of variable-rate bonds remained stable at 3% over that period.

The decline in the share of inflation-linked bond issuance has been widespread among those that issue them, following the sharp increases in interest payments associated with these instruments due to the 2022-23 inflation spike. Inflation-linked bond issuance shares decreased in 13 of the 18 regular issuers in 2024 compared to 2015-19 and increased meaningfully only in Costa Rica (Figure 1.4, Panel D).

While most issuers are gradually reducing the share of inflation-linked bonds they issue, some have implemented more drastic changes. For instance, Canada and Germany respectively ended their programmes in 2022 and 2023 (Government of Canada, 2022[6]; Government of Germany, 2023[7]). To help reduce inflation exposure in the debt portfolio, the United Kingdom reduced the proportion of inflation-linked bonds it issued by about 15 percentage points between 2018-23, with the level stabilising at around 11% in 2024 (UK DMO, 2024[8]). This decision was taken in 2018 before the inflationary spike in 2022-23. Similarly, Sweden announced a gradual reduction of its inflation-linked programme in 2024 (Government of Sweden, 2024[9]), and also switched inflation-linked bond auctions from multi-price to single-price in order to reduce pricing uncertainty for bidders, and encourage greater auction participation (von Wayland and Schedvin, 2024[10]). In Türkiye, the share of inflation-linked bonds in the debt stock fell by more than half from nearly 14% in 2020 to about 6% in 2024 (Republic of Türkiye, 2024[11]; 2025[12]).

Although inflation-linked bonds carry asymmetrical risks, they offer significant benefits, with many OECD countries maintaining their programmes (OECD, 2024[13]). These benefits include: 1) lowering borrowing costs in the long run as investors pay inflation premiums; 2) diversifying the investor base by attracting investors with inflation-linked liabilities such as pension funds and insurance companies; 3) extending the maturity profile, as they enable investors to protect themselves from inflation risks in the long term, which in turn allows sovereigns to issue at longer maturities, reducing refinancing risks; 4) signalling the government's commitment to inflation control; 5) providing a robust mechanism to assess real rate expectations through break-even inflation; 6) reducing fixed-rate bond supply, lowering their costs; and 7) offering tail risk protection to markets, aiding financial stability.

It is worth noting that the increase in T-bill issuance and the reduction in inflation-linked bond issuance occurred alongside a slight lengthening of the overall maturity profile for fixed-rate bonds. The share of fixed-rate bond issuances with tenors of 1 to 15 years in 2024 was around one percentage point lower than their average share in 2015-19. Meanwhile, the share with tenors exceeding 15 years increased by a similar margin in that period (Figure 1.4, Panel C). At the same time, the average ATM of the outstanding debt in OECD countries remained largely stable in 2024 at 8.1 years, higher than the pre-pandemic value of 7.7 years (Figure 1.4, Panel E).

Box 1.2. Recent revisions to annual issuance plans

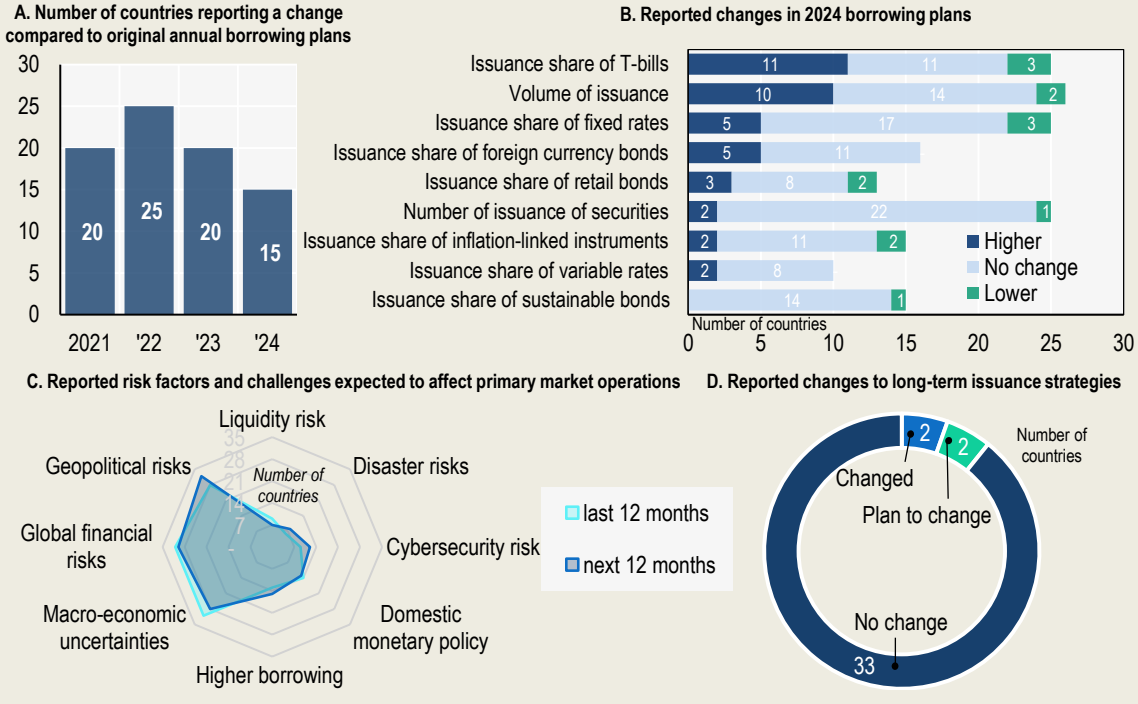
Sound public debt management involves transparency, predictability and flexibility. While being predictable and programmatic is a key principle that most debt managers adopt in their policies and practices (see Box 1.3), they also adapt to changes in the funding environment and investor sentiment. This includes revising their annual borrowing plans, which typically involves adjustments to accommodate changes in the financing requirement, instrument mix, maturity profile or timing of issuance. Frequent revisions are generally indicative of volatility in fiscal needs or market conditions.

The number of sovereign issuers reporting in year changes to their original annual borrowing plans decreased from 20 countries in 2023 to 15 in 2024 (Figure 1.5, Panel A). Over the past four years, this figure peaked at 25 in 2022 when inflation hit multi-decade highs and Russia started its war of aggression against Ukraine. These events altered borrowing needs and financial conditions in many countries.

In 2024, the most common factor impacting borrowing by sovereign issuers was geopolitical risks, followed by global financial and macro-economic uncertainty (Figure 1.5, Panel C). More specifically, the war in Ukraine and conflicts in the Middle East disrupted global trade and energy markets, putting upward pressure on inflation and changing macro-financial conditions (OECD, 2024[1]).

The most common revisions to borrowing plans involved increasing the issuance share of T-bills and changing overall issuance volumes (Figure 1.5, Panel B). Eleven issuers increased the T-bill share of gross borrowing in 2024 compared to their original issuance plans. Ten issuers adjusted their issuance volumes, indicating uncertainty about borrowing needs as DMOs calibrate their issuance plans to meet their annual borrowing target without knowingly over- or under-borrowing. Despite adjustments to their in-year plans, only a few countries revised their long-term strategies (Figure 1.5, Panel D).

Figure 1.5. Revisions to borrowing plans



Source: OECD Survey on Primary Market Developments 2024.

Issuance of fixed-rate bonds funded a greater share of net borrowing needs in 2024, but remained stable as a share of the outstanding debt stock

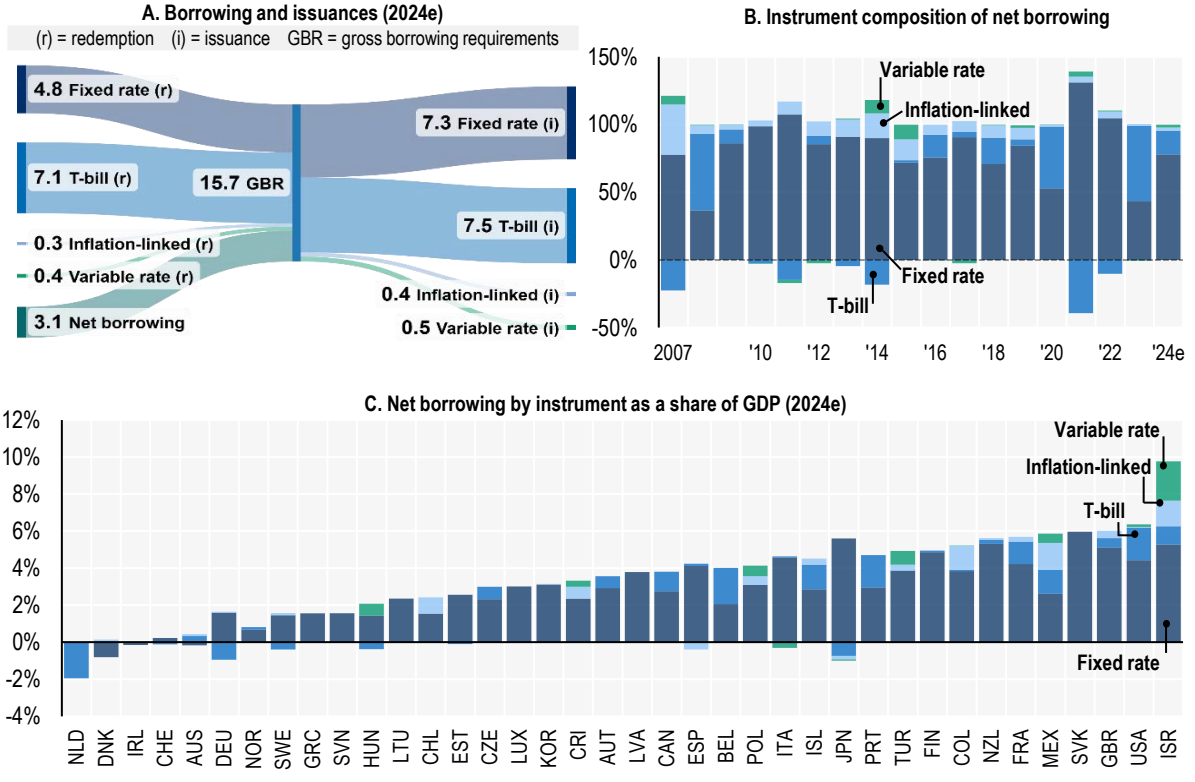
Assessing how issuance strategies affect the composition of the outstanding debt stock requires analysing each instrument's contribution to funding net borrowing requirements. Since many sovereign issuers aim to maintain specific instrument compositions within the debt stock, examining net borrowing by instrument composition offers valuable insights into issuance strategies and targeted debt stock composition.

Although the issuance of fixed-rate bonds funded a fairly low share of gross borrowing in 2024, issuance funded nearly double the share of net borrowing, rising from around 45% in 2023 to nearly 80% in 2024 (Figure 1.6, Panels A and B). This level is consistent with pre-pandemic figures. Meanwhile, T-bill issuance funded just 18% of net borrowing in 2024, compared to over 50% in 2023. This decline shows that high T-bill issuance shares are driven primarily by refinancing needs rather than funding a substantial share of net borrowing, as seen in 2020 during the pandemic and in 2023 amid major shifts in monetary policy.

This trend was widespread, with fixed-rate bond issuance funding more than 80% of net borrowing in most OECD countries in 2024 (Figure 1.6, Panel C). The average contributions of fixed-rate bond issuances to net borrowing rose from 81% in 2023 to 87% in 2024, while the median contribution decreased from 89% in 2023 to 85% in 2024. In several countries, including Germany and Japan, the high contribution of fixed-rate bonds to net borrowing coincided with negative net borrowing through T-bills, an issuance strategy that ultimately will lead to a higher fixed-rate bond share in the debt stock.

Figure 1.6. Instrument composition of net borrowing

The contribution of fixed-rate bond issuances to net borrowing significantly increased in 2024



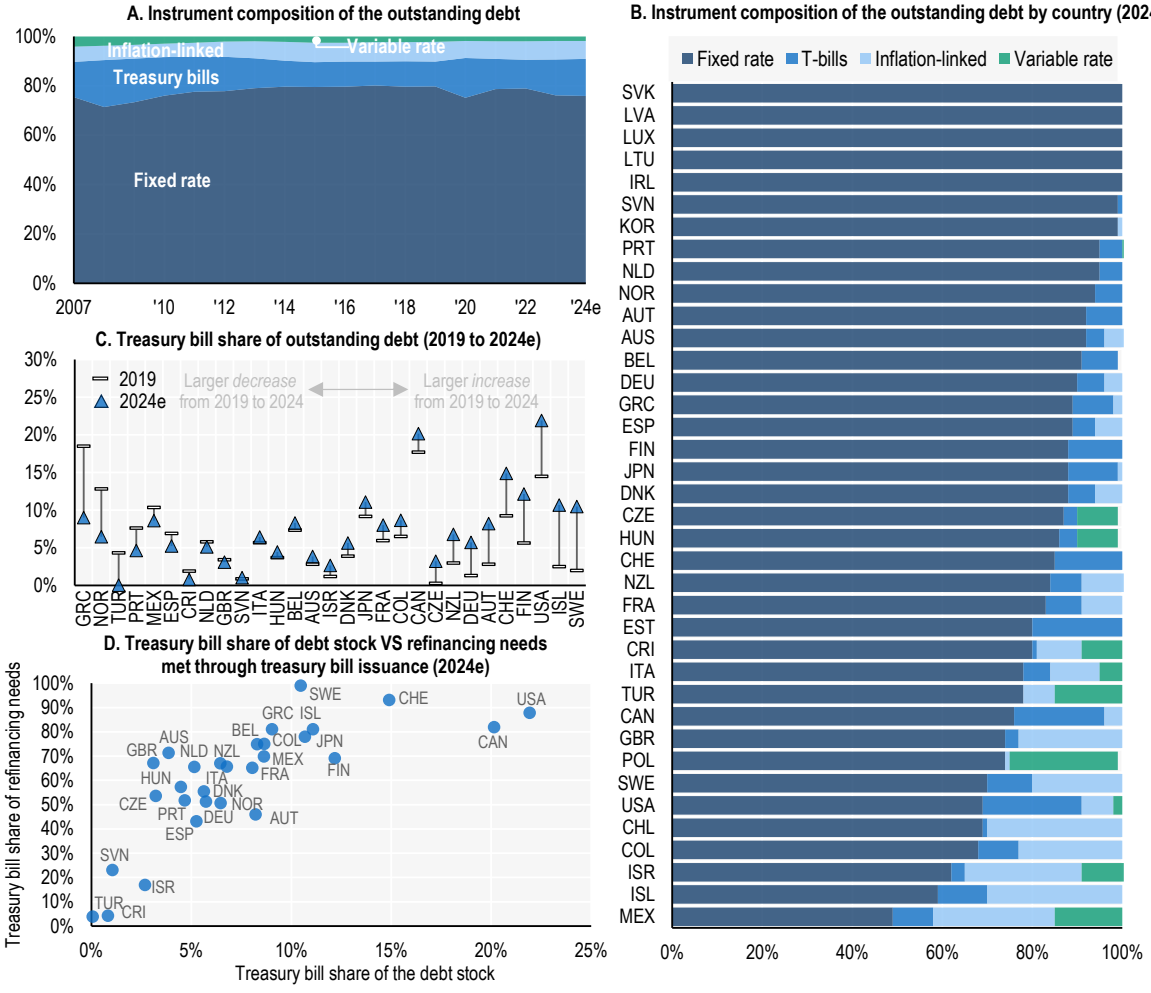
Note: "2024e" denotes estimations.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

At the same time, net issuances of inflation-linked bonds contributed to only about 2% of the total net borrowing in 2024, against an average of 10% in 2011-20. While aggregate issuances of these instruments exceeded redemptions in 2024, the net contribution was minimal during a year of high net borrowing needs.

An exception to both these trends is Israel, which significantly increased its issuance of both inflation-linked and variable-rate bonds to fund net borrowing in 2024, reducing reliance on fixed-rate bonds. Fixed-rate shares dropped from two-thirds in 2023 to just over half in 2024, with inflation-linked and variable-rate bonds funding 14% and 22% of net borrowing in 2024 against 8% and 14% in 2023. These instruments are particularly useful in times of heightened uncertainty, enabling issuers to meet borrowing needs without increasing investors' exposure to inflation or interest rate risk.

Figure 1.7. Instrument composition of outstanding debt

The fixed-rate share of outstanding debt remained largely stable in 2024, but the treasury bill share remained above pre-pandemic levels by a significant margin, increasing refinancing needs



Note: "2024e" denotes estimations. Panels C and D only include countries that regularly issue T-bills.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

As a result of these borrowing strategies, the fixed-rate bond share of the outstanding debt remained largely stable at 76% in 2024 with T-bills' share remaining at nearly 15% (Figure 1.7, Panel A). If a similar strategy to 2024 is adopted moving forward, the share of T-bills will stay above the past decade's 12% average, while the share of inflation-linked bonds will continue a gradual decline, approaching 7% in 2024, and not return to the pre-pandemic average of nearly 8%.

In 2024, T-bills accounted for the highest share of the outstanding debt stock since 2011 (with the exception of 2020). Since the pandemic-related surge in T-bill issuance in 2020, their share has never dipped much below 12%, whereas in 2015-19 it was around 10%. This trend of higher T-bill share is observed in about half of OECD countries or about two-thirds of those that regularly issue T-bills (Figure 1.7, Panel C). In six countries, namely Austria, Finland, Iceland, Sweden, Switzerland and the United States, the T-bill share of the debt stock remains more than five percentage points above 2019 levels. Despite this, fixed-rate bonds accounted for close to or over 70% of the debt stock in 35 OECD countries in 2024 (Figure 1.7, Panel B).

This persistently higher share of T-bills in the outstanding debt, compared to the pre-pandemic period, leads to elevated refinancing needs. Since T-bills are often rolled over multiple times annually, even a small increase in their outstanding amounts can significantly amplify refinancing requirements. In 2024, for regular T-bill issuers, T-bills accounted for 8% of outstanding debt on average but 60% of refinancing needs, excluding those issued and maturing within the same year (Figure 1.7, Panel D).[10] This necessitates more active cash management, including potentially having to maintain larger liquidity buffers and offering more T-bill lines to better spread redemptions throughout the year.

Sovereign borrowing costs across yield curves

Monetary easing and wider term spreads kept borrowing costs largely stable in 2024

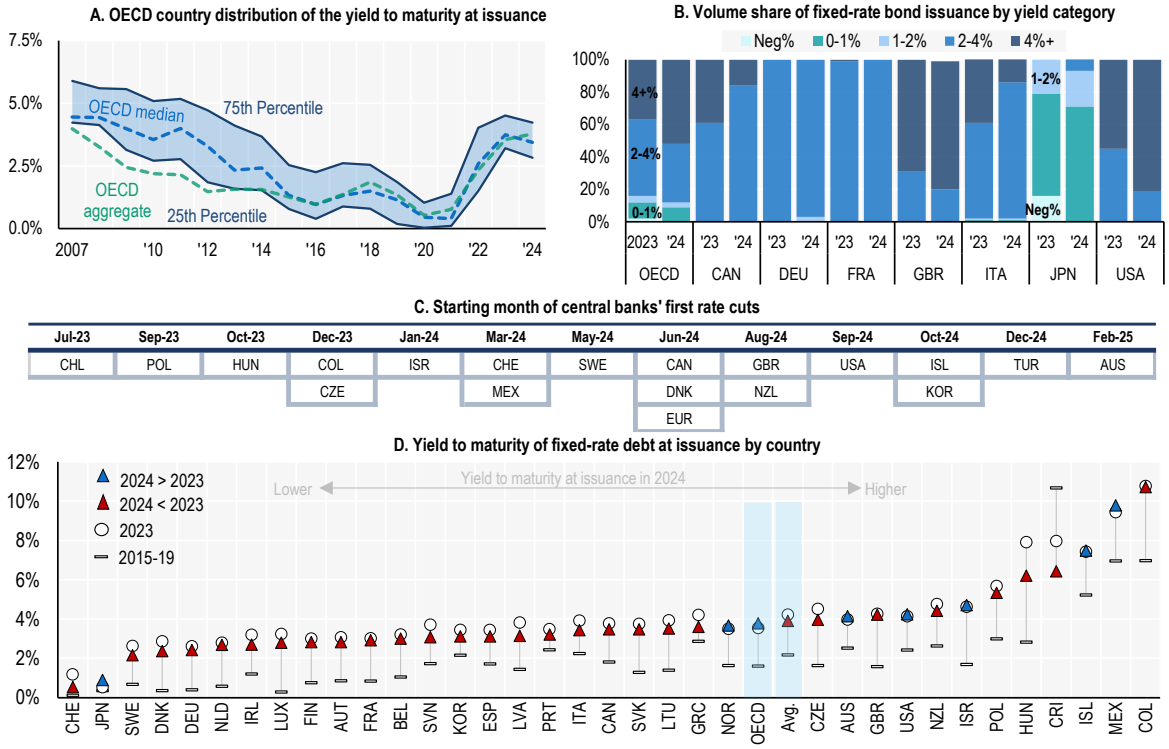
The volume-weighted average yield to maturity at issuance (YTM) for fixed-rate debt remained largely stable throughout 2024 in OECD countries, fluctuating around 4% (Figure 1.8, Panel A). While policy rates began to decline in most large OECD countries from mid-2024 (Figure 1.8, Panel C), they remained at recent peaks for about half of 2024. The notable exception was Japan, which raised its policy rate into positive territory in 2024 for the first time since 2010. Overall, aggregate borrowing costs in 2024 were similar to 2023 and exceeded 2015-19 averages in all OECD countries, except Costa Rica, by an average of 2 percentage points (Figure 1.8, Panel D).

Despite the relative stability in aggregate borrowing costs in 2024, borrowing costs have actually declined in 29 OECD countries and rose in only 8 (Figure 1.8, Panel D).[11] The countries whose borrowing costs fell were mostly European but also included Canada, Costa Rica, Korea and New Zealand. Borrowing costs remained largely stable in the United States but increased in Japan and Mexico. Notably, Japan did not issue bonds with negative rates in 2024 for the first time since 2015, and issued (30-year and 40-year) bonds with yields exceeding 2% for the first time since 2013 (Figure 1.8, Panel B).

In the euro area, 12 countries saw a greater decline in YTMs than Germany in 2024, leading to a narrowing of their spreads to Bunds. Notably, spreads tightened by more than 10 basis points in eight countries: Estonia, Greece, Ireland, Italy, Lithuania, Luxembourg, Latvia and Slovenia. During the same period, France saw its spreads widen by nearly 10 basis points, amid heightened political uncertainty and a need for sizeable fiscal consolidation (OECD, 2024[1]).

Figure 1.8. Yield to maturity at issuance

The yield to maturity at issuance remained largely stable in 2024 overall, but actually declined in the majority of OECD countries



Note: Panels A and D exclude Chile and Estonia due to data availability issues and Türkiye due to scaling problems. The OECD aggregate refers to the average yields weighted by the amount of fixed-rate borrowing.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

Movements in yields across OECD countries' sovereign curves were uneven, with shorter-term rates falling more than longer-term rates in 2024 (Figure 1.9, Panels A and B). The 2-year bond yield fell by over 10 basis points in 24 countries, rising only in Australia, Israel and Japan, with the average movement being a decline of approximately 50 basis points. Meanwhile, the 10-year bond yields fell by over 10 basis points in 18 countries but rose in Australia, Chile, Israel, Japan, the United Kingdom and the United States, with the average movement being a decrease of just under 20 basis points. As sovereigns typically issue right along their curves, but tend to concentrate issuance around the 10-year maturity, overall borrowing costs in 2024 declined only slightly from 2023, despite falling policy rates amid lower inflation expectations.

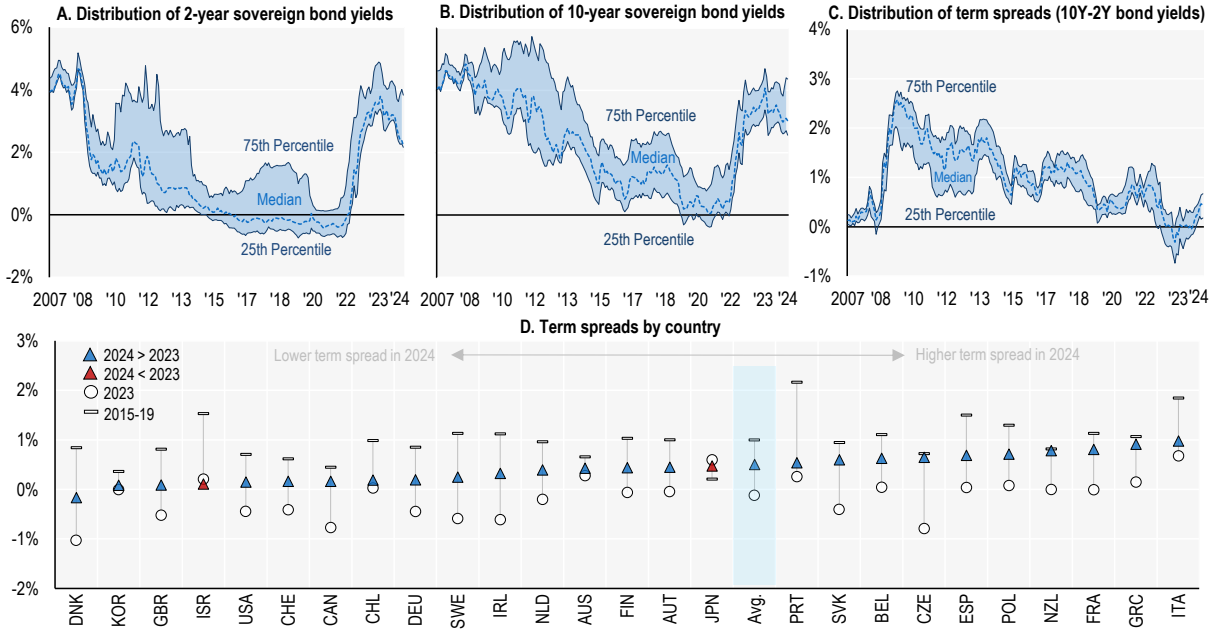
Consequently, term spreads — the difference between 10-year and 2-year bond yields — widened in 2024 across most OECD countries but remained near 15-year lows (Figure 1.9, Panel C).[12] Term spreads rose by an average of 60 basis points, narrowing only in Israel and Japan (Figure 1.9, Panel D). Moreover, while 17 countries had inverted yield curves in 2023, only the term spread in Denmark remained negative in 2024. Despite this widespread increase in term spreads in 2024, they remained below 2015-19 levels in all countries except Japan, averaging +100 basis points in 2015-19 compared to -20 and +40 basis points in 2023 and 2024, respectively.

For sovereign issuers, term spreads are key indicators of the price-for-duration risk and influence the trade-off between borrowing costs and refinancing risks. Steeper yield curves raise the cost of reducing refinancing risks. However, sovereign issuers rarely alter issuance strategies solely based on movements

in yields. Instead they tend to maintain stable issuances to develop liquid benchmarks along the yield curve that appeal to different investors. While limiting flexibility to adjust to market changes, this approach reduces liquidity premiums, lowering long-term borrowing costs (see Box 1.3).

Figure 1.9. Distribution of bond yields and term spreads

Term spreads turned positive in 2024 as 2-year bond yields fell more than 10-year yields in most OECD countries, but these spreads remain well below pre-pandemic levels and are still near a 15-year low



Note: Some countries are excluded due to data availability. Panels A, B and C include only the countries listed in Panel D. Annual values in Panel D refer to the average of the twelve end-of-month term spreads.
Source: LSEG and OECD calculations.

The persistence of higher long-term nominal and real rates indicates expectations of increased neutral interest rates

Increases in term spreads meant steeper yield curves for most major issuers in 2024 (Figure 1.10).[13] The curve in the United States was flat in 2024, whereas it was inverted in 2023. Japan's yield curve moved higher and steepened further. In the United Kingdom, short-term yields declined while long-term rates rose, though the curve remained inverted from the one to the three-year mark. Germany's yield curve shifted downwards and flattened, while France's curve steepened as short-term yields fell significantly while long-term yields remained largely unchanged. Italy's curve moved lower in a parallel shift. Despite some steepening in 2024, G7 yield curves remain flatter than in the pre-pandemic period.

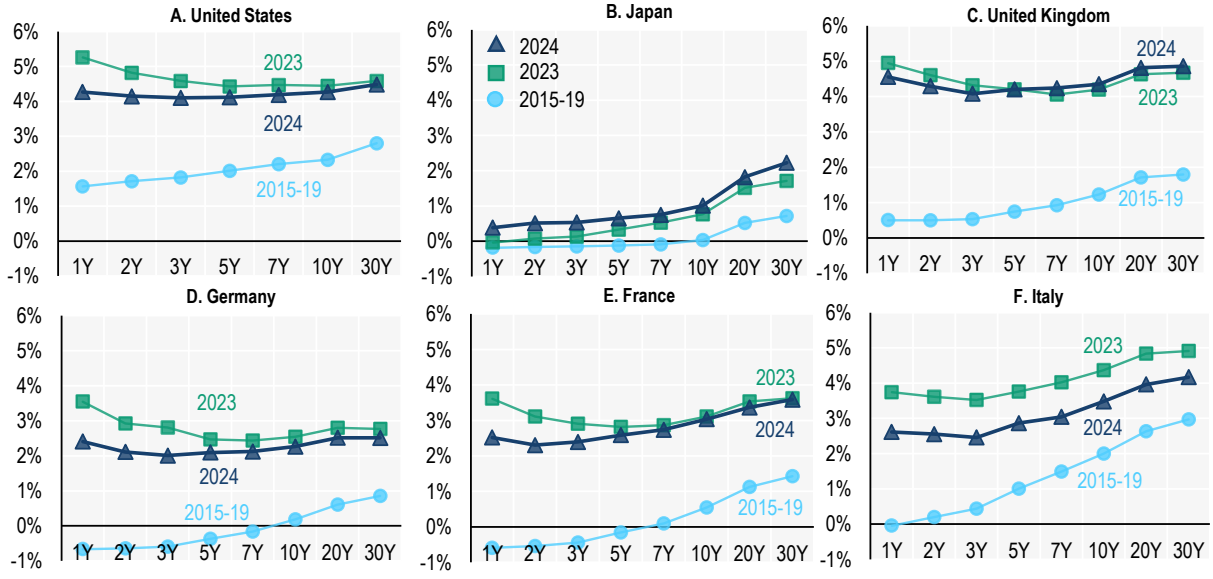
Notably, long-term rates in these six countries are much higher in 2024 than before the pandemic. This upward shift reflects a significant repricing of long-term macro-financial prospects. Potential drivers include a higher inflation premium following the recent period of historically high inflation, as well as other factors such as the resilience of US economic growth despite elevated interest rates (TBAC, 2025[14]).

A key driver of rising long-term yields is the market perception of the neutral rate of interest (r*) or its nominal equivalent, the terminal rate—the level to which policy rates are expected to converge over the long term.[14] Historically, neutral rates had been declining due to structural factors like ageing populations (Lunsford and West, 2019[15]), shifts in savings and investment patterns (Rachel and Summers, 2019[16])

and regulatory reforms (Ranaldo, Schaffner and Vasios, 2021[17]). However, in 2024, forward curves implied expectations of a higher neutral rate, reflecting the global economy's resilience during the tightening cycle and growing divergence among forecasters, indicating increased uncertainty (BIS, 2024[18]). Rising neutral rate expectations could influence sovereign borrowing costs.

Figure 1.10. Yield curves in selected countries

Yield curves became less inverted in 2024 as short-term rates fell, but yields remain well above pre-pandemic levels



Note: This chart shows the average daily yields over the last quarter of the year, unlike the annual averages presented in previous figures. For 2015-19, the values represent the average of the quarterly averages over the five years from 2015 to 2019. Country panels are arranged by GDP, with the three euro area countries placed in the same row to improve comparability. Annex 1.B has similar charts for more countries.
Source: LSEG and OECD calculations.

One implication of the increase in the neutral interest rate is the higher real cost of bond debt (real yields), measured as the difference between nominal rates and breakeven inflation.[15] Before the pandemic, 10-year real yields were mostly between -1% and 1%, but since 2023, they have fluctuated between 1% and 2% (Figure 1.11, Panel A). This rise reflects that nominal 10-year yields in 2024 were about two percentage points higher than pre-pandemic levels, while breakeven inflation increased by one percentage point over the same period (Figure 1.11, Panels C and D). As a result, real yields in 2024 exceeded pre-pandemic values in all OECD countries with breakeven inflation data except Japan, where they were largely unchanged, remaining in negative territory.[16]

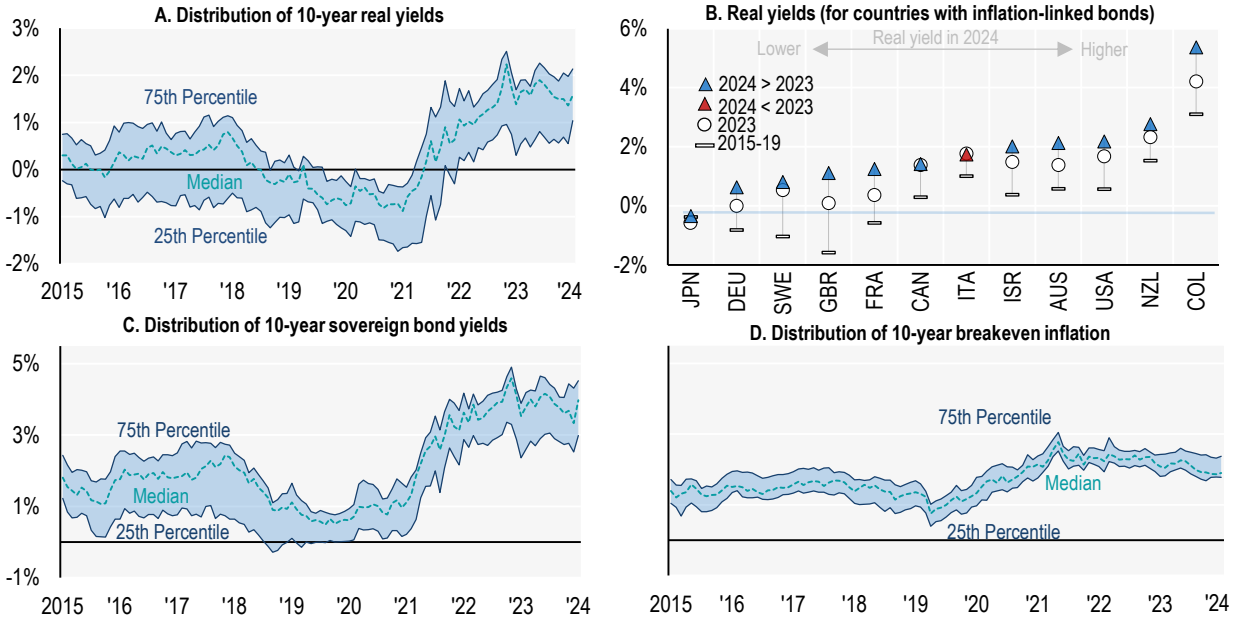
Ten-year real yields in 2024 were higher than both their 2015-19 averages and 2023 levels in all OECD countries with breakeven inflation data except Italy (Figure 1.11, Panel B). The increase in real rates in 2024 happened despite declining borrowing costs in most of these countries, which were driven by lower short-term rates, while long-term rates remained high or declined less than inflation expectations. While real rates increased in Germany and France, they remained stable in Italy in 2024, with narrower spreads to Bunds amid fiscal consolidation efforts and rising primary balances (OECD, 2024[1]).

Ten-year real yields were positive in 2024 in almost all these countries except Japan. Typically, positive real yields put upward pressure on debt-to-GDP trajectories by raising interest payments (OECD, 2024[13]). Although debt-to-GDP ratio trajectories improved in 2022-23 amid rising nominal yields, this was driven by inflation eroding the real value of outstanding debt — a dynamic that has been fading as inflation converges

to target. All other factors being equal, rising real rates will push up the primary balances required to stabilise debt levels in many OECD countries.

Figure 1.11. Distribution of ten-year real yields, nominal yields and breakeven inflation

Real yields remain near decade highs as ten-year rates stay elevated while break-even inflation gradually declines



Note: This figure only includes countries with sufficient break-even inflation data, as listed in Panel B. Annual values in Panel B refer to the average of the monthly average real yields.
Source: LSEG and OECD calculations.

Interest payments and their impact on debt-to-GDP ratio dynamics

Interest payment-to-GDP ratios continued to rise in 2024 and will rise further if borrowing costs remain high

In 2024, the gross interest payments-to-GDP ratio continued to rise, reaching 3.3%, up from 3.0% in 2023 and 2.7% in 2015-19, reaching the highest level since 2010 (Figure 1.12, Panel A). As a result, OECD countries are projected to allocate a larger share of government revenue to interest payments in 2024 than to several major government functions combined, including defence and housing (Figure 1.12, Panel B).[17]

In terms of country-specific trends, interest payments to GDP ratios are expected to have increased in 24 OECD countries in 2024 (Figure 1.12, Panel C). The largest increases, exceeding 0.3 percentage points of GDP, were observed in Belgium, Czechia, Finland, Poland and the United States. Except for Czechia, all these countries had net borrowing needs as a share of GDP above the OECD average and median.

Interest payments-to-GDP ratios declined by more than one percentage point in three countries in 2024: Iceland, Norway, and the United Kingdom.[18] In Norway, low net borrowing needs in recent years have led to lower interest payments. In Iceland and the United Kingdom, where inflation-linked bonds make up a significant share of debt, declining inflation was an important factor behind lower interest payments.

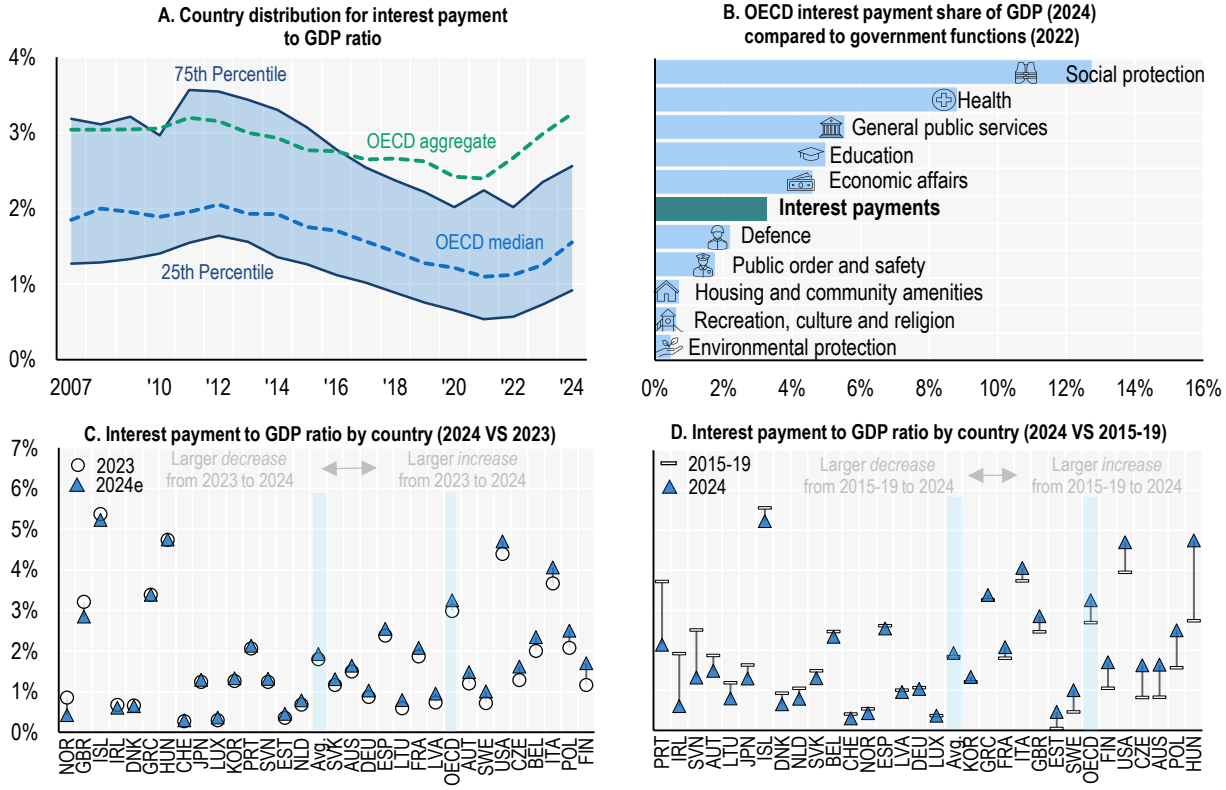
Despite an increase in interest payments-to-GDP ratios in most OECD countries in 2024, these ratios were only higher compared to 2015-19 in about half of countries (Figure 1.12, Panel D).[19] The median ratio was

around 1.5% in 2024, similar to the pre-pandemic period from 2015-19. There were only seven countries, Australia, Czechia, Finland, Hungary, Poland, Sweden and the United States, where this ratio rose by more than 0.5 percentage points of GDP in 2024 compared to the 2015-19 average. This group comprises four countries whose primary balances declined from an average of nearly zero in 2015-19 to -2% of GDP in 2022-24, compared to a decline from -1% to -2% in the OECD overall across the same period.

Therefore, for about half of OECD countries, the recent monetary tightening cycle has only partially reversed the reductions in interest payments-to-GDP ratios achieved during the second half of the past decade. These earlier declines stemmed from a combination of economic growth, lower primary deficits and falling long-term rates, particularly in the euro area following the launch of the European Central Bank's (ECB) quantitative easing programme in March 2015 (ECB, 2024[19]). Thus, interest payments-to-GDP ratios remain below historical highs in most OECD countries, but are projected to continue rising in the coming years.

Figure 1.12. Gross interest payments as a share of GDP

Interest payments as a share of GDP continued to rise in most OECD countries in 2024 but remained below pre-pandemic averages in about half of them



Note: This figure shows the values of general government and gross interest payments. Panels A and B include only countries with sufficient data in the OECD Economic Outlook, as shown in Panels C and D. The OECD aggregate in Panel A and the OECD value in Panels C and D represent the total general government interest payments divided by the total GDP of these countries.
Source: OECD System of National Accounts; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; and OECD calculations.

Movements in interest payments-to-GDP ratios are gradual because they reflect yields on the entire outstanding debt stock issued over decades. Even sharp increases in borrowing costs have a limited immediate impact, as they affect interest payments only through the refinancing or refixing of maturing

debt and new issuances. However, the slow-moving nature of debt interest costs also has the opposite impact, with bonds issued at higher rates locking in elevated interest payments for their entire lifespan and, particularly for longer maturities, impacting public finances for decades to come. While the financing costs for short-term, variable-rate, and inflation-linked debt already reflect the higher rate and inflation environment, most fixed-rate debt issued before 2022 has yet to be refinanced. If, as projected, it is mostly refinanced at higher rates, this will put further pressure on public finances.

Additionally, (nominal) effective interest rates (the ratio of interest payments to the outstanding debt stock) are expected to rise even in a hypothetical scenario where countries generate sufficient primary surpluses to avoid refinancing maturing debt. This is because debt issued at low rates before and during the pandemic will mature earlier than debt issued under the current higher-rate environment (Figure 1.13, Panel A). More precisely, bonds with yields below 1% accounted for around 40% of the total outstanding fixed-rate debt in 2022-23, nearly 30% in 2024, and are projected to account for 17% by 2030.[20] Conversely, bonds with yields above 4% comprised just over 5% of total fixed-rate debt in 2022-23, 13% in 2024, but are projected to account for nearly 20% in 2030.[21]

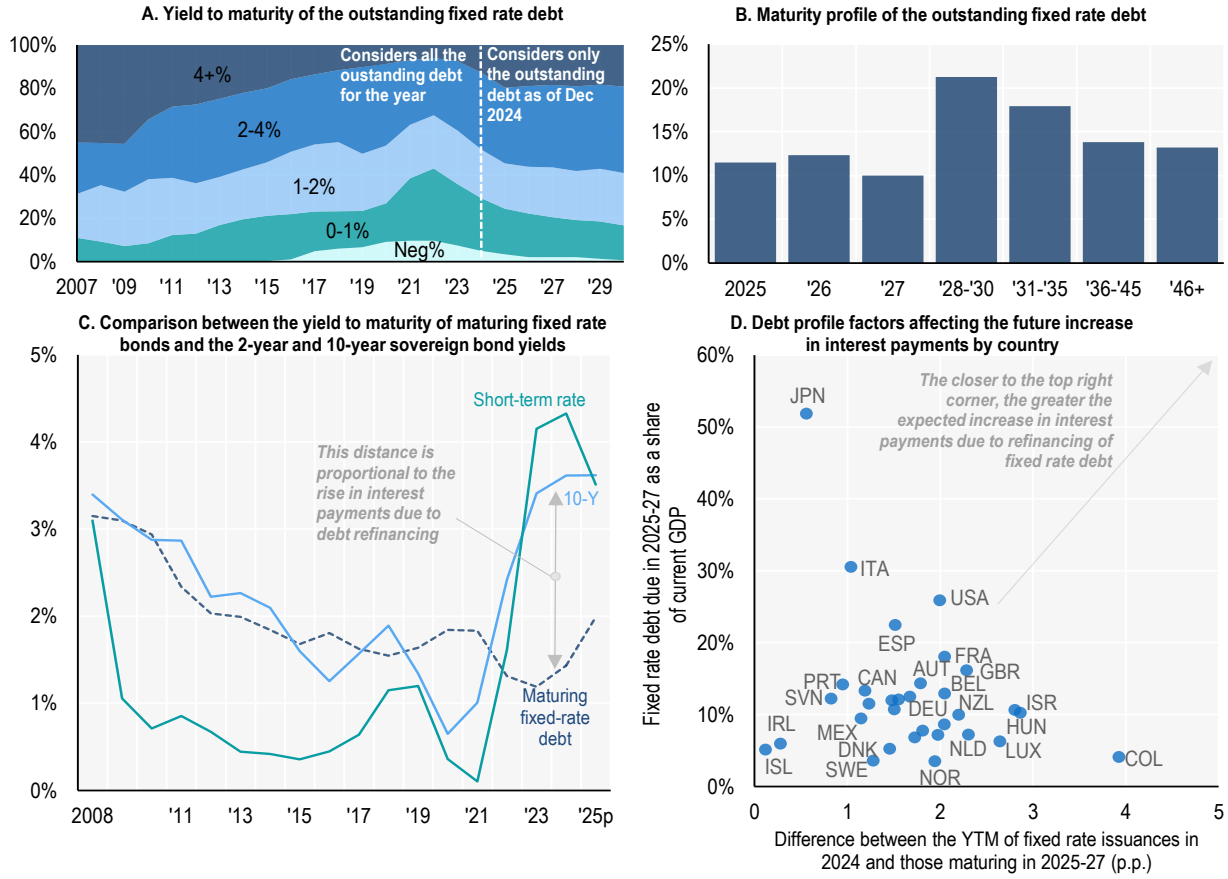
Without substantial primary surpluses, about one-third of the outstanding fixed-rate debt in the OECD as of 2024 is expected to mature by 2027 and will likely be refinanced at higher rates (Figure 1.13, Panel B). Sovereign issuers maintain regular issuances across the curve to ensure a smooth redemption profile, which spreads out refinancing obligations fairly evenly over the next few years. As a result, around 10% of the outstanding fixed-rate debt stock is expected to mature each year until 2030, without any significant spikes in maturities or refinancing risks in a single year.

Around 60% of the fixed-rate debt in the OECD that will mature by 2027 (approximately USD 9 trillion) was issued in 2021 or earlier, before the recent tightening cycle, most likely at yields below current market rates. Specifically, the average YTM of the maturing debt in 2025-27, weighted by outstanding amounts, remains below 2% in all three years. By comparison, the average of the projected 10-year interest rate in OECD countries is expected to remain around 3.6% in 2025 (Figure 1.13, Panel C). The debt maturing in 2025-27 will, therefore, likely be refinanced at nearly twice the original rates.[22]

The rise in interest payments from debt refinancing in the coming years will differ depending on the share of fixed-rate debt maturing relative to GDP and the gap between prevailing market rates and rates on maturing debt (Figure 1.13, Panel D). Four countries — France, Spain, the United Kingdom and the United States — face heightened vulnerability, with the debt maturing by 2027 exceeding 15% of their current GDP and the average yield-to-maturity on debt issued in 2024 surpassing that of this maturing debt by over 1.5 percentage points. For these countries, debt refinancing is expected to increase interest payments by roughly 0.4 percentage points of GDP by 2027. In other OECD countries, the average increase is projected to remain below 0.2 percentage points of GDP.

Figure 1.13. Yields, maturity profile and interest payments

Interest payments are set to rise further as market yields are expected to remain higher than the coupons on maturing debt



Note: This figure shows general government values and only displays countries with sufficient data in the OECD Economic Outlook. Short-term rates have varying definitions across countries but generally refer to 3-month bank rates. Panel D includes only the country labels of the countries that are "on the border" of the distribution, as including all labels would hinder the visualisation of the data points. 10-Y refers to 10-year sovereign bond yields.

Source: OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; and OECD calculations.

With higher interest costs, the debt-to-GDP ratio increased for the first time since 2020

Higher projected interest payments, combined with primary deficits above pre-pandemic levels, pushed up the central government marketable debt-to-GDP ratio from 82% in 2023 to 84% in 2024. It is projected to rise further to 85% in 2025 (Figure 1.1, Panel D, and Figure 1.14, Panel A). This marks a turning point in debt-to-GDP trends, which were largely stable or growing slowly in the five years before the pandemic and either stable or declining in the years immediately after, between 2021 and 2023.

These recent changes in debt-to-GDP dynamics are largely driven by movements in effective real interest rates (the combined effects of nominal rates and inflation) and primary balances. In 2015-19, real interest rates had a near-zero impact on debt ratios, while the effects of primary deficits were largely offset by growth, stabilising debt trajectories (Figure 1.14, Panels A and D). In 2021-23, higher primary deficits were outweighed by negative real rates, as inflation far exceeded borrowing costs (Figure 1.14, Panel E). In 2024-25, nominal effective rates are expected to rise as more debt is issued at higher rates, while debt

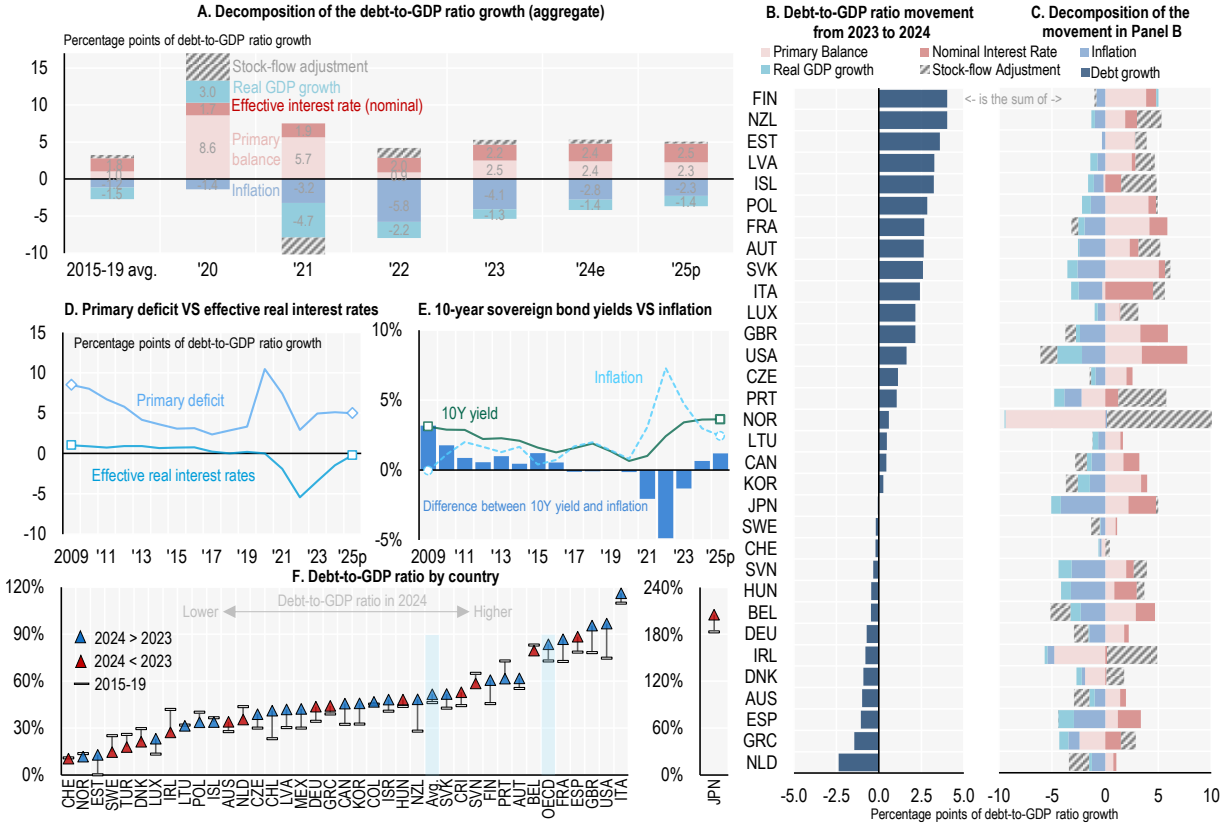
issued when rates were lower matures, and inflation converges towards targets. This shift will result in a scenario with both positive real effective rates and a high primary deficit relative to pre-pandemic levels, driving the debt ratio upward.

This movement in the aggregate debt-to-GDP ratio in the OECD reflects an increase in ratios in 23 OECD countries in 2024 against a decrease in 15. Cross-country differences were primarily driven by variations in nominal effective interest rates and primary balances (Figure 1.14, Panels B and C). In countries with rising ratios, primary balances and nominal interest rates added an average 1.6 and 1.2 percentage points of GDP to these ratios respectively, compared to 0.4 and 1 percentage points in countries where the ratio fell. The negative effects of growth and inflation on debt ratios were similar across both groups at 0.6 and around 1.5 percentage points of GDP.

Of the eight countries that had the largest increases in debt-to-GDP in 2024, five are geographically close to conflicts (Figure 1.14, Panel B). Israel saw the highest increase, exceeding seven percentage points of GDP. Estonia, Finland, Latvia and Poland, close to the conflict in Ukraine, were also significantly affected, with primary deficits contributing over 2.5 percentage points to their debt ratios—well above the 0.8 percentage point average for other OECD countries.

Figure 1.14. Decomposition of debt-to-GDP ratios

Deficits and rising effective interest rates are expected to offset the downward impacts of inflation and growth effects on debt ratios in 2024-25



Note: The decomposition of debt-to-GDP ratios combined central and general government information and only includes countries with the necessary data available in the OECD Economic Outlook for computations. Details can be found in Annex 1.A. The OECD in Panel F represents the sum of the outstanding marketable debt of the central government divided by the sum of GDP.

Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; and OECD calculations.

This rise in debt-to-GDP ratios in most OECD countries in 2024, combined with substantial increases in 2020, has led to increases of over five percentage points of GDP in 25 OECD countries since 2019 (Figure 1.14, Panel F). Debt-to-GDP ratios were at least 20 percentage points higher in 2024 than in 2019 in Japan, New Zealand and the United States. In contrast, debt ratios declined over the same period in 13 OECD countries - all European and collectively accounting for less than 4% of the OECD's outstanding marketable debt in 2024.[23]

The ability of debt management offices to influence interest payments and debt-to-GDP trajectories is limited. Their primary policy lever is the design of borrowing strategies which aim to minimise long-term costs while managing risks. To achieve this, sound debt management practices promote transparency and predictability, which help lower costs by securing liquidity premiums for the issuer. Box 1.3 examines how debt management offices have pursued this strategy and its implications for their ability to adjust issuance plans to react to changes in funding conditions that affect interest payments and debt-to-GDP trajectories.

Box 1.3. How and why sovereign issuers pursue regular and predictable issuance strategies

Given the recent rise in interest payments in most OECD countries, the issuance strategies of many sovereign issuers have come under greater scrutiny. Key criticisms include failing to lock in lower financing costs by issuing at longer maturities or not borrowing in excess of requirements when rates were lower, which could have mitigated the impact of higher rates on interest payments. As frequent borrowers, sovereign issuers focus on minimising costs and managing risks over the *long-term* by following a predictable and regular issuance strategy with a certain degree of flexibility. This box explains how this strategy works.

A predictable and regular issuance strategy consists of several key components. First, sovereign issuers enhance transparency by publishing borrowing plans and auction calendars in advance, in some cases including tentative auction sizes. Second, they issue regularly across a selection of maturity lines to support liquid benchmark yield curves. This involves reopening individual bond lines multiple times to increase their outstanding size before introducing new lines. Third, they ensure that issuance plans aim to meet the annual borrowing requirement each year, without deliberately over- or under-borrowing.

In addition to these practices, sovereign issuers aim to diversify their investor base to maintain stable demand. For most OECD issuers, this means issuing broadly across key maturities, helping to cover large borrowing needs while mitigating maturity concentration risk. Over-issuing in any particular segment of the curve can divert liquidity from other parts, potentially weakening future demand and conflicting with the long-term objectives of DMOs. It can also put pressure on security prices and increase underwriting risk, particularly for longer-dated bonds, as these tend to be more balance-sheet-intensive due to their higher duration.

The regular and predictable issuance strategy across the curve can increase demand for sovereign bonds and lower borrowing costs. This occurs through a reduction in liquidity premiums, making sovereign bond markets among the most liquid and least volatile markets. This approach requires adjustments to issuance strategies to be gradual, which is evident in the relative stability of auction sizes across issuers over time (Figure 1.15). Most changes aim at aligning issuance with borrowing requirements driven by fiscal needs. Adjustments to maturity or instrument composition are less common and are also typically done incrementally, by reducing the size of certain lines while simultaneously increasing others or by changing auction frequency. Substantial changes to planned auction sizes or dates are avoided to the extent possible, as they could signal instability or uncertainty to the market, potentially raising risk premiums and undermining investor confidence.

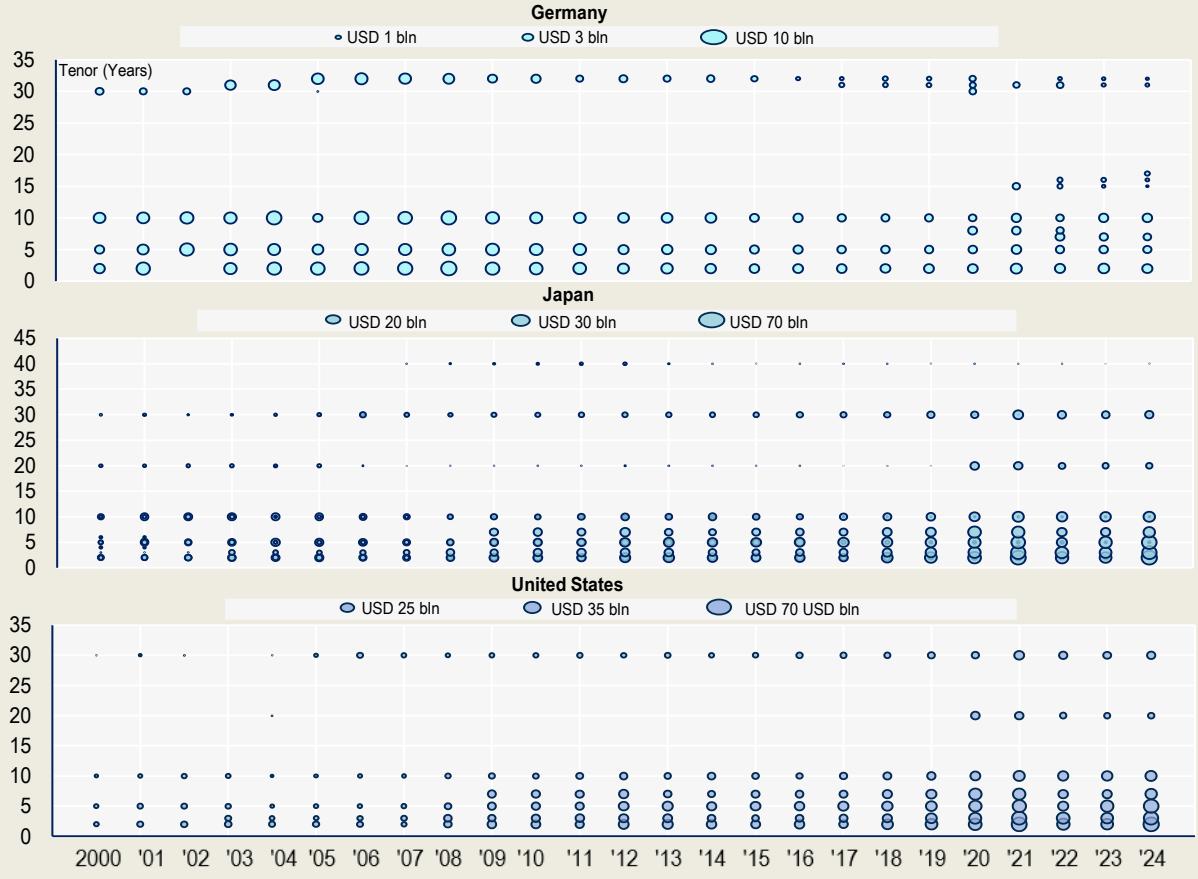
This strategy limits sovereign issuers' ability to significantly alter issuance strategies in response to changed funding conditions, as seen in recent years. Adjustments to annual issuance plans do occur

but are typically marginal and are a response to shifts in market conditions or borrowing needs. For example, in 2024, most OECD countries reported no modifications to various aspects of their issuance plans. Meanwhile, changes to long-term issuance strategies are typically rare – for instance only two OECD countries revised their long-term issuance strategies in 2024. Therefore, the ability to "lock in" lower financing costs in times of lower rates would require abandoning long-standing practices of being regular and predictable that have provided substantial *long-term* benefits.

Moreover, beyond the potential loss of credibility and negative effects on liquidity and pricing, any impact on borrowing costs from abrupt changes in issuance strategies would likely be minimal compared to external factors such as net borrowing needs and prevailing market conditions. Ultimately, the biggest drivers of borrowing costs are the overall borrowing requirement and market interest rates, both of which are largely determined by fiscal policy and expectations for future inflation levels and monetary policy.

Figure 1.15. Outstanding bond lines and average auction size

Sovereign issuers build liquid benchmarks and pursue a regular issuance strategy



Note: This Figure only includes fixed-rate bonds Annex 1.C plots the same figure for additional countries.
Source: LSEG and OECD calculations.

Sovereign debt investor base amid ongoing quantitative tightening

Quantitative tightening and high net borrowing have led to a record high volume of sovereign bonds to be absorbed by the market

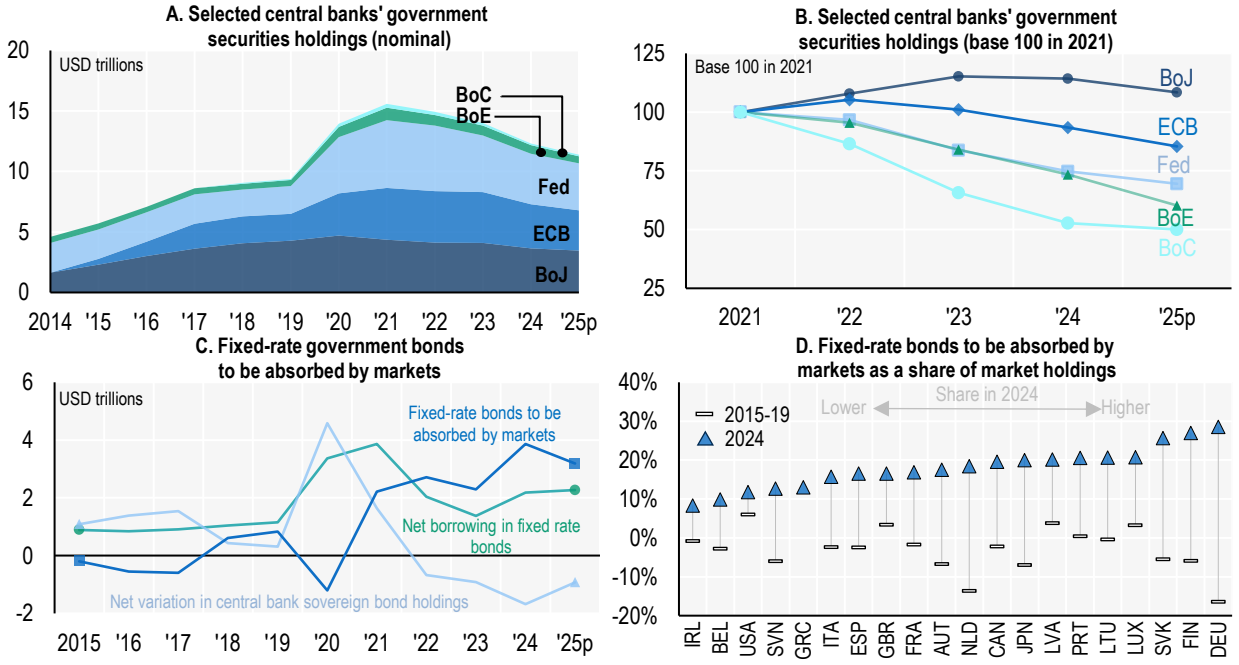
Central bank holdings of domestic sovereign bonds, which reached a historic high of nearly USD 16 trillion in 2021, have declined to just slightly more than USD 12 trillion in 2024 and are projected to fall by an additional USD 1 trillion in 2025 (Figure 1.16, Panel A). Central banks differ widely in their strategies to reduce these holdings, with some actively selling bonds and others partially or fully refraining from reinvesting proceeds from maturing bonds. Annex 1.D presents a summary of QT policies in selected OECD countries.

The pace of decline in sovereign bond holdings varies significantly among major OECD central banks due to differing QT policies and bond maturity profiles (Figure 1.16, Panel B).[24] The Bank of Canada is projected to reduce its holdings by nearly 50% between its peak in 2021 and the end of its QT programme in 2025, the steepest decline among major central banks in that period. This is followed by the Bank of England at 40%, the Federal Reserve at 30%, and the ECB at 15% during the same period. The Bank of Japan, which announced its QT programme in mid-2024, is expected to reduce its sovereign bond holdings by roughly 7-8% by March 2026 (Bank of Japan, 2024[20]). It is worth noting that the pace of QT programmes has changed in the past and can change again going forward, with these projections for 2025 incorporating the available information on QT policies as of early 2025.

QT's main implication for sovereign issuers is the impact on the net supply of fixed-rate bonds that needs to be absorbed by markets, which is expected to exceed USD 3 trillion annually for the first time in 2024-25 (Figure 1.16, Panel C). In comparison, net market absorption of fixed-rate bonds averaged zero in 2015-19; was negative in 2020 with QE programmes more than offsetting the absorption of record high pandemic-related net borrowing, and exceeded USD 2 trillion annually in 2021-23 with some central banks ceasing bond purchases and starting QT.

Figure 1.16. Central banks' holdings of domestic government securities and fixed-rate bonds to be absorbed by the market

A record volume of fixed-rate bonds has been absorbed by the market as investors bought bonds previously on central banks' balance sheets



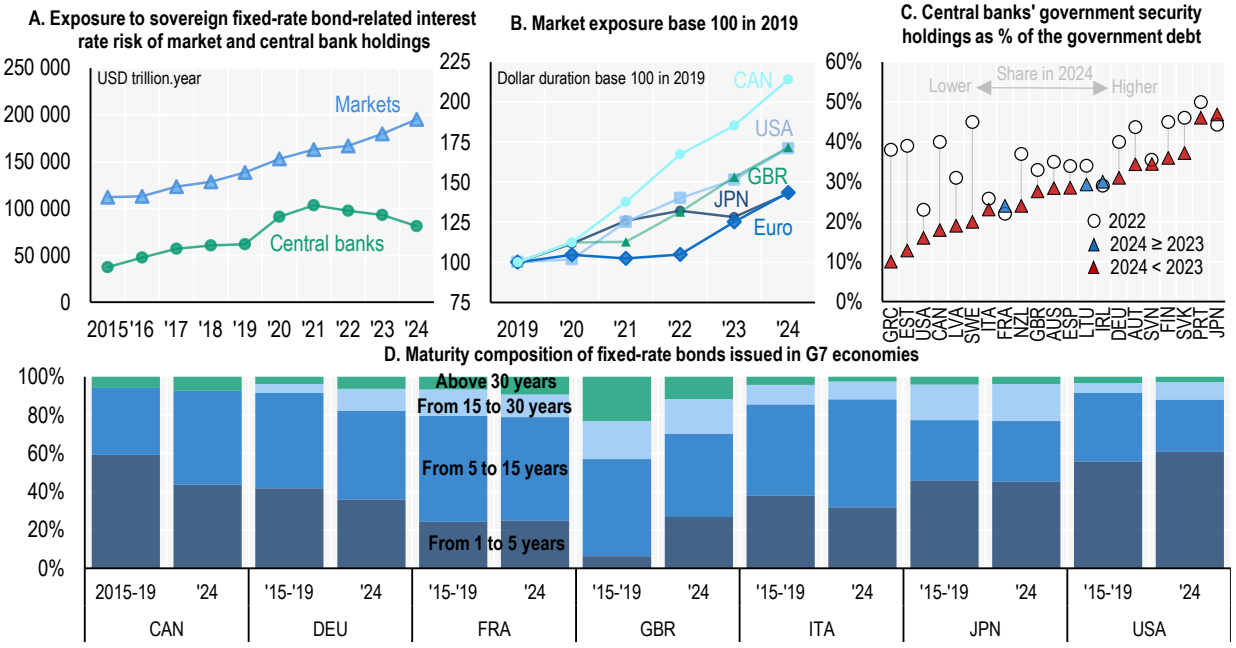
Note: The 2025 values are forecasts based on the pace published on central bank websites and their maturity profiles. Panel B begins in 2021, the year when central banks' sovereign bond holdings peaked in Canada, the United Kingdom and the United States. Panels C and D cover only countries under the monetary policies of the central banks listed in Panels A and B, representing 93% of OECD central government marketable debt in 2024. Panel D uses OECD survey data as of June 2024 and includes only countries with significant central bank holdings. ECB holdings reflect only those under the PSPP and PEPP programmes.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; Bank of Canada; Bank of England; Bank of Japan; European Central Bank; Federal Reserve website; and OECD calculations.

This trend of higher net supply of fixed-rate bonds needing to be absorbed by markets is widespread, affecting all 20 countries analysed. In 2015-19, the annual average net supply absorbed by the market was negative in 14 of these countries (Figure 1.16, Panel D), leading to a decline in market holdings of sovereign bonds over those five years. In contrast, in 2024, markets absorbed on average 18% of their holdings in new sovereign fixed-rate bonds. In 19 of the 20 countries, the fixed-rate bonds to be absorbed by the market as a share of market holdings was at least 10% in 2024. Hence, market participants now have a higher interest rate risk exposure.

The dollar duration of fixed-rate bond holdings of the market, which measures market exposure to interest rate risks, rose by approximately 75% from 2015 to 2024 (Figure 1.17, Panel A). This means that an increase in yields in 2024 would have had nearly twice the negative impact on the market value of fixed-rate sovereign bond market holdings than it would have had in 2015. For example, a 1% parallel shift higher in yields across the curve in 2015 would have reduced the mark-to-market value of sovereign bonds held by the market by approximately USD 1 trillion, but by around USD 1.75 trillion in 2024.

Figure 1.17. Exposure to interest rate risk, central banks' holdings and maturity composition of fixed-rate debt

Market exposure to fixed-rate bond-related interest rate risk has risen significantly



Note: Dollar duration is used to aggregate outstanding debt stocks that consist of bonds with different maturities. It measures the approximate sensitivity of a bond portfolio's value to small changes in interest rates. Specifically, it approximates how much the portfolio's value would decrease in absolute dollar terms for a one percentage point rise in interest rates. For example, a portfolio with a dollar duration of USD 10 billion would lose USD 100 million in value if interest rates increase by one percentage point (1% multiplied by USD 10 billion). The dollar duration calculations presented here are approximate: Due to the unavailability of secondary market data for all bonds, the duration of each bond was computed using the yield to maturity of the last primary market issuance. All panels cover only countries under the monetary policies of the central banks listed in Panel B, representing 93% of OECD central government outstanding marketable debt. Of these central banks, only the Bank of England has been actively selling bonds, while the others have been following a passive approach to reduce their balance sheets.
Source: 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; 2023 and 2024 OECD Survey on Liquidity in Government Bond Secondary Markets; LSEG; national authorities' websites; Bank of Canada; Bank of England; Bank of Japan; European Central Bank; Federal Reserve website; and OECD calculations.

This rise in market exposure to interest rate risk has varied significantly across countries, with the largest increases since 2019 observed in Canada, the United Kingdom and the United States (Figure 1.17, Panel B). In these countries, dollar duration grew by more than 50% from 2019 to 2024. By contrast, the increase was more modest in the euro area and Japan, reflecting the relatively lower net borrowing needs in these regions and either slower-paced QT programmes (euro area) or later adoption (Japan).

Higher market exposure to interest rate risk can stretch investor appetite for higher-duration bonds and might, therefore, compel issuers to shorten their issuance profile. For instance, from 2019 to 2024, the share of T-bills in the outstanding debt stock rose more in Canada and the United States (where market duration exposure rose the most) than in most euro area countries and Japan (Figure 1.7, Panel C). In the United Kingdom, where the issuance share of T-bills declined during this period, the proportion of fixed-rate bonds with maturities exceeding 30 years dropped sharply, from roughly one quarter in 2015-19 to around 12% in 2024. This decline was offset by increased issuance of fixed-rate bonds with tenors of one to five years (Figure 1.17, Panel D).

The duration risk on central bank balance sheets can also affect sovereign issuers, with central bank losses prompting the suspension of profit remittances, or even indemnification in a few OECD countries (OECD, 2024[13]). Recently, higher interest rates have led to central bank losses by increasing the cost of interest-bearing liabilities and reducing the value of their bond holdings, particularly in cases where central banks have engaged in QE and/or used mark-to-market accounting. These losses halted profit remittances to governments and required indemnification by central governments in some countries. Such outcomes can impact fiscal positions and potentially increase borrowing needs.

Central banks still hold significant sovereign bond portfolios, and uncertainty remains over the endpoint for current QT programmes, which is one of the main factors affecting market duration exposure. Central banks' sovereign bond holdings in 2024 accounted for about one-fifth of total outstanding sovereign debt on average across a selection of countries (Figure 1.17, Panel A). Although some market participants, such as in the United States, anticipate that this cycle of central bank balance sheet reduction will conclude sometime between mid-2025 and early 2026 (TBAC, 2025[14]), only Canada's and Sweden's central banks have currently announced a planned endpoint for their QT programmes, in March 2025 and the end of 2025, respectively (Bank of Canada, 2025[21]; Sveriges Riksbank, 2024[22]).

Price-sensitive investors now hold a larger share of the sovereign debt outstanding

In recent years, while central bank holdings of domestic sovereign debt have decreased, the share held by households and foreign investors has risen. In 25 selected OECD countries, representing nearly 90% of OECD central government outstanding marketable debt in 2024, central bank holdings fell from 29% in 2021 to 19% in 2024 (Figure 1.18, Panel A).[25] Meanwhile, the households' share increased from 5% to 11%, and the foreign investors' share rose from 29% to 34%.

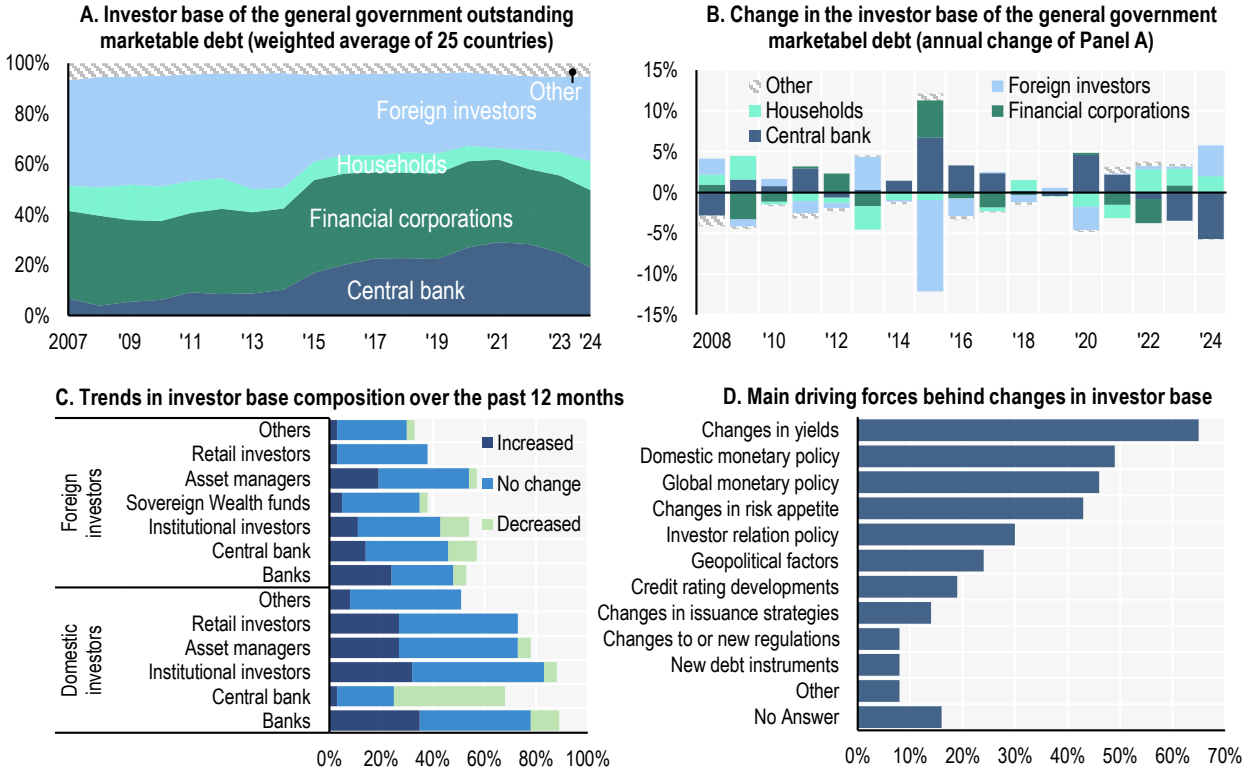
Initially, households absorbed much of the net increase in sovereign bond supply, with foreign investors stepping in later. Households helped offset declining shares from financial corporations and central banks in 2022, and from central banks in 2023 and 2024, absorbing the equivalent of one-third of the reduction in central bank holdings in 2024 (Figure 1.18, Panel B). Foreign investors began increasing their share more significantly in 2024, when they absorbed much of the increase in net supply in 2024. Their current share still remains similar to or even below pre-pandemic levels, as the recent increase offsets the decline in their holdings during the pandemic and the period just after.

Both households and foreign investors from the private sector are considered to be more price-sensitive, with their continued demand likely dependent on relative yield levels. In many countries, households were drawn to sovereign bonds by retail-targeted products offered by DMOs, looking to utilise higher savings post-pandemic amid low returns on bank deposits (Box 1.4). Foreign investors include official sector demand for foreign reserves, banks, and asset managers, with the latter being particularly price-sensitive and generally attracted to higher yields (Figure 1.18, Panels C and D).

Price-sensitive investors look for relatively higher yields. These can increase term spreads and limit the pass-through of lower policy rates to longer-term rates. Precise investor preferences depend on risk appetite, liabilities, and investment horizons, leading to preferences for specific yield curve segments. Higher bond supply in specific segments thereby tends to cheapen bond prices. The elevated supply of long-term bonds, driven by QT and high net borrowing, has raised yields in that segment. Consequently, empirical estimates of term premia have risen significantly in 2024 (Villeroy de Galhau, 2025[23]). This weakens the impact of interest rate cuts on long-term rates with long end yields sometimes rising in response to policy rate cuts.

Figure 1.18. Investor base composition

Households have absorbed a major share of central banks' domestic bond holdings since 2022, with foreign investors following in 2024



Note: Values refer to general government marketable debt as of Q2 2024 for Japan and Q3 2024 for others. Households include Non-Profit Institutions Serving Households. Panels A and B include 25 countries with nearly 90% of OECD central government marketable debt in 2024 – these are the countries listed in the next figure. In Panels C and D, survey answers are displayed as a share of the respondents to the questions.
Source: 2024 Survey on Liquidity in Government Bond Secondary Markets; 2024 OECD Survey on Central Government Marketable Debt and Borrowing; OECD (2024[1]), OECD Economic Outlook, Volume 2024 Issue 2, No. 116, https://doi.org/10.1787/d8814e8b-en; LSEG; national authorities' websites; Bank of Canada; Bank of Japan; European Central Bank; Federal Reserve website; and OECD calculations.

Geopolitical factors can influence sovereign debt markets and macro-fiscal dynamics in at least two ways. First, supply shocks from conflicts could fuel inflation, prompting monetary tightening. In today's environment of record-high market exposure to duration risk, this could stretch duration appetite, forcing sovereign issuers to shift issuance to shorter maturities or pay higher term premiums. Second, geopolitical tensions could reduce demand for sovereign bonds from non-politically aligned countries. For example, roughly one-third of euro area sovereign debt held by foreign investors comes from such countries, posing risks, especially for issuers whose bonds are not considered to be 'safe-haven' assets (Hudecz, Lauwers and Mimir, 2024[24]).

Country-specific data shows that since the introduction of QT programmes, the increase in foreign investors' holdings has offset the fall in central bank holdings of domestic sovereign bonds in more countries than household holdings did (Figure 1.19). Between June 2022 and June 2024, foreign investors' share of sovereign debt grew by more than one percentage point in 16 of the 25 countries analysed, and by over five percentage points in 8 of them. By contrast, the household share rose by more than one percentage point in 6 countries, exceeding five percentage points only in Italy and the United States (Box 1.4) in the same period.[26] Thus, the increase in the household share exceeding that of foreign investors in aggregate is primarily due to increased household demand in these two large issuers.

Box 1.4. Selected cases of heightened retail demand for sovereign bonds in 2022-24

Several sovereign issuers have sought to better capture retail demand during the last couple of years against the backdrop of higher gross borrowing requirements, positive real yields, and quantitative tightening. The number of OECD countries running retail programmes increased from 14 in 2019 to 18 in 2024, the highest since the global financial crisis. Over the last year, retail bonds were the most newly introduced type of bonds, along with sustainable bonds. Consequently, the share of outstanding debt held by retail investors increased significantly in several OECD countries.

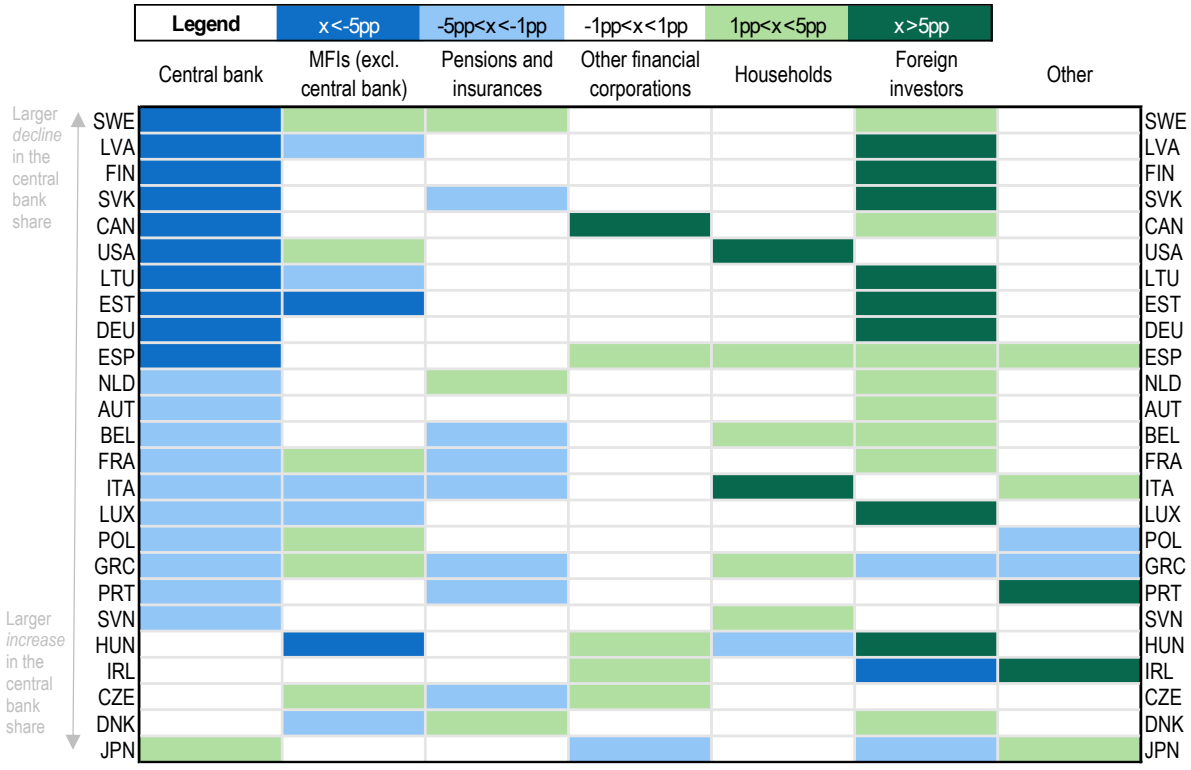
- **Belgium** and **Italy** have long-standing retail programmes that have attracted renewed interest via the issuance of new products. In Belgium, the successful issuance of the first one-year retail bonds in 2023 was done in part to stimulate competition in the savings market, with rates rising on products offered by the private sector following the issuance. This is one of the reasons retail demand was weaker in 2024. Meanwhile, Italy is now among the OECD countries with the highest share of sovereign debt held by households (around 14%) after Hungary and the United States, following successful issuances of new retail products since the COVID-19 pandemic.
- **Greece** and **Spain** have no retail programmes or products, but retail investors can participate directly in auctions. Greece introduced this option only recently, and it is limited to T-bills, while in Spain this is done via a well-established facility managed by the central bank. The retail share of the Greek debt stock increased from 1% in 2022 to 4% in 2024. In Spain, the retail share of gross borrowings increased from 0% in 2021 to 9% in 2023, with retail investors holding 40% of all outstanding Spanish T-bills as of July 2024.
- **Slovenia** issued its first-ever sovereign retail product in 2024 to help meet higher funding needs due in part to post-flooding reconstruction. The country also has a high level of domestic savings. The issuance aimed to increase investor base diversification by boosting domestic funding, increasing retail investors' interest in capital markets, and offering an attractive alternative to commercial bank deposits. The issuance size was slightly higher than the initially planned amount, highlighting the demand from retail investors for sovereign debt.
- The **United States** was one of the countries with the highest retail demand for sovereign debt over recent years. The share of outstanding debt held by retail increased from 12% in 2022 to 15% in 2024. Demand was mostly for marketable bonds despite the availability of non-marketable retail products.

Source: Foxall, S. and Policino, L. (2025[25]), "Sovereign Retail Debt Programmes and Instruments: A review of country practices", OECD Working Papers on Sovereign Borrowing and Public Debt Management, No. 10, https://doi.org/10.1787/e2a782d0-en.

While household shares grew in countries offering retail-targeted products or programmes, foreign investors significantly expanded their holdings, primarily in smaller markets where QT is taking place. On average, QT reduced central bank holdings of sovereign bonds by about 10 percentage points between 2022 and 2024 (Figure 1.17, Panel C). However, declines that exceeded this average were concentrated amongst a few smaller issuers, which account for only 2% of total sovereign debt in the OECD.[27]

Figure 1.19. Changes in investor base composition between June 2022-June 2024

Foreign investors absorbed the reduction in central bank holdings in most euro area countries, while household absorption was more prominent in a few countries that have retail programmes or products



Note: Values refer to the general government marketable debt. MFIs refer to Monetary Financial Institutions. "Other financial corporations" include pension funds and insurance companies for Canada and Japan.
Source: Bank of Canada; Bank of England; Bank of Japan; European Central Bank; Federal Reserve; and OECD calculations.

Liquidity in sovereign bonds and related markets

Liquidity is back to pre-pandemic levels, but volatility remains high

Ample liquidity is crucial for the smooth functioning of markets and the effective implementation of sovereign issuers' strategies. When liquidity is low, trading costs rise as transactions can cause significant price fluctuations. Conversely, liquid markets can accommodate larger borrowing volumes with minimal impact on prices, allowing debt managers to execute funding strategies efficiently, even amid macro-financial uncertainty or volatility in borrowing needs.

In 2024, liquidity in sovereign bond markets was reported to have improved in 40% of OECD countries, making this the second consecutive year where an increased share of countries reported an improvement. 40% is also the highest level reported since 2018, the beginning of the series (Figure 1.20, Panel A). This followed significant deterioration in liquidity during the monetary tightening cycle that began in 2022. Improved liquidity is evident in the narrowing of bid-ask spreads, a key indicator of reduced transaction costs and greater market efficiency (Figure 1.20, Panel B).[28]

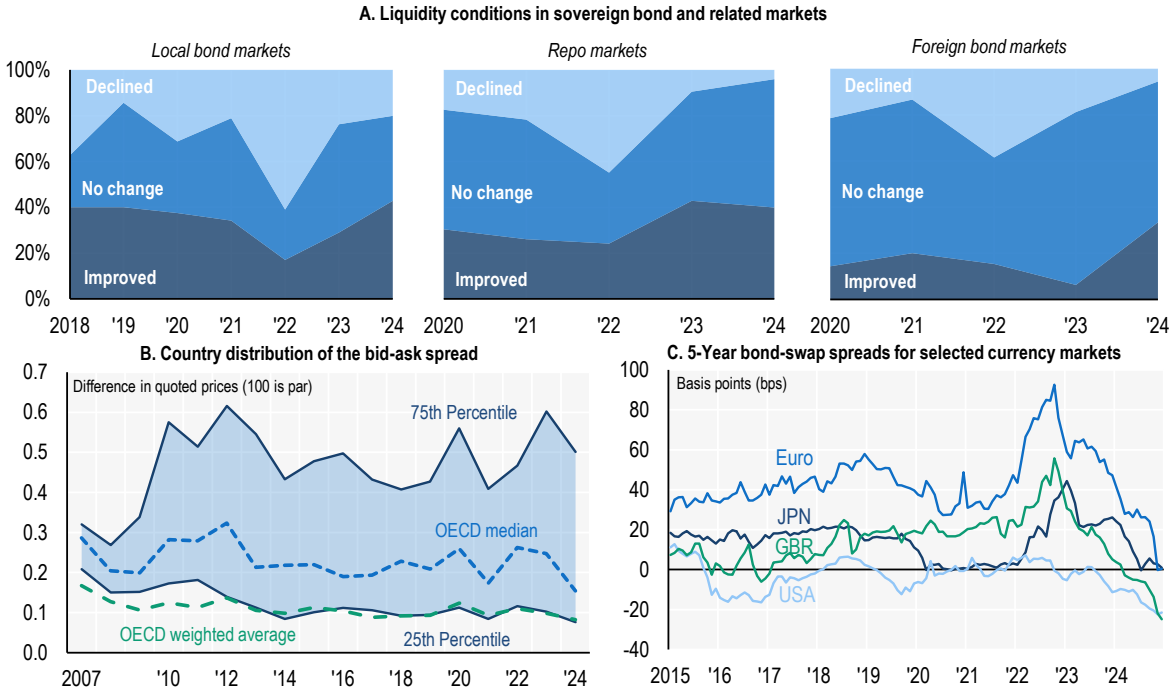
Liquidity in the repo and foreign bond markets for domestic sovereign securities has improved in over one-third of OECD countries, with a record-low number of countries reporting declines (Figure 1.20, Panel A).

The growing share of foreign investors in sovereign debt holdings across several countries underscores the importance of robust liquidity in foreign bond markets (Figure 1.19).

Repo markets serve two vital functions in sovereign bond markets. In the primary market, repo allows primary dealers to fund their bids at bond auctions and their underwriting positions in syndicated bond issues at a reasonable cost, thereby providing cheaper and less risky access to the capital markets for issuers. In the secondary market, they help ensure liquidity by enabling market-makers to offer 'immediacy' to investors by continuously quoting prices at which they are committed to trade on demand. In many countries, banks have traditionally served as primary dealers, while in a few cases, non-bank institutions also fulfill this role (e.g. Canada, Germany and the US).

Figure 1.20. Liquidity conditions, bid-ask spreads and five-year bond-swap spreads

While liquidity has improved in sovereign bonds and related markets, bond-swap spreads have dropped to decade-low levels



Note: Panel B includes all OECD countries except Estonia, Korea, Latvia and Lithuania due to unavailability of data. The swap spread in Panel C is the difference between the fixed-rate leg of a 5-year interest rate swap and the yield of a 5-year sovereign bond.
Source: 2018-2024 Survey on Liquidity in Government Bond Secondary Markets, LSEG and OECD calculations.

Derivative markets are also essential to primary dealers' intermediation activities. Primary dealers and other market participants rely on interest-rate swaps and future contracts to hedge market risk. Swaps convert fixed-income flows into floating-rate ones, thereby neutralising the duration risk of bond holdings. By offsetting declines in the mark-to-market value of bonds caused by rising interest rates, swaps help mitigate potential losses.

Despite improved sovereign bond and repo market liquidity, balance sheet constraints remain challenging for primary dealers, with around 40% of debt management offices in OECD countries reporting concerns over their profitability.[29] Stricter post-global financial crisis regulatory requirements under Basel III (see Box 1.5 for the US case) and record-high duration risk exposure from sovereign bonds (Figure 1.17) have raised primary dealers' warehousing costs. During QE programmes, central banks absorbed significant

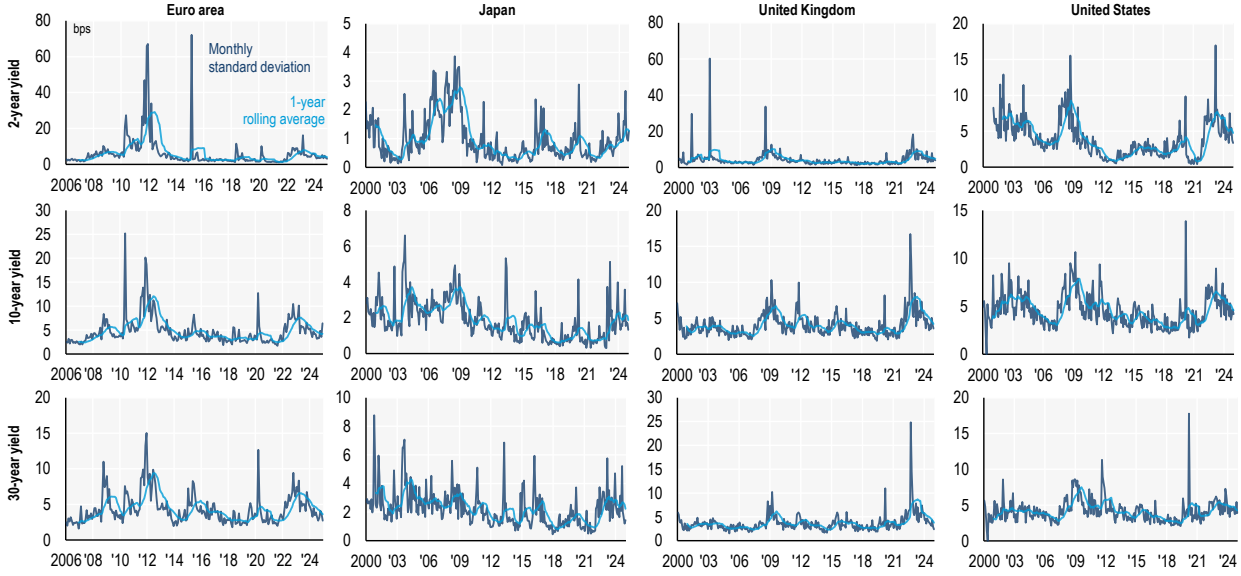
sovereign bond volumes in the secondary market, reducing market volatility and easing primary dealers' operations. As central banks have shifted to QT, primary dealers must, at least temporarily, warehouse a larger volume of bonds, increasing their nominal capital requirements. Without additional capital, they face opportunity costs for deploying more of their limited balance sheets to market making in sovereign bonds.

These rising balance sheet costs are reflected in historically low and even negative bond-swap spreads in some markets (Figure 1.20, Panel C). As there is an arbitrage relation between swaps and government bonds, swap rates and bond yields should not normally deviate much, while frequently being positive because of bonds' collateral value. Negative spreads are relatively uncommon and signal pressures in government debt absorption. By entering swaps paying fixed rates below the yields on their bond holdings, primary dealers hedge market (mostly duration) risk and can earn profits to offset the opportunity costs associated with allocating their balance sheets to sovereign bonds (BIS, 2024[18]). Additionally, primary dealers might offload inventories to more price-sensitive market participants, such as hedge funds, at significant discounts, thereby depressing market prices. These actors are then partially taking over the warehousing role that is traditionally undertaken by primary dealers.

Market volatility, which surged with the start of the monetary tightening cycle in 2022, remains above pre-pandemic levels across various countries and maturities (Figure 1.21). This is also evidenced by sharp yield movements in response to adverse events (Gomez-Cram, Kung and Lustig, 2024[26]). Heightened volatility has been affected by geopolitical and macro-financial uncertainty. Geopolitical tensions, including Russia's full-scale invasion of Ukraine and the conflict in the Middle East, have disrupted global trade and energy markets, pushing up energy prices and inflation, altering the macro-economic environment (OECD, 2024[1]). These challenges are compounded by elevated debt-to-GDP ratios, leading to reduced fiscal capacity to absorb shocks.

Figure 1.21. Market volatility in bond yields for selected countries and maturities

Secondary market volatility remains above pre-pandemic levels across various countries and maturities



Source: LSEG and OECD calculations.

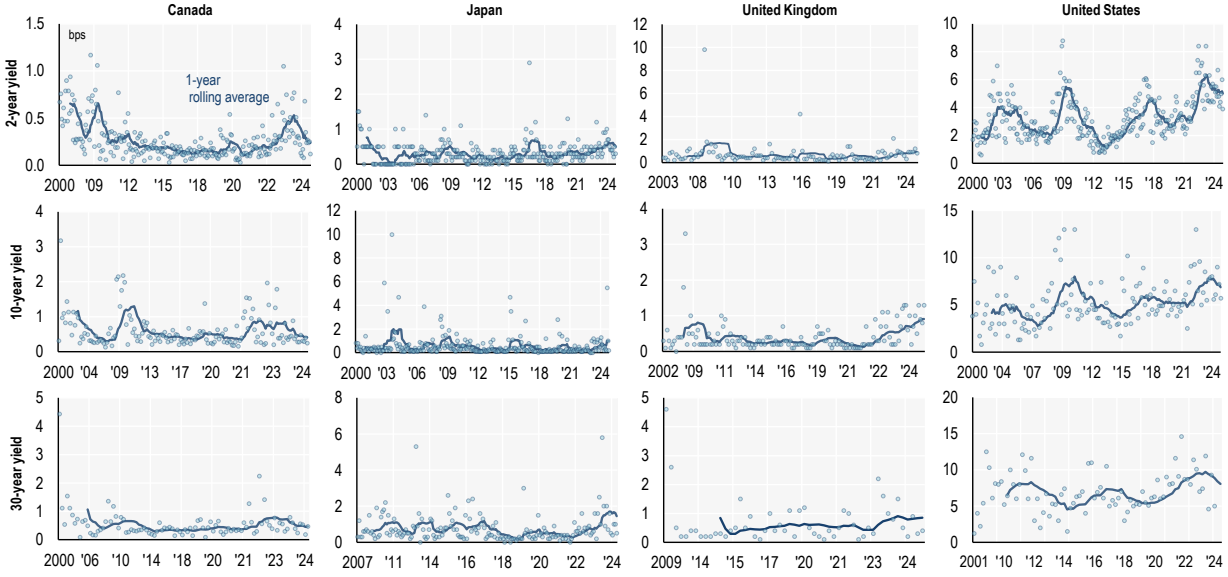
One potential implication of heightened volatility for sovereign issuers is an increase in auction tails. Auction tails measure the difference between the yield associated with the average accepted price and the yield associated with the lowest accepted price at multi-price auctions. They are, therefore, key indicators

of demand and market functioning. Larger tails reflect a wider range of bids, indicating divergence among market participants in pricing bonds, and suggest uncertainty or mixed market sentiment. In contrast, a small or non-existent tail implies favourable market conditions, with greater certainty about pricing and stronger, more uniform demand.

Auction tails, where reported, have generally risen across tenors for larger OECD issuers since the pandemic and remain significantly higher than levels over the past decade (Figure 1.22). This tends to reflect elevated uncertainty in price discovery and is often accompanied by underpricing (i.e. the issuer only being able to sell the securities at discounts compared to prevailing market prices). Thereby, increased volatility and uncertainty lead to higher issuance costs.[30]

Figure 1.22. Auction tails for selected countries

Auction tails were mostly higher in 2023-24 than in the period before the pandemic



Note: This figure includes only countries that publish auction results with sufficient detail to calculate auction tails. Each dot is an auction of a fixed-rate bond of the respective tenor. The differences in the years displayed are due to data availability. In the United Kingdom, the data encompasses the 5-year bond as the benchmark yield, instead of the 2-year bond.
Source: Official authorities' websites and OECD calculations.

Sovereign issuers have implemented several measures to enhance market liquidity, including structural changes and adoption of central clearance in some countries

Debt management offices implemented various measures to enhance market liquidity in 2024. This includes not only pursuing a regular and predictable issuance strategy but also various other measures (see Box 1.3). The most implemented measure in the OECD in 2024 was regularly tapping "on-the-run" securities (22 countries), ensuring the regular supply of actively traded bonds. Buyback and switch operations were also widely used (by 21 countries), allowing debt managers to smooth their redemption files and support market liquidity.[31] Ad hoc taps of "off-the-run" securities were conducted in 18 countries in 2024, providing additional liquidity in certain bonds when needed. Additionally, 11 countries utilised repos, reverse repos, or securities lending facilities to facilitate trading and strengthen market liquidity.

Box 1.5. Primary dealer balance sheet capacity in the United States

Primary dealers' (PDs) activities in both primary and secondary markets tend to increase with the amount of outstanding treasury securities, consistent with their roles as intermediation providers in the primary and secondary markets. In the primary market, PDs are required to participate in treasury auctions, while in the secondary market, they facilitate trading by taking bonds into their inventory and financing clients' purchases. In addition, they engage in repo markets to fund their operations and lend cash to clients.

As a result, the heightened supply of US Treasuries due to higher borrowing and QT has led to an expansion in PDs' market intermediation since mid-2022. This can be seen by both their increasing gross position in US Treasuries and their respective financing (Figure 1.23, Panel A). As the supply of bonds and the demand for trading them from market participants grows, PD balance sheets are likely to edge closer to their maximum capacity, which could limit their willingness to support the US Treasury market.

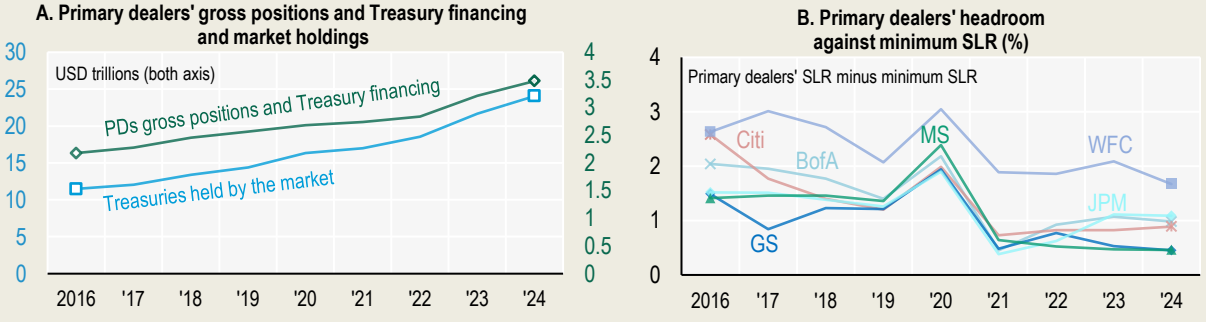
As most PDs are banks, they are constrained by regulatory capital constraints. The supplementary leverage ratio (SLR), established in 2014 as part of the Basel III reforms, has been the most binding requirement for PDs since the global financial crisis. It measures a bank's Tier 1 capital relative to its total leverage. It is particularly relevant for treasury market intermediation as it can impose a high regulatory capital requirement for a relatively low-risk but high-volume activity. Most PDs are subject to the minimum SLR of 5%, a requirement for those affiliated with US Global Systemically Important Banks.

Therefore, this higher supply of bonds and trading in the US Treasury market has increased the use of PDs' balance sheets for US Treasury operations and reduced their regulatory headroom. The headroom of the six largest PDs in US Treasuries against the minimum SLR has, since 2021, been lower compared to the pre-pandemic level (Figure 1.23, Panel B).

Reduced headroom for operations can amplify volatility spikes and increase market intermediation by other players, such as hedge funds. In times of stress, PDs may step back from intermediation before reaching these limits. Empirical evidence suggests that this impaired intermediation amplifies the yield response to net shifts in demand, increasing volatility, (Brauning and Stein, 2024[27]) and can lead to significant dysfunctionality in markets in times of crisis (Duffie and Van Tassel, 2023[28]). Moreover, if PD balance sheets are constrained, non-bank players such as hedge funds may need to step in, deploying repo leverage to assume positions like PDs. This could contribute to more volatility in the future.

Figure 1.23 US primary dealers' intermediation activity and headroom against the minimum SLR

Dealers are doing more intermediation in US Treasuries whilst headroom on their balance sheets is diminishing



Note: In Panel B, BofA, Citi, GS, JPM, MS and WFC respectively refer to BofA Securities, Citigroup Global Markets, Goldman Sachs, J.P. Morgan Securities, Morgan Stanley and Wells Fargo Securities. The headroom against minimum SLR is computed as the difference between each primary dealer and the minimum regulatory SLR. Data as of Q2 2024. Panel A as of July '24, panel B as of June '24.
Source: Federal Reserve and OECD calculations.

In addition to these measures, some sovereign issuers are putting in place structural changes to improve market transparency and efficiency. One example is the United States, where cash and repo transactions will be conducted exclusively via central clearing from December 2026 and June 2027, respectively (SEC, 2025[29]).[32] Enhancing the volume of centrally cleared transactions could help mitigate risks to market functioning by freeing up more of primary dealers' balance sheets and allowing all-to-all trading (OECD, 2024[13]). However, central clearing of all government bond and repo transactions would not fully eliminate financial market risk but rather change its nature with higher margin calls and challenges with one-sided flows that do not net out (Aquilina, Scheicher and Schrimpf, 2024[30]).

Another key area of structural reform is improving market transparency. These reforms aim to provide more comprehensive and higher-quality information on market trading—such as prices and positions—to support price discovery and risk management for market participants. Enhanced transparency would address common issues, including blind spots in specific market segments and fragmentation of market data. These challenges are particularly prevalent in sovereign bond markets due to the over-the-counter nature of trading and the reliance on primary dealers for intermediate trades, in contrast to the all-to-all trading model typically used in stock trading through exchanges.

More specifically, in terms of market transparency (and oversight), both the United States and the euro area conducted or plan to conduct changes. Reforms implemented in the United States Treasury market since 2020 have enhanced transparency by increasing the frequency and detail of trading data and expanding risk monitoring for hedge funds and repo transactions, while planned reforms focus on improving oversight of non-centrally cleared transactions and strengthening reporting on fund operations and trading practices.[33] In the euro area, the European Commission aims to enhance transparency in sovereign bond markets by strengthening pre- and post-trade data disclosure requirements, revising the deferral regime, and ensuring non-discriminatory access. These measures are designed to align with the implementation of the consolidated tape, which will provide a unified source of market data to improve transparency and accessibility (ESMA, 2024[31]) .

While increased transparency delivers benefits, a cautious and gradual approach is necessary given the impact of reforms and the fact that once they are implemented, reversing them could cause market dysfunctionalities. Some potential problems might arise due to the principal-client nature of sovereign bond markets. For instance, disclosing the volume data of trades in real-time could allow market participants to widen bid-ask spreads in anticipation of trades from a participant that has made a large operation. This is especially the case with primary dealers, which often warehouse the risk from large trades before redistributing it. This makes consultation with market participants, including debt management offices and primary dealers, as well as gradual implementation, key to calibrating the optimal level of transparency while preserving market efficiency.

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Annex 1.A. Methods and sources

Definitions and concepts used in the Sovereign Borrowing Outlook Survey

The Borrowing Outlook survey collects gross borrowing requirements, redemption and outstanding debt amounts with a breakdown of these items by maturity, currency, interest rate types and ESG-labelling (i.e. sustainable bonds). It also collects data on DMOs' holdings, NextGenerationEU loans and country-specific methodological aspects. It uses the core definition of sovereign debt, and central government marketable debt, mainly due to its comparability and collectability. This measure, directly linked to the central government budget financing, enabled the OECD to collect not only for realisations but also for estimates of government borrowing requirements, funding strategies, as well as outstanding debt with instruments, maturity and currency types.

Coverage of institutions: Central government

The coverage of institutions by debt statistics varies from public sector to central government. Public sector represents the broadest institutional coverage, as it includes local governments, state funds financial and non-financial public corporations as well as central government debt. The general government definition, which is used for example by the OECD System of National Accounts (SNA), consists of central government, state and local governments and social security funds controlled by these units. Central government covers all departments, offices, establishments and other bodies classified under general government, which are agencies or an instrument of the central authority of a country, except for separately organised social security funds or extra-budgetary funds. In terms of layers of coverage of institutions, central government stands out as the core definition. Debt of the central government is raised, managed and retired by the national DMOs on behalf of the central government. Hence, the advantage of this relatively narrow definition of debt is that it enables countries to provide comparable figures, in particular for the purpose of estimations.

Coverage of types of debt: Marketable debt

In terms of instruments, liabilities can be in the form of debt securities, loans, insurance, pensions and standardised guarantee schemes, currency and deposits, and other accounts payable. Debt items can be classified as marketable and non-marketable debt. While marketable debt is defined as financial securities and instruments that can be bought and sold in the secondary market, non-marketable debt is not transferable. For example, bonds and bills issued in capital markets are marketable debt; multilateral and bilateral loans from the official sector are non-marketable debt.

The Borrowing Outlook survey focuses on marketable debt instruments, while most government debt statistics (e.g. OECD SNA, EU Maastricht debt, and IMF Public Sector Debt Statistics) cover both marketable and non-marketable debt items. OECD governments are financed predominantly by marketable debt instruments. This is a central definition for every analysis concerning various issues around debt management including borrowing conditions, portfolio composition, investor preferences and market liquidity. An advantage of using this definition is to indicate to investors which instruments are available to trade in the secondary markets, and which are not. Another reason is to enable the issuer to calculate different characteristics of the debt, such as duration or time to maturity, which in the case of non-marketable debt would present a difficult issue.

Terminology

- The standardised gross borrowing requirement (GBR) for a year is equal to the net borrowing requirement during that year plus the redemptions of long-term instruments in the same year and the redemptions of short-term instruments issued in the previous year. Therefore, this indicator captures the issuances of all securities excluding those that were issued and redeemed in the same calendar year. In other words, the size of GBR in the calendar year amounts to how much the DMO needs to issue in nominal terms to fully pay back maturing debt issued in previous years plus the net cash borrowing requirement through any issuance mechanism.
- Net borrowing requirement (NBR) is the amount required to finance the current budget deficit. While the refinancing of redemptions is a matter of rolling over the same exposure as before, NBR refers to new exposure in the market, or new borrowing.
- Gross debt, or debt stock, corresponds to the outstanding debt issuance at the end of calendar years. This measure does not take the valuation effects from inflation and exchange rate movements; thus, it is equal to the total nominal amount that needs to be redeemed.
- Redemptions refer to the total amount of the principal repayments of the corresponding debt including the principal payments paid through buy-back operations in a calendar year.

Regional aggregates

- Total OECD area denotes the following 38 countries: Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, the United Kingdom and the United States.
- OECD accession candidate countries include Argentina, Brazil, Bulgaria, Croatia, Indonesia, Peru, Romania and Thailand.
- The G7 includes Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.
- The OECD euro area includes 17 countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, the Slovak Republic, Slovenia and Spain.
- The euro (EUR) is the official currency of 20 out of 27 EU Member States. These are collectively known as the euro area. The euro area countries are Austria, Belgium, Croatia, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, the Slovak Republic, Slovenia and Spain. In this report, the euro area covers only the countries that are simultaneously in the euro area and in the OECD.

Calculations and data sources

- For consistency reasons, estimates that are presented as a percentage of GDP use GDP estimates from the last OECD Economic Outlook in the previous year (i.e. December 2024 for this publication) and are calculated using nominal GDP data.
- Debt is measured as the nominal value of current outstanding central government debt. Nominal value, the undiscounted amount of principal to be repaid, does not change except when there is a new issue of an existing instrument. This coincides with the original promise (and therefore contractual obligation) of the issuer. DMOs often use face value when they report how much

nominal debt will mature in future periods. One important reason for using face value is that it is the standard market practice for quoting and trading specific volumes of a particular instrument.

- Currencies are converted into USD using the respective historical exchange rates, with the data sourced from London Stock Exchange Group (LSEG).
- All figures are expressed in calendar years unless specified otherwise.
- All statistics (e.g. median, averages) displayed in figures consider only the countries in the figure and may not include all OECD members.
- Aggregate figures for gross borrowing requirements (GBR), net borrowing requirements (NBR), central government marketable debt, redemptions, and debt maturing are compiled from answers to the Borrowing Survey. The OECD Secretariat inserted its own estimates/projections in cases of missing information for 2024 and 2025, using publicly available official information on redemptions and central government budget balances. Where government plans have been announced, but not incorporated into financing plans as of the end of December 2024, they are not included in the projections presented in this publication. Also, the latest estimates of government net lending in the OECD Economic Outlook database are used in estimating some missing data.
- Both the 2024 OECD Survey on Primary Market Developments and the 2024 OECD Survey on Liquidity in Secondary Government Bond Markets were carried out in October 2024.

Revised definitions

- Inflation-linked securities are instruments with coupon and/or principal payments that are linked to an inflation index. The data includes accrued inflation for all years up to and including the current year of the survey as of the reporting date.
- Variable rate notes have a floating or variable interest rate or coupon rate. It is a long-dated debt security whose coupon is refixed periodically on a “refix date” by reference to an independent interest rate index such as SONIA or Euribor. For example, medium and long-term floating rate notes (FRNs, colloquially known as floaters) are debt obligations with variable interest rates that are adjusted periodically (typically every one, three, or six months). The interest rate is usually fixed at a specified spread over one of the interest rate indices. For projections of variable rate debt, the rate at the level of the last settled coupon is used.
- Average term-to-maturity figures follow the same coverage described at the beginning of this Annex, with country-specific methods detailed below:
  - Germany: Calculation excluding holdings in own stock. Inflation-linked securities are weighted with 0.75.
  - Hungary: Data excludes retail securities, locally issued FX bonds, and loans and, since 2020, also excludes the non-marketable bonds issued to municipalities. Data includes cross-currency swaps.
  - Italy: Liabilities under the Support to Mitigate Unemployment Risks in an Emergency and Next Generation EU programmes (which would raise the figure to 7.4) are excluded.
  - Japan: The Ministry of Finance announces ATM, based on Fiscal Year, not Calendar Year. Figures from 2006 to 2023 exclude saving bonds. The figure for 2024 is estimated and includes saving bonds.
  - Netherlands: Figures are based on outstanding T-bills and bonds, and do not include outstanding commercial paper.
  - New Zealand: Figures include all New Zealand Government Bonds, T-bills and Euro-Commercial Paper computed using the exchange rate as of 31 December.

- Sweden: Time to maturity (uplifted amount at current exchange rate) figures include government bonds, inflation-linked bonds, public bonds, foreign currencies, green bonds and T-bills.
- United Kingdom: ATM is weighted by the nominal amounts outstanding of gilts and T-bills issued for debt management purposes, as of the reporting date. Nominal amounts of gilts include government holdings; nominal values of index-linked gilts also include accrued inflation as of the reporting date.

Debt decomposition model

Single countries

To compute the debt-decomposition of OECD countries, this chapter adopted the methodology outlined by Escolano (2010[32]) and used the equation below to capture the change in debt-to-GDP ratio between time t and t-1:

$$d - d_{(t-1)} = \frac{ip}{(1+y)} * d_{(t-1)} - \frac{\pi}{(1+y)} * d_{(t-1)} - \frac{g}{1+g} * d_{(t-1)} - pb + sf$$

Where:

- *d* is the central government debt stock from the Borrowing Survey expressed as a ratio to GDP from OECD (2024[1])
- *ip* is the effective interest rate, expressed as general government gross interest expenses from OECD (2024[1]) in time t as a ratio of *d* in time t-1
- *y* is the nominal GDP growth rate from OECD (2024[1]) between time t and t-1
- *π* is inflation, defined as the change in GDP deflator from OECD (2024[1]) between time t and t-1
- *g* is the real GDP growth rate from OECD (2024[1]) between time t and t-1
- *pb* is the general government's primary balance as a ratio of GDP, both from OECD (2024[1])
- *sf* denotes the stock-flow adjustments.

OECD area

For the OECD area decomposition, the following variables are used:

- *d* is the sum of each country's central government debt stock divided by the sum of each country's GDP
- *ip* is the sum of each country's general government gross interest payments divided by the sum of each country's *d* at time t-1
- *y* is the growth rate of the sum of each country's nominal GDP
- *π* is the sum of each country's *π*, weighted by GDP
- *g* is the sum of each country's *g*, weighted by GDP
- *pb* is the sum of each country's general government primary balance, divided by the sum of each country's GDP
- *sf* denotes the stock-flow adjustments

To compute OECD area values, country figures were converted into US dollars using the year-end exchange rates, sourced from LSEG.

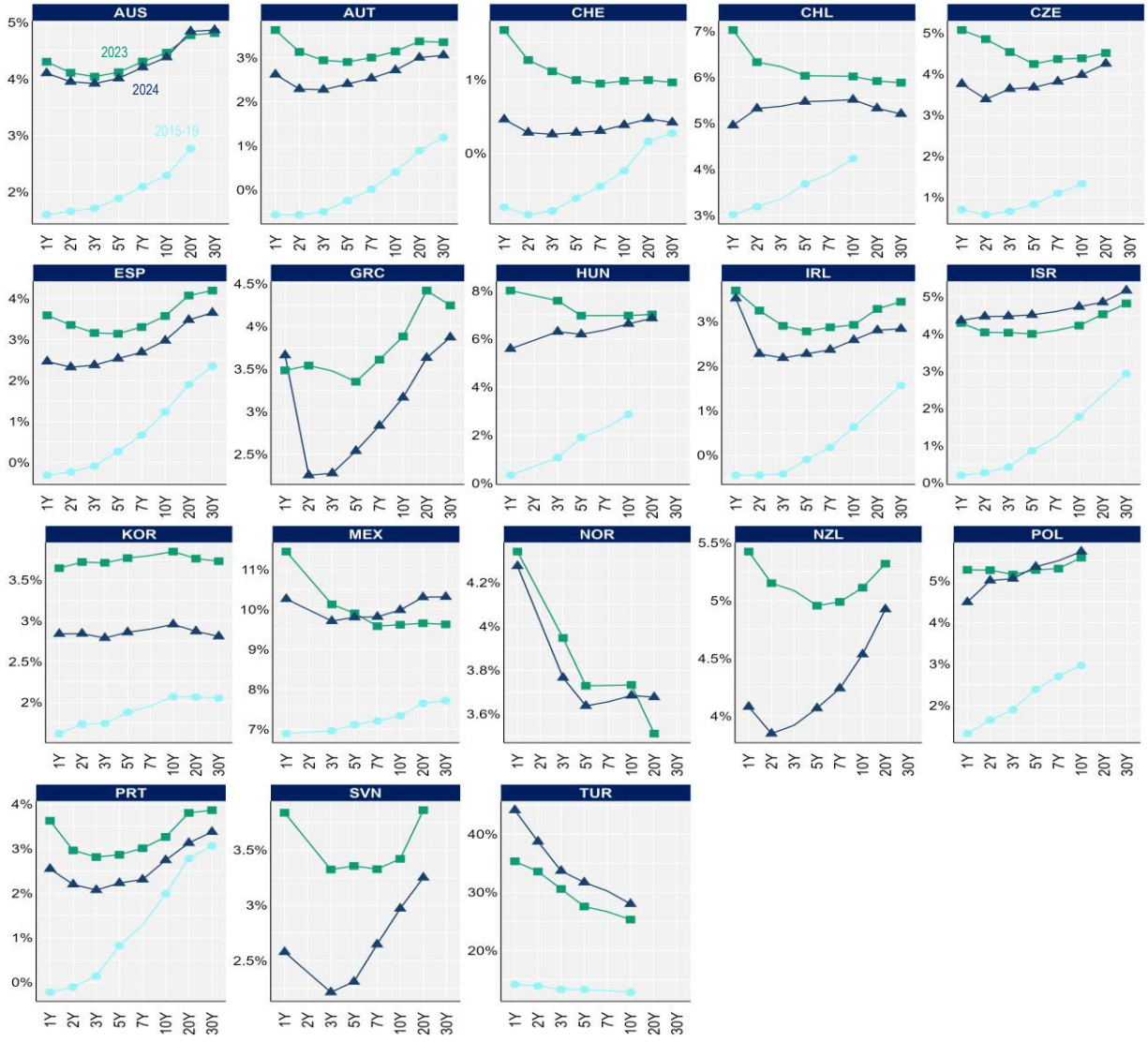
Further specifications

Computations did not cover CHL, COL, CRI, ISR, MEX and TUR due to missing general interest expenses data. Thus, computations cover 97% of total OECD central government debt.

Annex 1.B. Yield curves for selected countries

The figure below shows the average daily yields over the last quarter of the year. For 2015-19, the values represent the average of the quarterly averages over the five years from 2015 to 2019. Selected OECD countries are those with available data in LSEG.

Annex Figure 1.B.1. Yield curves for selected countries



Source: LSEG and OECD calculations.

Annex 1.C. Auctions size analysis for selected countries

The figure below shows the average auctions size for fixed-rate bonds by tenor. Selected countries are those for which data is available.

Annex Figure 1.C.1. Average auction size by tenor for selected countries (1 out of 2), 2000-24

Source: LSEG and OECD calculations.

Annex Figure 1.C.2. Average auction size by tenor for selected countries (2 out of 2), 2000-24

Source: LSEG and OECD calculations.

Annex 1.D. A summary of quantitative tightening policies in selected countries

The bullet points below summarise quantitative tightening (QT) policies in selected countries, focused on government bond holdings and ordered by the start of their programmes.

- Australia: In February 2022, the Reserve Bank of Australia ceased bond purchases. It subsequently decided to hold the bonds to maturity, allowing its bond holdings to decrease gradually, and is reviewing this approach periodically (Reserve Bank of Australia, 2022[33]).
- New Zealand: In February 2022, the Reserve Bank of New Zealand agreed to initiate a gradual reduction of bond holdings by selling a limited number of securities in order of maturity date, starting with the longest maturity, while allowing shorter-maturity bonds to mature without reinvesting the proceeds (Reserve Bank of New Zealand, 2022[34]).
- The United Kingdom: In February 2022, the Bank of England's Monetary Policy Committee ceased reinvesting the proceeds from its maturing government bond holdings. In September 2022, the Committee decided to commence selling government bonds from November onwards, with a quarterly schedule targeting short- to medium-term maturity sectors (3 to 20 years). In September 2023, it decided to reduce the stock of government bonds by GBP 100 billion from October 2023 to September 2024. In September 2024, it decided to reduce the stock of government bonds by an additional GBP 100 billion from October 2024 to September 2025 (Bank of England, 2022[35]; 2022[36]; 2023[37]; 2024[38]).
- Canada: In April 2022, the Bank of Canada discontinued its bond purchase programme, meaning that proceeds from maturing bonds would not be reinvested (Bank of Canada, 2022[39]). In January 2025, it announced the plan to complete its balance sheet normalisation programme, ending QT in March 2025 (Bank of Canada, 2025[40]).
- The United States: In May 2022, the Federal Reserve Board communicated that reductions of the System Open Market Account's (SOMA) balance sheet would be gradual, predictable, and achieved through stopping reinvestments from the proceeds of matured bonds with a monthly cp of USD 30 billion for the first three months, USD 60 billion until May 2024, and USD 25 billion since then (Board of Governors of the Fed, 2022[41]; 2024[42]).
- Sweden: In September 2022, Sweden's central bank (Sveriges Riksbank) announced that the asset purchase programme was expected to cease at year-end, leading to a gradual decline in its balance sheet across all maturities. In February 2023, the bank announced that it would have started selling government bonds as of April 2023. In November 2024, the bank announced that sales were expected to be concluded at the end of 2025 and that it aimed to keep in its balance sheet SEK 20 billion of long-term government bonds (Sveriges Riksbank, 2022[43]; 2024[22]; 2023[44]).
- Euro area: In December 2022, the ECB Governing Council decided that the holdings of government bonds purchased through the Asset Purchase Programme (APP) would decline at a measured and predictable pace, as proceeds from matured securities would be only partially reinvested starting from March 2023. In May 2023, the Council decided that APP holdings would not be reinvested at all starting from July 2023. In December 2023, the Council decided that it would reduce the

Emergency Purchase Programme (PEPP) portfolio during the second half of 2024 and to fully discontinue reinvestments at the end of 2024 (ECB, 2022[45]; 2023[46]; 2023[47]).

- Japan: In July 2024, the Bank of Japan decided to reduce the amount of its government bond purchases at a gradual pace each quarter until March 2026 (Bank of Japan, 2024[48]).

Notes

[1] Adjusted by the United States Consumer Price Index (CPI).

[2] This refers to the average gross borrowing requirement-to-GDP ratio for the period 2015-19.

[3] The 2015-19 average is CPI-adjusted to 2024 real values.

[4] Discrepancies between the general government deficit and the central government net borrowing requirements from the markets arise from three primary sources, complicating the precise attribution to cash balance management. Firstly, there is a scope difference: net borrowing requirements in this analysis refer to the central government, while the fiscal deficit covers the general government, including state and local governments and social security funds. Secondly, the central government's marketable debt may not grow alongside the deficit if fiscal needs are met by selling financial assets, such as real estate or state-owned enterprises. This also includes the use (drawdown) of cash balances. Lastly, governments may increase net liabilities through non-marketable debt instruments, such as loans or arrears. Despite these sources of differences, in most OECD countries, subnational governments generally run fiscal surpluses or deficits much smaller than central government fiscal balances. At the same time, asset sales and non-marketable debt funding are relatively uncommon. Consequently, a significant part of the discrepancy can be attributed to the use of cash balances under normal conditions.

[5] Gross borrowing requirements have grown unevenly across countries over recent years, with the United States share increasing significantly. More specifically, the United States' share rose from around 40% in 2007-08 to 50% in 2017 and is expected to reach nearly 70% in 2024. This growth accelerated after the mid-2010s, driven by higher fiscal deficits and faster GDP growth (both when compared to the OECD average), along with US dollar appreciation. The latter alone has accounted for approximately one-third of the nearly 20 percentage points rise since 2017.

[6] Issuance strategies are shaped not only by the risk-cost trade-off but also by market demand and the flexibility of different instruments. Uneven demand across maturities and the need to maintain market liquidity influence sovereign issuance choices. Longer-dated securities, often favoured by pension funds and insurance companies, face lower overall demand, limiting strategic flexibility. In addition, debt managers frequently reopen individual lines to build them up to a benchmark size, which supports liquidity. However, this can be costly, particularly for long-dated securities issued below par, where higher duration amplifies price sensitivity to interest rate changes, reducing cash proceeds when rates rise. In contrast, shorter-dated instruments offer greater issuance flexibility, allowing for larger volumes to be issued at short notice, often without requiring syndication.

[7] For these funds, T-bills are among the limited types of suitable collateral and play a crucial role in managing the maturity of their holdings, especially as Government-Sponsored Enterprises' (e.g. Fannie Mae and Freddie Mac) balance sheets shrank and the availability of agency paper decreased.

[8] Liquidity buffers, typically built up through the proceeds of bond issuance, are often invested in short-term instruments or deposited with central banks, which usually earn lower short-term rates compared to long-term borrowing costs.

[9] The United States only started their variable-rate program in 2014-15, meaning comparisons with the entirety of the last decade would be distorted.

[10] Note that the Sovereign Borrowing Outlook uses the standard methodology to calculate gross borrowing and refinancing needs, excluding the refinancing of T-bills issued and maturing within the same year. For further details, see Annex 1.A.

[11] This analysis does not include Chile and Estonia due to data availability.

[12] Term spreads provide key insights into market expectations for monetary policy and economic conditions. They include the compensation the market prices for holding long-term bonds instead of rolling over short-term risk-free securities, accounting for the risk that long-term bond returns may fall below cumulative future short-term returns. In OECD sovereign bonds, where credit risk is negligible, term spreads mainly reflect expectations of short-term interest rates and duration risk—the sensitivity of bond prices to yield curve changes. Given that future interest rates are affected by future decisions of central banks, which are navigating a trade-off between controlling inflation while avoiding causing unnecessary damage to the economy (BIS, 2022[49]), the shape of the yield curve is affected primarily by expectations on inflation, but also on the growth and employment outlooks.

[13] A yield curve can shift in three main ways: level, steepness, and curvature (Litterman, Robert and Scheinkman, 1991[50]). A level shift occurs when yields across all maturities move up or down by a similar magnitude, reflecting parallel changes. A steepness shift happens when short-term yields move more than long-term yields (or vice versa), causing a non-parallel change in the curve's slope. Lastly, a curvature shift involves changes concentrated in the mid-range of maturities, where intermediate yields rise or fall relative to short- and long-term rates.

[14] The neutral rate of interest is the real short-term interest rate expected to prevail when there is no or a negligible output gap in the economy and inflation is stable (NY Fed, 2024[51]).

[15] Real yields represent the rate of return on investments after adjusting for inflation. They can be measured as the difference between nominal yields and breakeven inflation, which reflects inflation expectations and the inflation risk premium—the additional compensation the market prices for locking in returns based on current inflation forecasts, particularly under conditions of future inflation uncertainty.

[16] Break-even inflation data is available only for countries with outstanding inflation-linked bonds that allow for a computation of ten-year inflation expectations.

[17] As of this report's publication, the latest available data on government expenditure by function is from 2022.

[18] This refers to movements in general government gross interest payments. The movement of other interest payment indicators, such as those specific to central government, can diverge. For instance, in Sweden, central government interest payments declined in 2024 (Riksgalden, 2025[52]).

[19] The gap between the OECD aggregate and the median interest payments-to-GDP ratio is mainly driven by the fact that three large issuers—Italy, the United Kingdom, and the United States—are among the six countries with the highest ratios.

[20] This refers to the share of fixed-rate debt issued prior to 2024 with yields below 1%.

[21] This refers to the share of fixed-rate debt issued before 2024 with yields above 4%.

[22] In 2026, the OECD forecasts an increase in 10-year rates—a maturity more representative of the OECD borrowing profile than short-term rates—in 23 out of 38 countries. In contrast, declines are anticipated more broadly for short-term rates, which account for only a minority of OECD borrowing (OECD, 2024[53]).

[23] These are Belgium, Denmark, Iceland, Ireland, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Sweden, Switzerland, and Türkiye.

[24] The maturity profile of central banks' sovereign bond holdings were explored in the 2024 edition of the Sovereign Borrowing Outlook (OECD, 2024[13])

[25] The latter information refers to the general government marketable debt. General government marketable debt is mostly composed of central government marketable debt. In 18 out of the 25 countries analysed, almost all (more than 95%) of general government marketable debt is attributed to central governments as of Q2 2024 or latest. Subnational governments account for roughly half of the general government marketable debt in Canada, around one-quarter in Denmark, one-fifth in Germany and Sweden, 10% in Belgium and France, and 6% in the United States.

[26] The United States household holdings data encompass domestic hedge funds, private equity funds, and personal trusts.

[27] These countries are Canada, Estonia, Greece, Latvia, New Zealand and Sweden.

[28] A bid-ask spread is the amount by which the ask price exceeds the bid price for a bond in the secondary market. The bid-ask spread is essentially the difference between the highest price that a buyer is willing to pay for an asset and the lowest price that a seller is willing to accept.

[29] 2023 Survey on Liquidity in Government Bond Secondary Markets.

[30] For example, in the case of auctions of German federal government bonds, a one-percentage-point increase in annualised option-implied yield volatility leads to auction bid yields which are, on average, 0.3 basis points (0.03%) higher (Shida, 2023[54]).

[31] This includes the new US buyback programme to enhance liquidity and improve cash management. *Liquidity support buybacks*, launched in May 2024, provide predictable opportunities for market participants to sell off-the-run securities. By October 2024, the US Treasury had conducted about 20 liquidity support operations, purchasing nearly USD 30 billion in securities while receiving offers totalling approximately USD 150 billion. Additionally, cash management buybacks, aimed at reducing volatility in cash balances and bill issuance, commenced in September 2024, with the US Treasury conducting four cash management-related buyback operations, purchasing around USD 20 billion. While the program is small relative to the overall size of the US sovereign bond market, it is not insignificant compared to the outstanding amount of certain bond lines, significantly impacting targeted lines (TBAC, 2025[14]).

[32] This will exclude transactions where one counterparty is a central bank, sovereign entity, international financial institution, or natural person.

[33] Recent regulatory changes in the United States have significantly enhanced market transparency and oversight in the Treasury market. Since 2020, the Financial Industry Regulatory Authority (FINRA) has progressively increased the frequency and detail of its Trade Reporting and Compliance Engine (TRACE) reports, moving from monthly to weekly publication and, in 2024, introducing end-of-day data for on-the-run securities with capped trade sizes, complementing aggregate statistics. Meanwhile, the Office of Financial Research (OFR) launched a hedge fund monitoring tool in 2024 to assess risks related to liquidity and leverage, and the Fed extended PD reporting to separately list General Collateral and triparty repo transactions for improved market monitoring. From December 2024, the OFR mandated daily reporting of non-centrally cleared bilateral repo transactions by selected broker-dealers and financial entities, capturing approximately 75% of volume post-central clearing. Planned reforms include the US Securities and Exchange Commission (SEC) that will enforce dealer registration rules from May 2025, requiring significant liquidity providers to register, join a self-regulatory organisation, and comply with associated regulations; and in March 2025, the SEC, Commodity Futures Trading Commission, and Financial Stability Oversight Council that will implement enhanced reporting, improving data on large hedge funds' operations, liquidity, and strategies, while distinguishing between cash and derivative positions.

2 Corporate debt markets in the face of global uncertainties

Global corporate bond debt increased again in 2024 after two years of inflation-driven deleveraging. Most outstanding debt has a lower effective cost than prevailing yields, meaning debt servicing costs will likely increase going forward. Since 2008, the link between corporate debt and investment has been severed, with debt issuance significantly above pre-crisis trend while investment has stayed below trend. Instead, debt raised in the last two decades has been used primarily for financial operations. The outstanding debt stock is therefore unlikely to pay itself off through returns on productive investment. Current global policy uncertainties raise concerns about the stability of foreign investor demand, a critical part of major corporate debt markets.

Introduction

This chapter illustrates recent developments in corporate borrowing, estimates the future costs of increased interest rates and discusses the prospects and implications of a widespread corporate deleveraging. It also seeks to assess market vulnerabilities and susceptibility to shocks. The main body of the chapter concentrates on corporate bonds, but developments in the syndicated loan and private credit markets are also discussed.

Key findings

- **The corporate debt stock is growing again.** The global corporate bond market reached USD 35 trillion in outstanding amounts in 2024, resuming a long-term trend of more than two decades of consecutive debt increases that came to a temporary halt in 2022.
- **Debt servicing costs will likely increase from current levels despite falling interest rates.** Nearly half of global corporate bond debt currently has an interest rate of 4% or less. There is a disparity between the cost of outstanding debt and the current cost of debt: globally, at the end of 2024, 63% of investment grade debt and 74% of non-investment grade debt had interest costs below the prevailing market rates. Even if central bank policy rates continue to fall as expected, most outstanding debt will likely be refinanced at a higher cost.
- **Increased interest payments are relatively minor in the near-term.** The debt coming due between 2025 and 2029 has an average interest rate that is 148 basis points lower than end-2024 market rates, meaning relatively small increases in interest costs in the short term. However, if the effective cost of the outstanding debt stock increased by one percentage point, annual interest expenditure would grow by a total of USD 151 billion, to USD 784 billion.
- **Outstanding debt has primarily been used for financial operations rather than real investment.** One of the most common reasons for issuing bonds in the last two decades has been to refinance existing debt. Other financial operations like building cash reserves and shareholder payouts have also been relatively prevalent. This has allowed companies to continuously decrease their effective cost of borrowing, but also implies that the outstanding debt likely will not “pay itself off” through returns on productive investments. Since 2008, there has been a disconnect between corporate investment and corporate borrowing, with investment currently below trend while corporate bond issuance is significantly above trend.
- **Global policy uncertainty adds to concerns about the stability of foreign demand.** The continued withdrawal of central bank support for bond markets coupled with increasing levels of bond issuance means either new investors will have to fill the demand gap in certain segments of the market, or existing investors will need to increase their lending. Foreign investors, representing over a third of total holdings in some major markets, will play an important role, but global policy uncertainties, notably concerning international interest rate differentials and trade policy, raise concerns about the stability of their demand.
- **Corporate debt has been increasing across market segments.** Growing corporate debt is not limited to bond markets. Syndicated lending, a USD 25 trillion market and a dominant form of borrowing for non-financial companies, has also grown significantly over time. Private credit, a type of lending that became substantial relatively recently, now amounts to at least USD 1.6 trillion in assets globally. Its increasing interconnections with the traditional financial system, including pension funds and insurance companies, coupled with multiple layers of leverage, call for regulatory and supervisory vigilance.

Global debt markets face an uncertain outlook

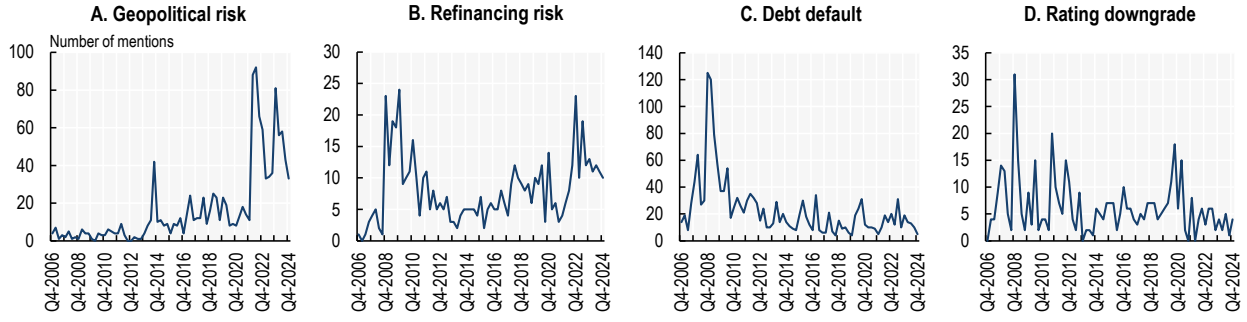
The last five years have been characterised by rapid and significant changes in global debt markets. Two decades of sustained debt build-up reached new highs on the back of substantial monetary and fiscal stimulus in the wake of the COVID-19 pandemic in 2020 and 2021, with global issuance amounts reaching historically unprecedented levels. That came to an abrupt end in 2022, as monetary policy tightened in response to the highest inflation levels in OECD countries in three decades. Policy rates increased faster than at any other point in recent history. The possibility of having to manage a scenario with prohibitively high rates in an environment of elevated debt levels was widely considered plausible, even if long average maturities and an overwhelmingly fixed-rate interest structure on corporate bonds would delay the pass-through of increasing rates, partially and temporarily insulating companies from the full effects of the new financial conditions.

Inflation has since declined sufficiently for such an outcome not to materialise. The global economy and financial markets have also proved more resilient than many expected. Inflation in late 2024 was at or below target in more than 60% of countries, and less than 1% above target in more than 75% (OECD, 2024[1]). Major central banks in OECD countries began easing cycles in mid-2024, and market-implied future policy rates point clearly downward across almost all major economies. Financial conditions remain supportive. Global default rates, while slightly above historical averages, have remained relatively subdued and are expected to fall below the four-decade average in 2025 (Moody's, 2024[2]).

Despite these tailwinds, global debt markets face an uncertain outlook. This is primarily driven by macro-level uncertainties, notably with respect to geopolitical risk and, closely interlinked, international economic policy (OECD, 2024[3]). Corporate disclosure – financial and non-financial filings and earnings call transcripts – suggests that while narrowly defined debt-related risks such as defaults and rating downgrades are a lesser concern, discussions about refinancing and geopolitical risks remain prominent (Figure 2.1). Such uncertainty can expose the market to bouts of volatility, the severity of which are difficult to assess in advance.

Figure 2.1. Mentions of debt risk indicators by major companies in the United States, Europe and Japan

Concerns regarding geopolitical and refinancing risks remain elevated



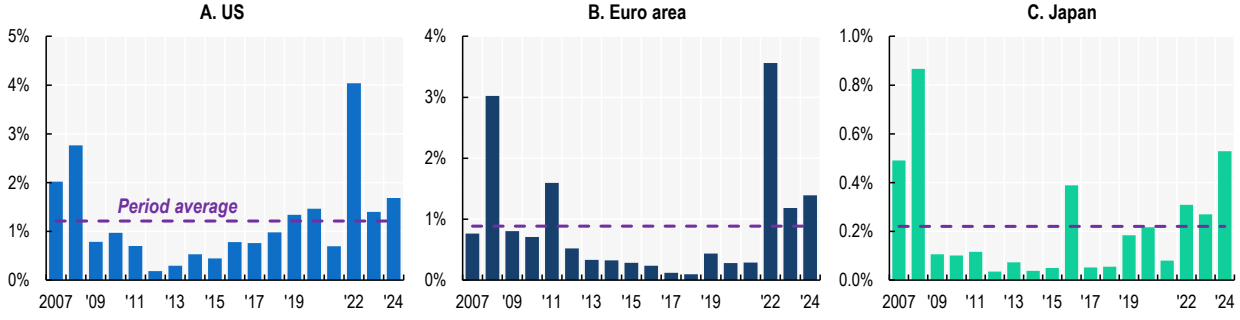
Note: Refers to companies in the Russell 3000, Euro STOXX 600 and NIKKEI 225 indices. Mentions in corporate filings and earnings call transcripts.
Source: Corporate document analysis via Bloomberg, see Annex 2.A for details.

This, in turn, drives a broader uncertainty with respect to macro-economic outcomes and therefore interest rate paths, with effects on debt market dynamics. This is reflected in short-term changes in interest rate expectations. Figure 2.2 shows the intra-year swing (the difference between the highest and the lowest value in a year) in the 2-year Overnight Indexed Swap (OIS) in three major markets. A higher value implies

greater changes in interest rate expectations within a single year. For the first time in recent history, this value has now been above historical averages for three consecutive years in the United States, the euro area and Japan, illustrating the uncertainty brought about by the inflation shock.

Figure 2.2. Intra-year swing in two-year interest rate expectations

The last three years have seen significant volatility in interest rate expectations



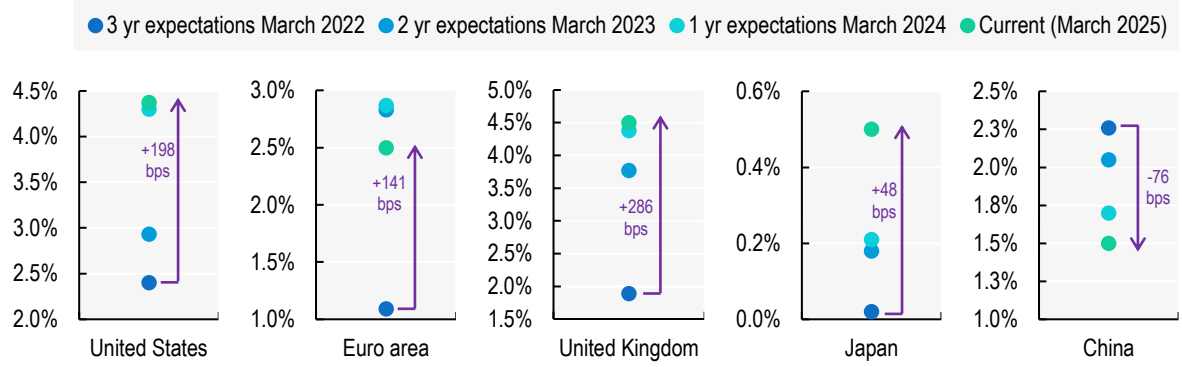
Note: Based on differences between the highest and lowest value of the 2-year Overnight Indexed Swap (OIS) for each market in a given year.
Source: Bloomberg.

In addition, despite rapid reductions in policy rates and yields, interest rates have generally not fallen quite as rapidly as markets expected back in 2022. In the United States, policy rates are nearly 200 basis points higher than market-implied expectations back in March 2022, 141 points higher in the euro area, as much as 286 points in the United Kingdom, and 48 points in Japan. The one exception is China, where rates are 76 basis points lower than markets expected back in 2022, owing to weaker growth prospects (Figure 2.3).

Coupled with the fact that the return of high levels of inflation in 2022 led to the cessation of structurally important central bank support for debt markets through large-scale bond purchases – in effect removing a restriction on downward bond price pressure – this raises the question of whether current levels of debt can be sustained, and at what cost, or if widespread deleveraging is needed. This chapter seeks to address these questions.

Figure 2.3. Market-implied rate expectations versus current rates

Markets have tended to underestimate the level of future policy rates



Note: Chinese data refer to the seven day reverse repo rate.
Source: Bloomberg.

Developments in corporate bond market borrowing

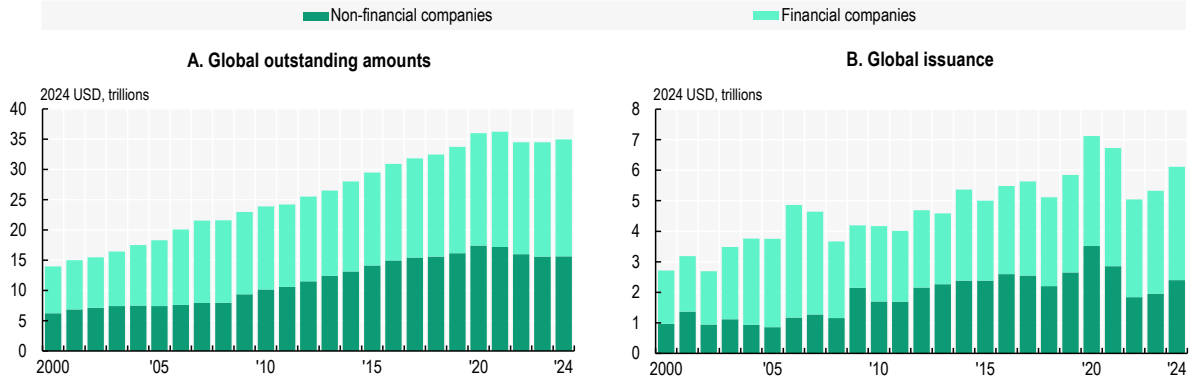
The global debt stock is growing again after two years of real term decreases

The global outstanding stock of corporate bond debt stood at USD 35 trillion at the end of 2024, a real term increase of 1.4% from the previous year. This marks the return of a long-term trend of an expanding debt stock. Total corporate bond debt saw real term year-on-year growth for 22 consecutive years between 2000 and 2021, a growth streak that came to a temporary halt with the interest rate shocks of 2022 and 2023 (Figure 2.4, Panel A). It should be emphasised, however, that this brief period of decreasing debt was driven by elevated levels of inflation in 2022 and 2023, leading to a corresponding upward adjustment in real term debt for earlier years, rather than widespread active deleveraging. Net issuance (new issuance minus redemptions) in fact remained positive on aggregate throughout 2022 and 2023.

The outstanding amounts in 2024 represent a growth of 62% in real terms since 2008, at the onset of the post-crisis monetary stimulus. That growth has largely been driven by increased issuance by non-financial issuers, whose debt has nearly doubled and currently stands at USD 15.7 trillion (Figure 2.4, Panel A). Non-financial issuance has also become more concentrated at the lower end of the credit rating scale. Over half of all investment grade issuance since 2014 has been rated BBB, the lowest investment grade rating (OECD, 2024[3]). Consequently, the non-financial market segment was hit harder by the sudden change in financial conditions in 2022, contracting more than twice as much as financial issuance (Panel B).

Figure 2.4. Global corporate bond debt

The outstanding stock of corporate bond debt grew in real terms in 2024 for the first time in three years



Source: OECD Capital Market Series Dataset, LSEG; see Annex 2.A for details.

Both the level of debt and the way it is distributed between financial and non-financial issuers differ significantly across countries (Figure 2.5, Panel A). The United States has by far the world's largest corporate bond market, totalling USD 11.4 trillion at the end of 2024, of which non-financial company debt represents more than 60%. This is followed by China, where total bond market borrowing amounts to USD 6.7 trillion. Financial companies are more dominant in China, representing over 60% of total outstanding amounts. The same is true in many OECD countries – the share of financial company debt in the total debt stock is over 60% in 24 out of 38 member countries. This dominance is particularly pronounced in bank-based European economies: financial company debt makes up an average of more than 70% of total debt in France, Germany, Italy and Spain.

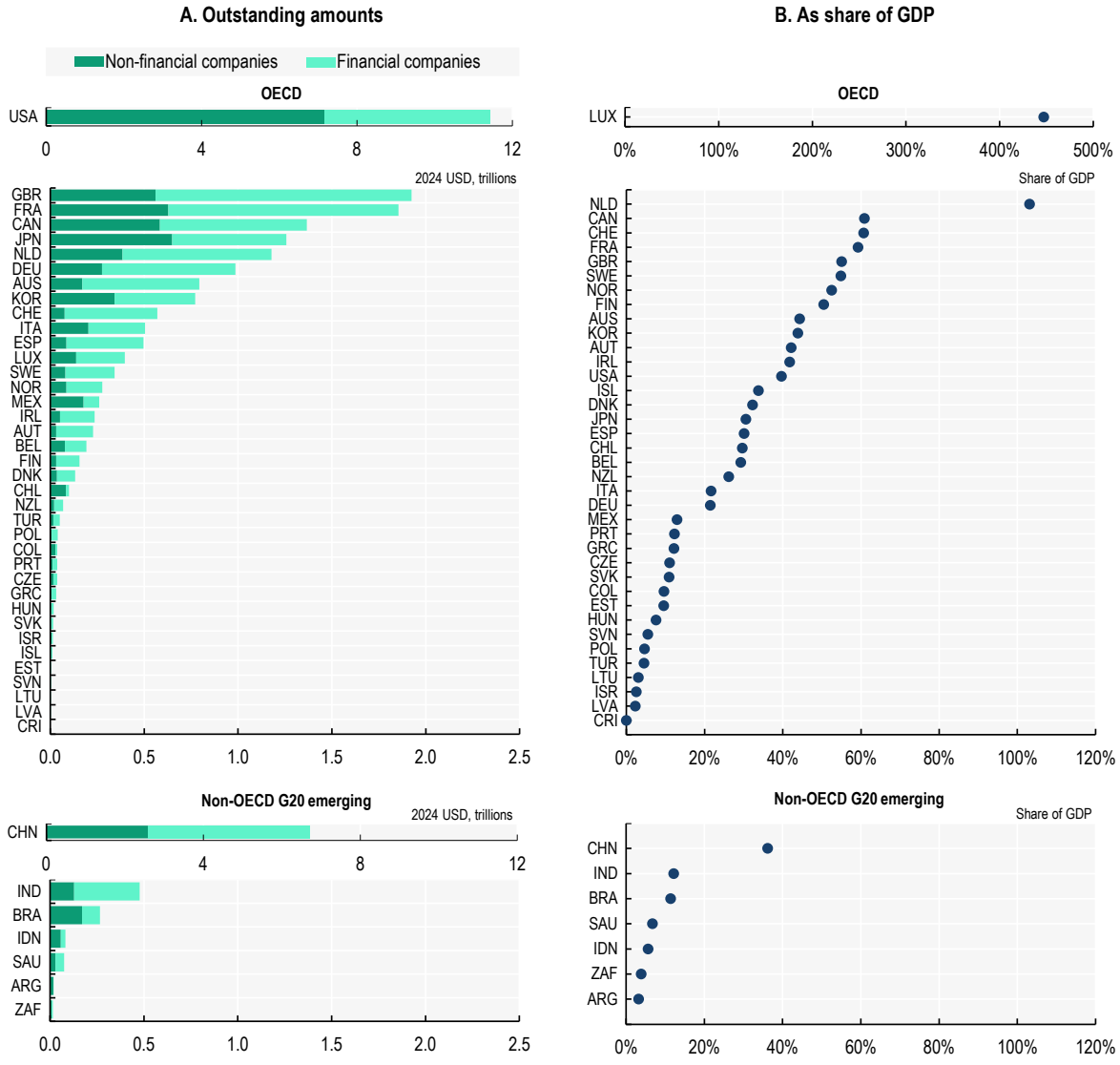
There are also stark cross-country differences in the size of corporate debt relative to the size of the economy. Total corporate bond debt amounts to more than 50% of GDP in nine OECD countries.

Luxembourg has by far the highest ratio (447%), owing to its role as a major financial centre and headquarter of major institutions, combined with a relatively small domestic economy. There are similar dynamics at play in the Netherlands, due many major international companies using it as their headquarters.

Most OECD countries have seen an increase in leverage over time: since 2008, debt-to-GDP ratios have increased in 30 out of 38 countries, by nine percentage points in the median country. Only three OECD countries have seen substantive deleveraging since 2008: Iceland, Ireland and Portugal, all of which were very significantly impacted by the 2008 financial crisis. Consistent with trends in sovereign debt, emerging markets are less intensely indebted than advanced economies. Among the emerging markets in the G20, only China has a corporate bond debt-to-GDP ratio of more than 15% (Figure 2.5, Panel B).

Figure 2.5. Outstanding corporate bond debt by country, end-2024

Global corporate bond markets are concentrated in a few countries



Note: Based on companies' country of domicile.

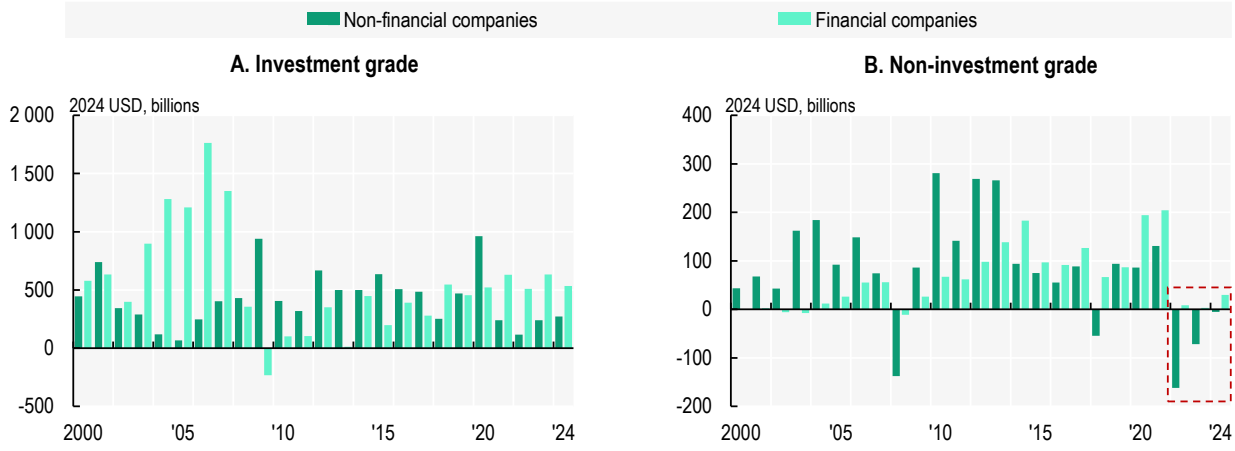
Source: OECD Capital Market Series Dataset, LSEG, see Annex 2.A for details; IMF.

Higher-risk market segments have also rebounded

Riskier market segments were naturally hit more severely by the interest rate shock in 2022. Investment grade companies – with the exception of financial companies in 2009 – have had positive net issuance in every single year since 2000, meaning the total debt stock has been consistently growing. As noted above, this has been sustained throughout the recent period of tightening monetary policy (Figure 2.6, Panel A). The same is not true for non-investment grade issuance, which turned sharply negative for non-financial companies in both 2022 and 2023. While this has happened before during periods of market strain (notably in 2008), the magnitude in 2022 was unprecedented. The 2022 contraction was 18% larger in real terms compared to 2008 for non-financial companies (Figure 2.6, Panel B). Financial company issuance also fell sharply but remained positive. These developments began reversing in 2024, as non-investment grade issuance turned sharply positive again for financial companies and, while still negative, returned to near-zero for non-financial companies as a result of falling interest rates.

Figure 2.6. Net issuance of corporate bonds

Net borrowing by higher-risk issuers is increasing again after two years of active deleveraging



Source: OECD Capital Market Series Dataset, LSEG, see Annex 2.A for details.

Corporate bond markets are not, then, on a path to debt reduction. Lower rates compared to 2022-23, and downward-pointing future policy paths, have mitigated concerns about the sustainability of a large debt stock. However, most of the current outstanding debt was issued in an environment where interest rates were extremely low compared to current market rates. A similarly sized, or larger, debt stock therefore inevitably means that aggregate interest expenditure will increase in the coming years, as the existing debt matures and needs to be refinanced. The following section seeks to quantify these costs.

The costs of a long-term debt build-up

Increased corporate bond borrowing is not a negative development in and of itself. Debt markets can provide companies with financing for investment projects, often more countercyclical in character and less dependent on collateral than bank loans. The costs and risks of high levels of indebtedness at the macro-economic level must therefore be weighed against the economy-wide benefits that accrue from widespread access to financing. However, the higher the cost of debt, the greater the commensurate benefits need to be to offset increased expenditure. In this sense, changes in interest rates affect the character of the debt

stock, with the possibility of rendering unsustainable debts that previously were not (Minsky, 1995[4]; OECD, 2024[3]).

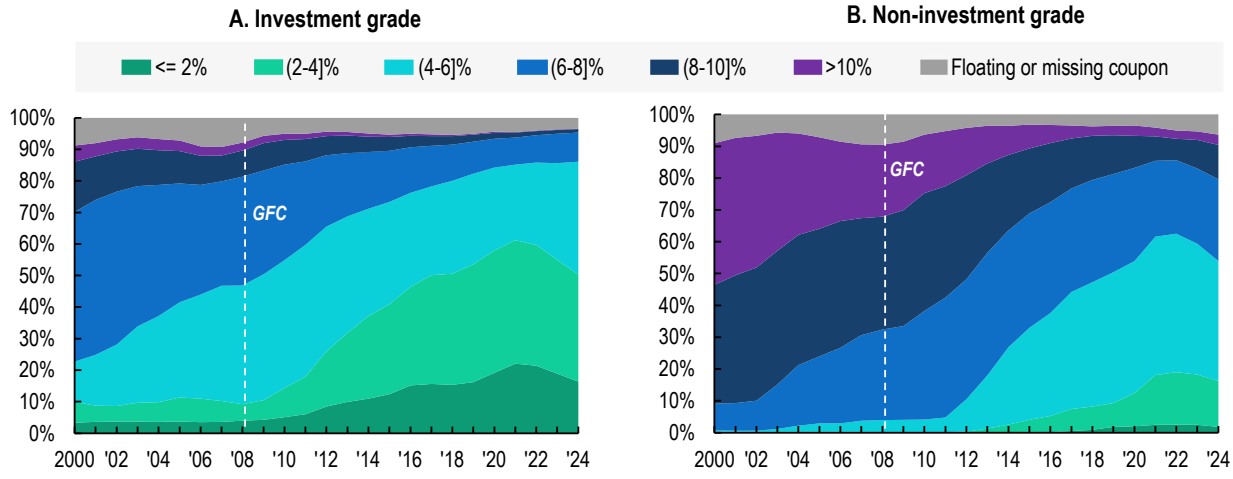
Corporate interest payments have so far mostly been insulated from rate increases owing to widespread use of fixed-rate debt with long maturities

So far, no such development has taken place. Owing to long maturities and predominantly fixed-rate debt, the current cost of the outstanding bond debt stock is still very similar to what it was before 2022, when policy rates and yields were much lower. Almost half of all outstanding corporate bond debt globally had an interest rate of 4% or less at the end of 2024, more than 50 basis points below the US government's 10-year borrowing cost at the same time.

Figure 2.7 illustrates how lower coupon buckets have become increasingly dominant in total debt over time, particularly since the 2008 financial crisis. In 2000, less than 10% of investment grade debt had a coupon of 4% or below. In 2024, the equivalent figure was 50%. Bonds with coupons above 6% represent 10% of total debt, down from 69% in 2000 (Panel A). Equivalent developments have taken place in the non-investment grade segment, where nearly a quarter of total debt cost less than the average US 10-year benchmark yield at the end of 2024 (Panel B).

Figure 2.7. Outstanding global bond debt by interest rate (coupon), non-financial companies

Corporate borrowing costs have shifted structurally lower since 2008 and remain low

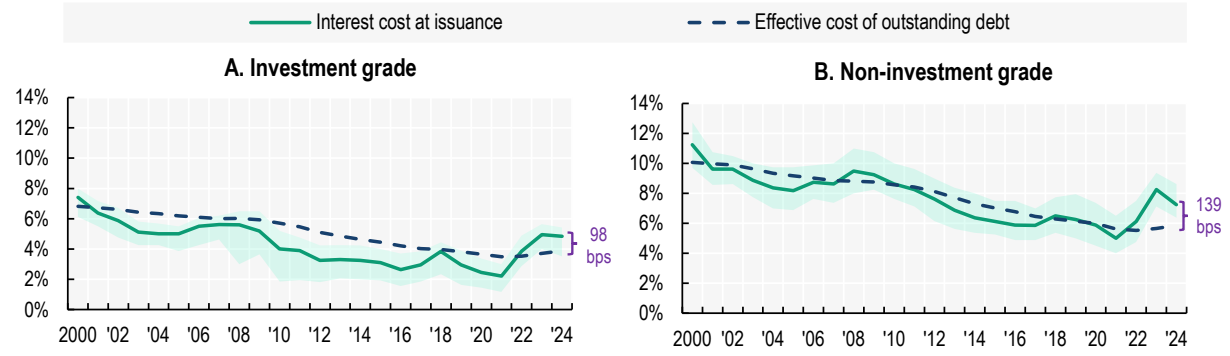


Note: Where coupon data are not available, the yield to maturity at issuance is used. GFC = 2008 global financial crisis.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

While rapid rate increases have not yet significantly affected the total debt stock, the increases are clearly visible in new flows. The global median interest rate at issuance has increased by 263 basis points for investment grade companies, up to 4.8%, since the nadir in 2021. The increase for non-investment grade bonds is 225 basis points, up to 7.3%, during the same period. As shown in Figure 2.8, this is substantially higher than the weighted cost of outstanding debt (dashed blue line). The difference between the cost of outstanding debt and the median rate at issuance is 98 basis points for investment grade bonds and 139 basis points for non-investment grade bonds. For the latter, the interest rate even on the twenty-fifth percentile of new issues (lower shaded green area) is more than 50 basis points higher than the effective outstanding cost.

Figure 2.8. Interest rate at issuance vs. effective cost of outstanding debt, global

The cost of issuing new debt is significantly higher than the cost of outstanding debt



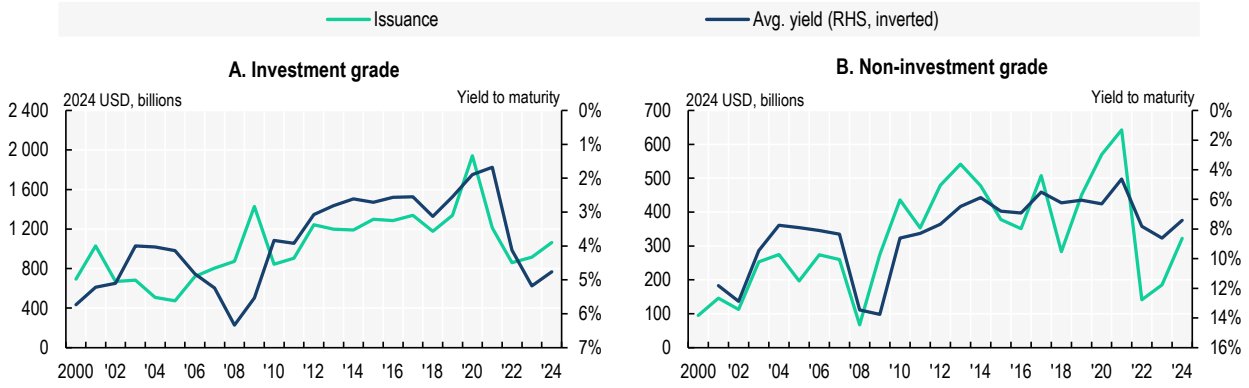
Note: Refers to non-financial companies. Interest costs are based on coupons or, when unavailable, the yield to maturity at issuance. Full lines show medians, shaded areas show the range between the 25th and the 75th percentiles. The cost of outstanding debt is estimated for fixed-rate debt by weighing coupon buckets (in 50 basis point increments) by outstanding amount, see Annex for details.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

The extent to which this will eventually be reflected in the cost of the outstanding debt stock naturally depends on the magnitude of issuance at higher cost. As would be expected, issuance amounts by non-financial corporates are strongly inversely correlated with yields (Figure 2.9). This slows down the passthrough of higher yields to outstanding debt further, adding to the effects of dispersed repayment schedules and fixed-rate structures. In the last two decades, periods where yields have spiked above existing costs of debt have been short enough, and issuance has reduced sufficiently in those periods, that the weighted interest rate of the outstanding debt stock has barely moved. As shown in Figure 2.8, the cost of the stock has been on a linear downward trend with very little fluctuation, whereas yields, while also on a structural downward trend, have exhibited much more volatility.

However, in a high-debt environment with significant near-term refinancing needs, there is reason to expect that the pace of that passthrough might increase. The key assumption driving this is that, unlike earlier periods, yields will remain above the weighted cost of outstanding debt for an extended period.

Figure 2.9. Issuance amounts and average reference yields

Companies issue less when borrowing costs are higher, delaying the pass-through of increased interest rates



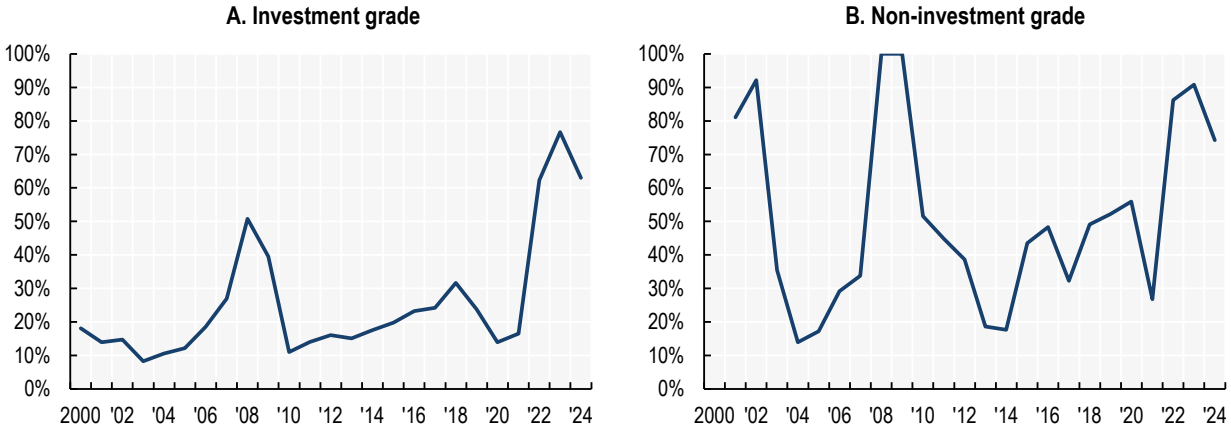
Note: The reference indices are the Bloomberg Global Aggregate Corporate Index for investment grade bonds and the Bloomberg Global High Yield Corporate Index for non-investment grade bonds. Both indices are in USD terms. Annual averages.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details; Bloomberg.

Managing higher rates in a high-debt environment

The magnitude of the disconnect between prevailing yields and the costs of outstanding debt makes the current period unique in recent history. At the end of 2024, 63% of investment grade debt globally had interest costs below the relevant reference yield, a proxy for the current cost of refinancing that same debt. This is down from a high of 77% in 2023, but still the second-highest share on record, 12 percentage points more than during the yield spikes following the 2008 financial crisis (Figure 2.10, Panel A). For non-investment grade bonds, the figure is 74%, together with 2022 and 2023 the highest since the 2008 financial crisis, when uncertainty and debt distress in the lower-rated segment brought yields high enough to exceed all outstanding debt (Panel B). During the 2008 period, the non-investment grade market was effectively frozen, with new issuance collapsing by nearly 75% (see Panel B of Figure 2.9). Yields then came down fast enough, aided by large-scale fiscal and monetary support, and remained low enough for the cost of the outstanding stock not to change.

Figure 2.10. Share of outstanding debt with an interest cost below prevailing market rates

The share of outstanding debt with an effective cost below prevailing yields is at the highest level in 25 years

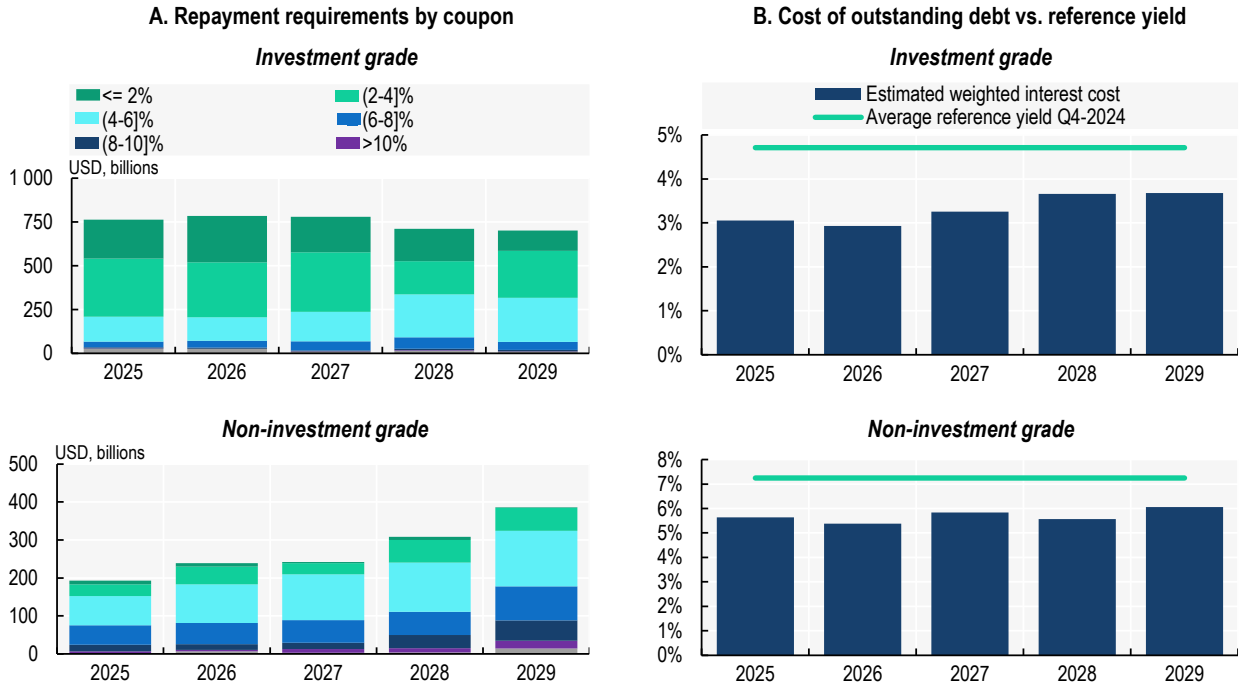


Note: Refers to fixed-rate bonds issued by non-financial companies globally. The cost of outstanding debt is estimated by weighing coupon buckets (in 50 basis point increments) by outstanding amount, see Annex 2.A for details. The reference indices are the Bloomberg Global Aggregate Corporate Index for investment grade bonds and the Bloomberg Global High Yield Corporate Index for non-investment grade bonds. Both indices are in USD terms.
Source: OECD Capital Market Series dataset, LSEG, see Annex for details; Bloomberg.

This time, yields are coming down more slowly and debt levels are significantly higher. Of the investment grade debt coming due in the next three (five) years, 72% (65%) has a coupon of 4% or less. Similarly, over 60% of the non-investment grade debt coming due by 2029 has a coupon of 6% or less (Figure 2.11). On average, the debt coming due between 2025 and 2029 has an interest rate that is 140 basis points lower than end-2024 reference yields for investment grade companies and 156 basis points lower for non-investment grade companies. If all debt coming due in those years is refinanced at prevailing yields, it would amount to an average increase in annual interest expenditure on that debt of USD 34.1 billion and USD 11.6 billion, respectively, for investment grade and non-investment grade companies until 2030. Even when considering the cost increases facing issuers of unrated bonds, and other types of debt, additional expenditure tied to near-term refinancing remains relatively insignificant at the macro level and should not be difficult for the corporate sector as a whole to absorb nor pose broader economic challenges.

Figure 2.11. Refinancing requirements in the next five years by cost of outstanding debt

The cost of debt coming due in all of the next five years is significantly lower than 2024 year-end yields



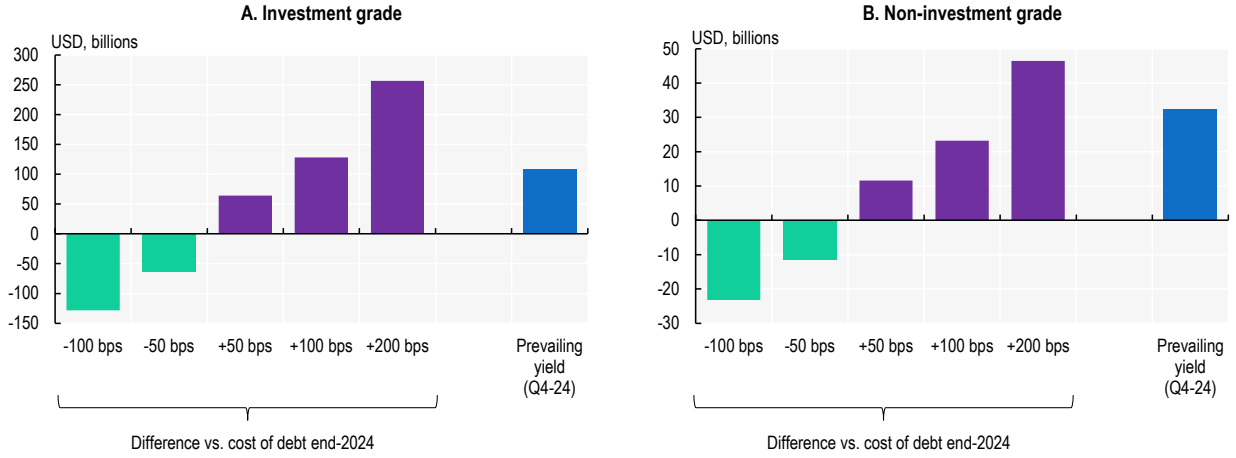
Note: Panel B refers to fixed-rate debt. The cost of outstanding debt is estimated for fixed-rate debt by weighing coupon buckets (in 50 basis point increments) by outstanding amount, see Annex for details. The reference indices are the Bloomberg Global Aggregate Corporate Index for investment grade bonds and the Bloomberg Global High Yield Corporate Index for non-investment grade bonds. Both indices are in USD terms.

Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details; Bloomberg.

The magnitude would be much greater if the effective cost of the entire debt stock was to increase. If the cost of debt rose to equal prevailing yields in the final quarter of 2024, annual interest expenditure would grow by USD 108 billion to USD 605 billion for investment grade companies and by USD 32 billion to USD 168 billion for non-investment grade companies. In a scenario where the weighted cost of debt ends up 200 basis points above end-2024 levels (i.e. at 6%, up from 4% currently), global interest expenditure on corporate bond debt would amount to more than USD 935 billion annually. Even a relatively small increase in effective costs of one percentage point would increase annual interest expenditure by USD 151 billion (Figure 2.12). However, any such increase will happen very gradually over time. While interest costs at issuance and the effective cost of outstanding debt have tracked each other very closely in the last two decades (see Figure 2.8), this is because interest rates have trended structurally downwards. This relationship should not be expected to hold in an environment of higher rates. Companies refinance their outstanding debt when the cost of that debt is higher than prevailing rates. Naturally, they will not do the same when the inverse is true, slowing down the increase in aggregate costs and weakening its link with rates at issuance. Fixed-rate interest structures and a dispersed repayment schedule ensure that debtors are not heavily exposed to interest rate shocks on their corporate bond borrowing in the short term.

Figure 2.12. Scenario analysis: additional annual interest costs at different spreads

If the cost of outstanding debt increased by 200 basis points, annual interest expenditure would grow by more than USD 300 billion



Note: Refers to fixed-rate bonds issued by non-financial companies globally. Spreads relative to the estimated weighted cost of debt at the end of 2024. The indices used for prevailing yields are the Bloomberg Global Aggregate Corporate Index for investment grade bonds and the Bloomberg Global High Yield Corporate Index for non-investment grade bonds. Both indices are in USD terms. To capture all outstanding debt, total unrated bond debt (26% of aggregate outstanding amounts) has been assigned to the investment grade/non-investment grade group based on the distribution between investment grade and non-investment grade debt in total rated debt.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details; Bloomberg.

Debtors then have two broad options: deleveraging to reduce interest expenditure going forward or maintaining existing levels of debt at a higher cost. These two scenarios are covered in turn below.

Option one: Widespread deleveraging

An economy-wide deleveraging can take two forms. The first is passive, meaning the size of the economy (or revenues and assets in the case of an individual company) grows, reducing the relative debt load without actively devoting more money to debt servicing. A passive deleveraging can happen either through real economic growth or through increases in inflation – both of which serve to increase the nominal value of GDP, thus reducing the debt-to-GDP ratio for the economy as a whole. For OECD sovereign borrowers, for example, inflation contributed nearly twice as much as real economic growth to reductions in debt-to-GDP ratios between 2021 and 2023. Inflation-driven deleveraging, however, does not fundamentally improve long-term debt sustainability, since inflation premiums will eventually be priced into the cost of borrowing (OECD, 2024[3]). The second form is an active deleveraging, with borrowers simply devoting more of their cash flows to debt servicing, thus actively reducing the debt load (the numerator rather than the denominator in the case of the debt-to-GDP ratio). The global corporate bond market has not seen an active deleveraging at any point in the last 25 years. There is no indication that it is happening now either, given that net issuance was strongly positive in 2024, although this might change if interest rates remain significantly above the current effective cost of debt.

All else being equal, an active deleveraging necessarily implies that less funds are available for other uses compared to a passive one. As companies, governments and households devote more money to debt servicing, there will be less available for investment and consumption, with corresponding effects on economic growth. At a global level, the reduction in debtors' funds available for consumption and investment is of course offset by a corresponding increase in creditors' funds. However, because net creditors tend to have a lower propensity to spend, and because increased savings by these creditors are

channelled to household and government debt to a greater extent than productive business investment, a shift in available funds from debtors to creditors will likely lead to a decrease in aggregate demand (Mian, Straub and Sufi, 2021[5]). In other words, larger fund flows to net creditors do not necessarily offset the negative effect on economic growth stemming from reduced funds available to net debtors.

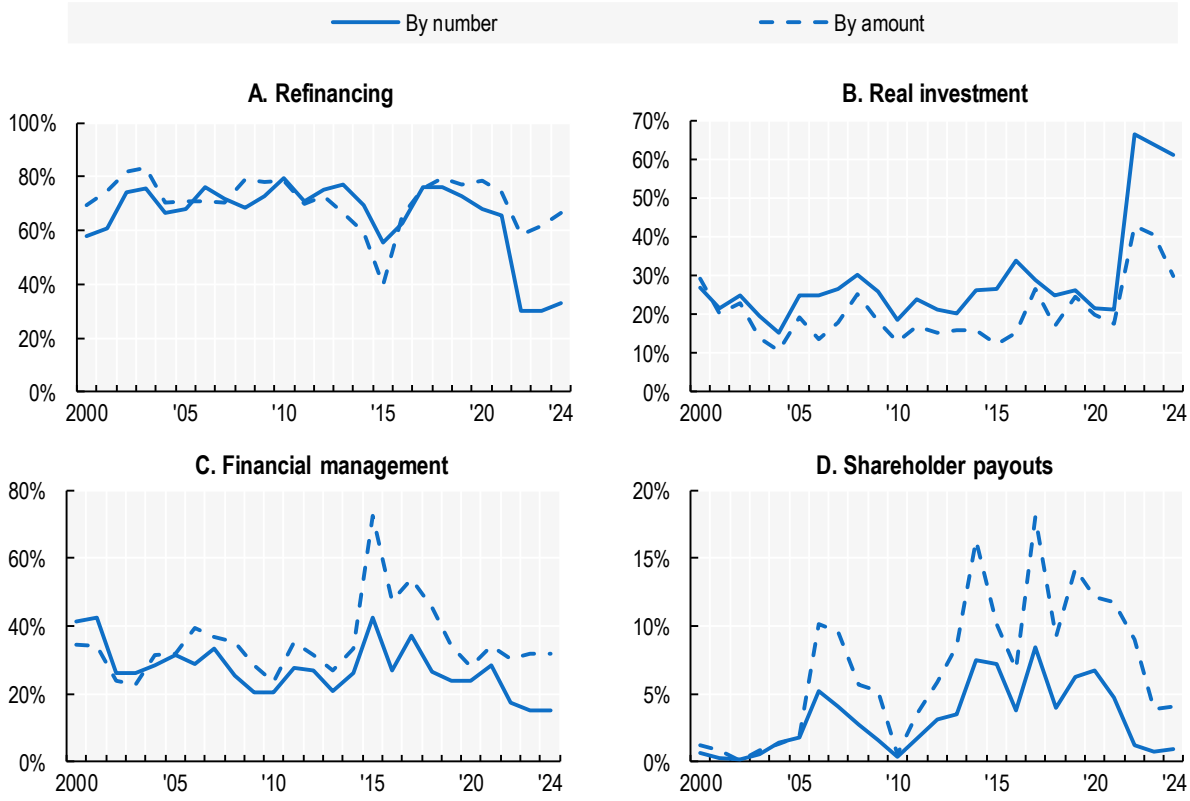
What about the prospects of a significant passive, growth-driven deleveraging? This is the ideal scenario from a macro-economic perspective. Borrowing can effectively pay for itself over time if it is used for productive investments that enhance growth and therefore repayment capacities. This underscores the importance of differentiating between different types of borrowing, notably between debt used to finance real investment and debt used to finance consumption and operations outside of the real economy. In the short-term, investment and consumption borrowing have the same effect – increasing aggregate demand – but their long-term effects differ. Whereas the former can directly increase productive capacity, the latter does not (Mian, 2024[6]). How companies have used the debt they raised over the last two decades is therefore key to understanding the feasibility of "growing out of" that very same debt.

To estimate this, Figure 2.13 looks at what non-financial corporate borrowers indicate they will use proceeds for, based on over 36 000 bonds issued between 2000 and 2024. Up until the interest rate shock of 2022, financing different financial operations was by far the most common reason to borrow. Dominant among these were refinancing operations (Panel A), mentioned in 72% of prospectuses (weighted by issue amount) between 2000 and 2021. This is what has allowed companies to continuously reduce their effective borrowing costs (see Figure 2.8) in parallel to the structural decrease in yields over the same period. Debt-financed shareholder payouts (share buybacks or dividends) – in effect a way to reduce the total cost of capital when the cost of equity is higher than the cost of debt – also became more common during this period, mentioned in 9% of prospectuses (Panel D).

The sharp increase in the cost of debt has since had a profound impact not just on how much companies borrow, but also what they borrow for. Specifically, debt raised for real investment (such as capital expenditure and R&D) has become much more prevalent (Panel C), whereas debt financing for financial operations has become much less common (Panels A, B and D). In other words, flows in today's debt markets are fundamentally different from those of the last two decades. As the cost of debt has increased, the rationale for issuing debt for refinancing, establishing cash reserves or financing shareholder payouts has decreased, with funds instead going to real investment.

Figure 2.13. Stated uses of corporate bond proceeds, non-financial companies

Most borrowing in the two decades before 2022 was used to fund financial operations rather than real investment

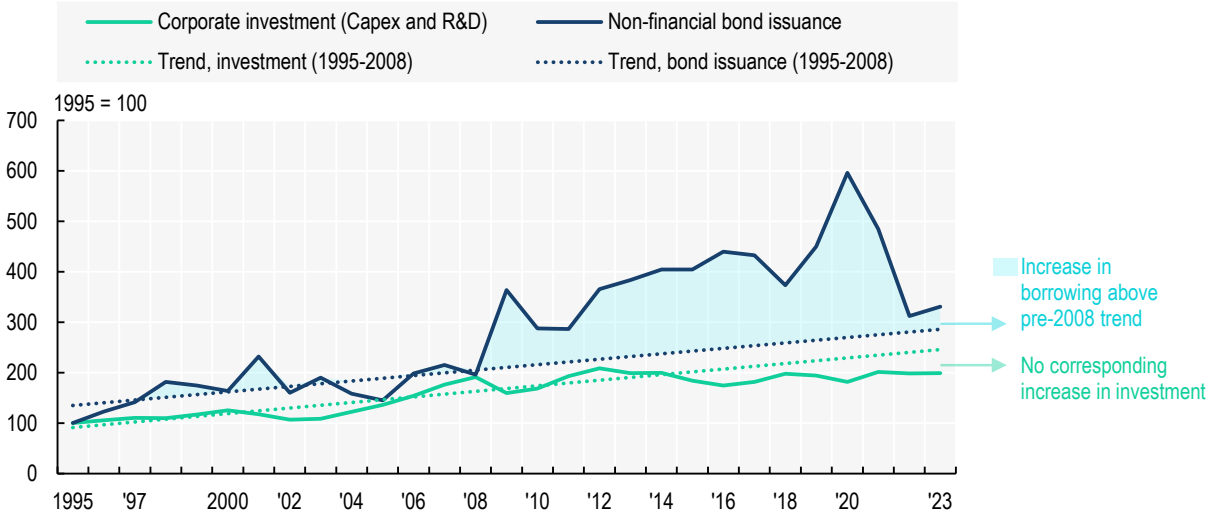


Note: Based on 36 728 bond issues where the stated use of proceeds is more specific than "general corporate purpose". 169 unique stated uses of proceeds are manually classified into higher-level groups. Refinancing refers to operations to make payments on or restructure existing borrowing. Real investment refers to non-financial investment projects, e.g. "highways", "capital expenditure", "renewable energy, "R&D". Financial management is non-refinancing operations that refer to balance sheet management, e.g. "invest in liquid assets", "cash reserves", "working capital". Shareholder payouts are either share buybacks or dividends. A bond can have more than one use of proceeds.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

Real investment being the most common purpose of borrowing is a relatively new phenomenon. Since most borrowing in the two decades prior to 2022 was used to finance activities other than investment, it is unlikely that the existing debt stock will provide the returns to pay itself off. This is particularly relevant for debt issued in the low-interest rate period between 2008 and 2022. While corporate bond issuance increased significantly above the historical trend during this period, corporate investment (measured as the sum of capital expenditure and R&D) did not, and has even been somewhat below trend in recent years (Figure 2.14). The cumulative bond issuance by non-financial companies between 2009 and 2023 was USD 12.9 trillion more than it would have been following the pre-2008 trend, whereas cumulative investment was USD 8.4 trillion lower compared to trend during the same period. In other words, increased borrowing since 2008 has not been associated with increased investment. This suggests that if a widespread, non-inflation driven deleveraging is to take place, it will likely need to be active in large part.

Figure 2.14. Corporate investment and borrowing globally

Companies have significantly increased their borrowing, but not their investment, since 2008



Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

Option two: Maintaining current levels of debt at a higher cost

The second option would be for corporations to maintain (or even increase) current levels of debt by rolling over existing borrowing coming due rather than paying it off, with corresponding increases in interest payments as effective interest rates increase (see Figure 2.11 and Figure 2.12). Based on recent net issuance and outstanding debt trends, this seems to be the approach most closely aligned with reality. This will require investors to purchase greater amounts of debt. Given the withdrawal of central banks from bond markets, that money will either need to come from a new investor base, making up for lost demand, or the existing investor base will need to buy more debt. Understanding the demand structures that enable current levels of corporate borrowing – where demand is coming from, and how stable it is – is therefore an important element to assess these markets.

One of the intended effects of monetary easing initiatives worldwide in recent years, in particular quantitative easing (QE), has been to drive down long-term interest costs, including for corporations. Part of the dynamics through which this happens is by pushing more funds to riskier market segments in response to low and decreasing yields on safer assets such as government bonds. This is why QE has been found to increase corporate bond issuance (OECD, 2024[3]; US Federal Reserve System[7]; Gagnon et al., 2011[8]; Krishnamurthy and Vissing-Jorgensen, 2011[9]; Todorov, 2020[10]; Lo Duca, Nicoletti and Martinez, 2014[11]). The reversal of that process in the form of quantitative tightening (QT) will, therefore, lead to lower levels of demand for corporate bonds, riskier segments in particular, even though large-scale bond purchase programmes did not target these segments directly. Research suggests that the negative effect of QT has so far been significantly smaller than the (reverse) positive effect of QE, especially for passive QT, but the impact could increase in the future (Du, Forbes and Luzzetti, 2024[12]).

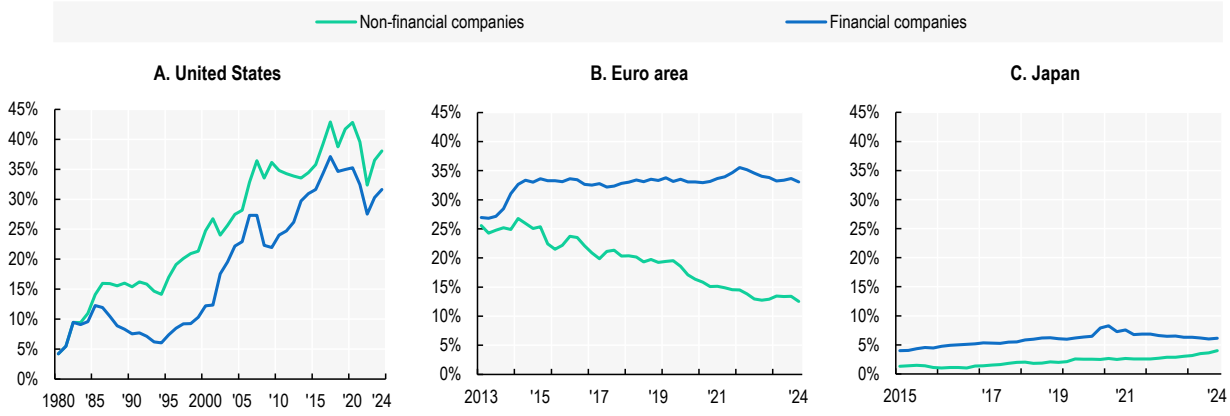
Foreign demand is a very important component of some corporate bond markets. Much like the broader economy, there has been a clear increase in financial market globalisation since the 1970s. In 1980, US corporate bonds were held predominantly by domestic investors – just 4% of total outstanding amounts were in the hands of foreign investors for both financial and non-financial company bonds. Since then, the market has seen sustained growth in international participation. Foreign ownership of non-financial

company bonds had climbed to 43% in 2020, more than 10 times higher than four decades prior. The foreign share fell sharply in 2022, but has since increased again.

Financial company bonds followed a similar trajectory (Figure 2.15, Panel A). The euro area, for which data are available for the last decade, has seen a decline in foreign ownership of non-financial bonds ever since the start of the data series in 2013, which accelerated with the COVID-19-induced crisis in 2020. Foreign ownership of financial company bonds has remained constant (Panel B). The Japanese market has not seen a corresponding decrease, but foreign ownership has never been very high in Japan. In the third quarter of 2024, foreign ownership of Japanese corporate debt securities represented 4% of outstanding amounts for non-financial companies and 6% for financial companies, similar to US levels in the early 1980s. However, there are signs that foreign ownership of Japanese non-financial company bonds has started growing following the shift in Japan's monetary policy stance, increasing by more than 50% since 2022 (Panel C).

Figure 2.15. Foreign ownership of corporate bonds

Foreign investors make up a significant part of total demand in major markets



Note: The following securities are considered: US – "corporate and foreign bonds" (includes bonds issued by US companies both in the United States and in foreign countries, but not bonds issued in foreign countries by foreign subsidiaries of US corporations); euro area – "debt securities" (long-term); Japan – "debt securities" (based on the Special Data Dissemination Standard Plus). Euro area and Japanese data series start in 2013 and 2015, respectively.
Source: US Federal Reserve, European Central Bank, Bank of Japan.

There are three key reasons to expect that current foreign demand dynamics may change: geopolitical uncertainties; changes in relative interest rates; and quantitative tightening.

First, in the short-term, geopolitical uncertainties may increase risk aversion and lead to shifts in expectations of relative returns, with impacts on international portfolio flows. There are also possible longer-term impacts. The level of uncertainty with respect to trade policy is currently high, in large part due to geopolitical tensions (OECD, 2024[1]). If these uncertainties end up ushering in new global trade environment, it may drive or accelerate shifts in domestic policy choices and economic models, notably reducing large surpluses underpinning current demand. This is by no means certain, and there should of course be corresponding changes in deficits over time, reducing borrowing, but at current levels of debt this possibility adds an aspect of uncertainty with respect to the stability of foreign demand.

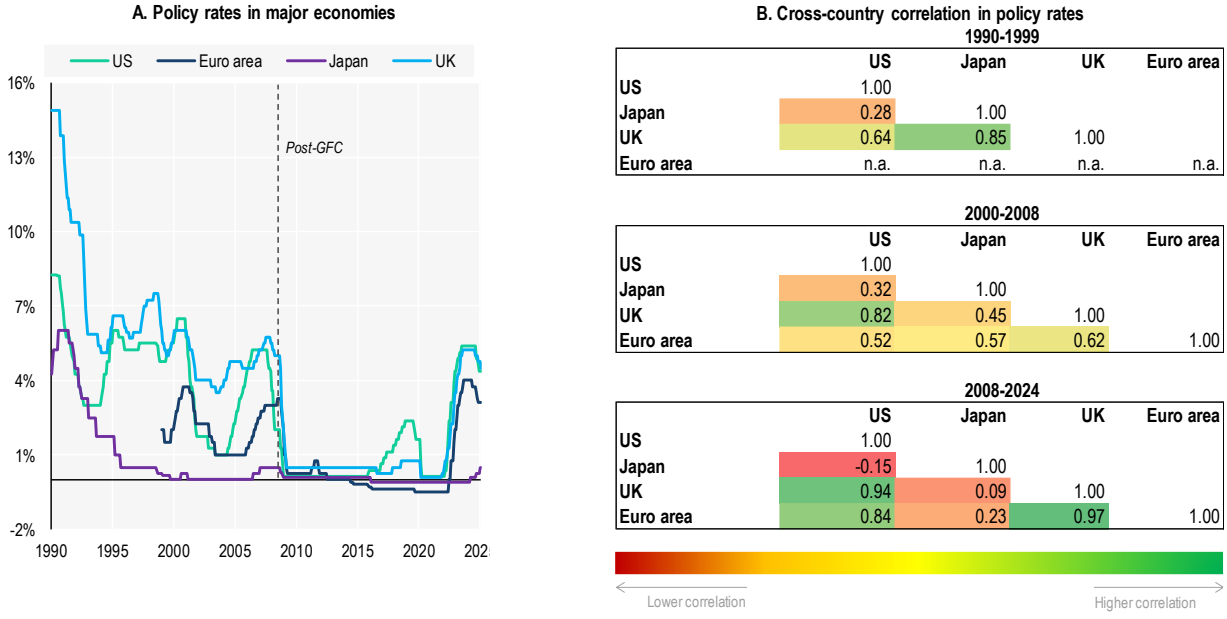
Second, international interest rate differentials significantly affect foreign ownership. Since the monetary easing in the wake of the 2008 financial crisis, when many central banks brought rates close to zero, interest rates in major economies have tended to co-move more strongly than in other periods of recent history (Figure 2.16). The notable exception is Japan, which maintained an expansionary monetary

position during a period in which other major economies tightened significantly, which has weakened the correlation. Structurally low yields domestically have therefore driven Japanese investment abroad for a long time, but divergent macro-economic developments are now reversing that trend. Whereas other major economies have generally begun softening their monetary policy stances in response to lower inflation, the Bank of Japan has increased rates. This shift in interest rate differentials has a large impact on the incentives of Japanese investors, making domestic investments more attractive, especially when considering returns net of currency hedging costs. These dynamics are already visible in sovereign debt markets, where Japanese investors' net sales of lower-yielding European government debt have reached the highest levels in more than a decade (Novik, Smith and Keohane, 2025[13]).

This illustrates the possibility of similar large-scale shifts in foreign demand as long-held assumptions about interest rate differentials have to be reevaluated. This is particularly relevant for differentials between markets where interest rate correlations are high and have been increasing for the last years, since it exposes investors to unexpected reversals in correlations. For example, a divergence seems to be appearing between the ECB and the US Federal Reserve's relatively more strict policy stance, again due to diverging macro-economic developments.

Figure 2.16. Co-movement of policy rates in major economies

Policy rates have tended to co-move since 2008 in most major economies; markets are positioned accordingly



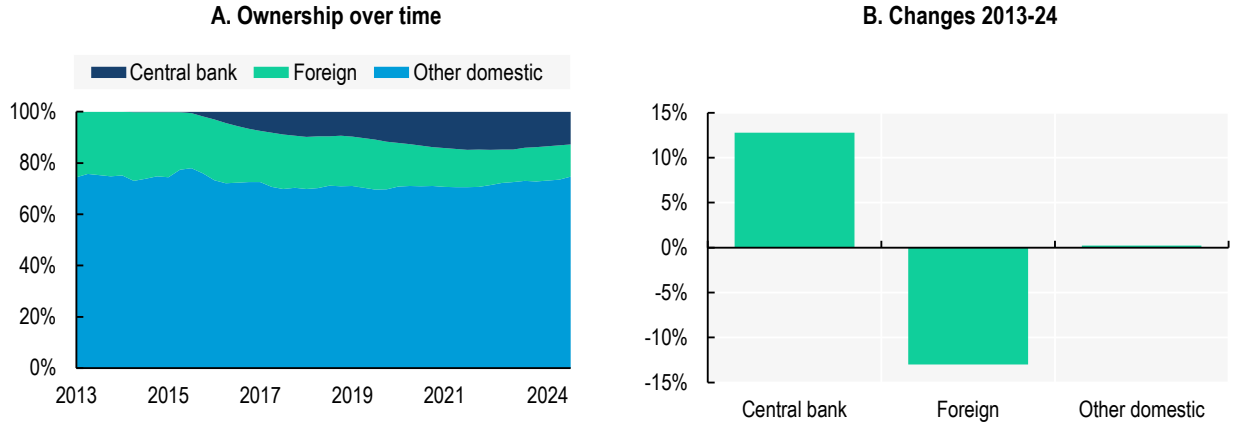
Source: OECD calculations based on data from LSEG.

Third, the withdrawal of central banks through quantitative tightening may impact foreign investment flows. The presence of central banks has been one of the main characteristics of global debt markets, sovereign and corporate, since the 2008 financial crisis. Central bank debt security holdings globally increased by more than five times between 2007 and 2022, reaching over USD 18 trillion (OECD, 2024[3]). That makes the withdrawal of these investors one of the defining features of today's debt markets. It is therefore important to assess whether their presence has altered the character of global debt markets with respect to international demand and, consequently, what their absence might imply. For example, in the euro area, foreign ownership has more than halved (falling by 13 percentage points) since 2013. This appears to have been offset entirely by an increase in central bank holdings, which have grown by the equivalent amount. In other words, 100% of the 13 percentage point increase in central bank ownership corresponds to

decreases in foreign ownership (Figure 2.17). Most of this is likely due to interest rate differentials (given the ECB's more accommodative stance compared to other major central banks during the greater part of this period), but the figures raise the broader question of whether, if central bank intervention primarily crowds out foreign investors, foreign demand can be expected to increase again to offset the withdrawal of central banks under quantitative tightening. There are indications that this is happening in certain sovereign debt markets (see Chapter 1), but there are no guarantees that the same dynamics will apply in corporate markets.

Figure 2.17. Ownership of non-financial corporate bonds, euro area

Increases in central bank ownership of corporate bonds have been entirely offset by decreases in foreign ownership



Note: Refers to long-term (maturity > 1 year) debt securities issued by non-financial companies.
Source: European Central Bank.

In sum, sharp increases in interest rates have only very partially flowed through to the large stock of global corporate bond debt. The vast majority of outstanding debt currently has an effective cost significantly below prevailing yields. Interest cost increases will materialise eventually if yields remain above post-2008 averages for an extended period of time, but this change will be gradual and therefore should not pose major direct macro-economic challenges in the near term. Nevertheless, other challenges remain in global corporate bond markets. There are no signs of deleveraging, active or otherwise, taking place – on the contrary, the debt stock continued to grow in 2024. Maintaining this level of debt at a sustainable cost requires a sufficiently large, diverse and international demand base, but broader geopolitical and macro-economic uncertainties call the availability and stability of that demand into question.

High levels of concentration could amplify bond market shocks

The extent to which corporate bond markets are exposed to negative demand shocks also depends on characteristics of the market structure other than the level of foreign ownership. The degree of concentration is another important, but relatively understudied, aspect of debt markets' susceptibility to shocks. It is an indication of market access from the issuer side as well as a determinant of broader market sensitivity to financial stress and the extent of fire sale risks. The increasing size of corporate bond markets in recent years is well established (see Figure 2.4), but whether and how that has impacted market structure in terms of concentration is less widely known. There are three broad types of concentration: at the issuer, investor and portfolio levels. These are covered in turn below.

Issuer-level concentration

Potential concentration on the issuer side provides important nuance to an environment of growing indebtedness – there are fundamental differences between a market that grows because more companies are borrowing and one that grows because a small number of companies are borrowing greater amounts. Figure 2.18 provides an estimate of issuer concentration by looking at the share of the largest companies, measured by total long-term debt on the balance sheet, in total outstanding corporate bond debt.

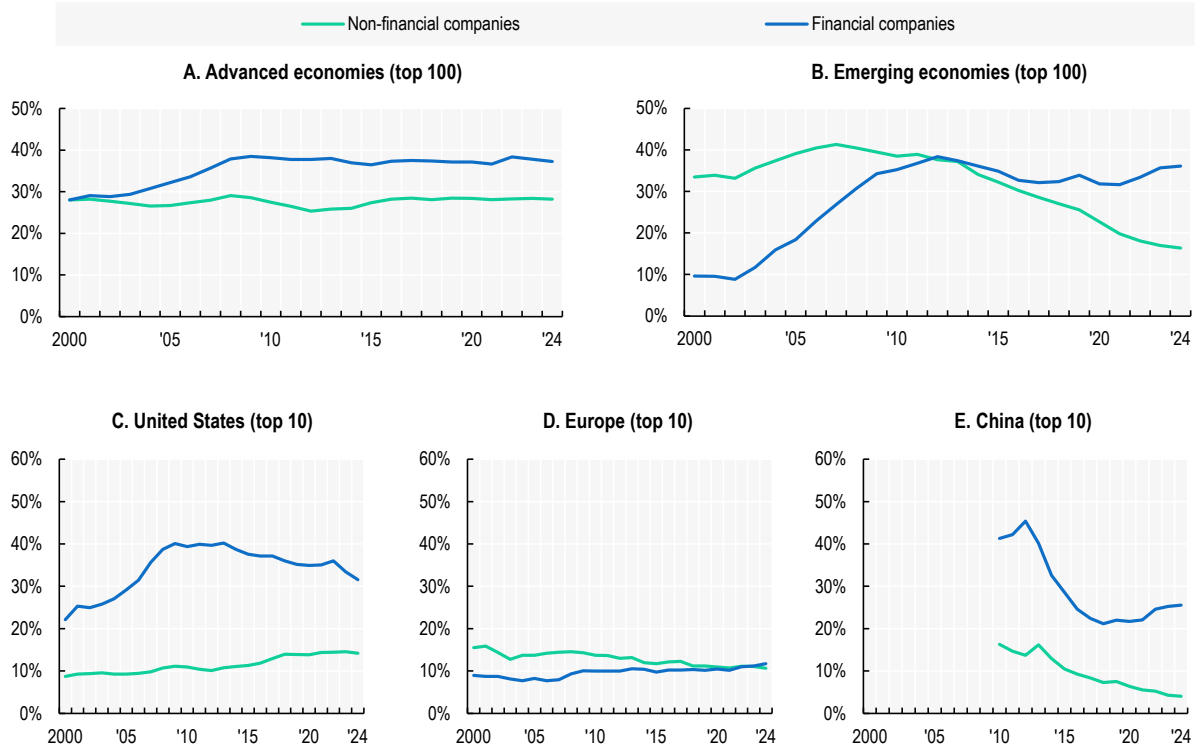
The most evident trend globally is that concentration is currently higher in the financial than in the non-financial sector. However, both current levels of concentration and developments over time differ substantially across countries. In advanced economies, representing three quarters of total global corporate bond debt, concentration has remained relatively constant over time, although financials saw an upward trend up until 2008. In 2024, the 100 largest financial (non-financial) companies owed 37% (28%) of total outstanding debt (Panel A). Both the current levels of concentration and developments over time are similar for financial companies in emerging economies, but with a more pronounced increase pre-2008. Contrarily, concentration has decreased among non-financial companies, with the top 100 firms representing 16% of total debt at the end of 2024 (Panel B). Globally, the 100 largest non-financial (financial) companies represent 22% (32%) of all outstanding debt.

At the regional level, given the smaller number of total issuers compared to broad income group aggregates, the measure instead looks at the ten largest companies. There are some notable trends. First, concentration in the non-financial sector is generally relatively low, below 15% in all regions below. Second, non-financial sector concentration has generally decreased over time. The notable exception is the United States, where the top ten share has been increasing since 2015. Developments in the financial sector are less homogenous. In the United States, concentration increased rather sharply up until the 2008 financial crisis but has since been on a subtle downward trend. In Europe, concentration has always been relatively low but has increased consistently over the last two decades. Chinese data are sparse up until 2010, but the available information suggests a sharp decrease in concentration up until 2019, after which it has begun increasing somewhat.

There is, in sum, no unequivocal trend toward either greater or lesser issuer-level concentration over time globally. Non-financial bond markets do appear to have diversified somewhat over the past years, whereas the opposite is true for financial companies. In both sectors, the largest companies represent very substantial shares of the total market. A market where the largest 100 issuers represent around a third of the total for broad country groupings must be considered rather concentrated.

Figure 2.18. Largest issuers, share in total outstanding bond debt

The 100 largest issuers owe around a third of global bond debt, but there are large differences between markets



Note: The largest issuers in each year are defined based on the amount of long-term debt on the balance sheet. Top 100 companies for Panels A and B, top 10 companies for Panels C-F.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

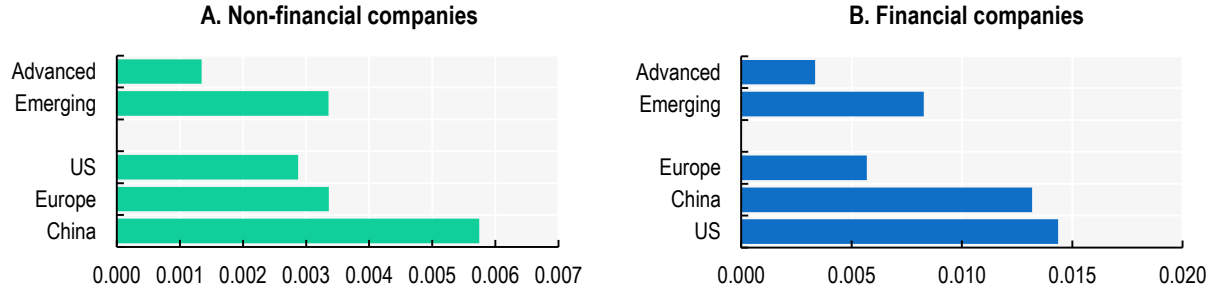
The methodology in Figure 2.18 has some limitations when it comes to international comparability. Differences in the total number of issuers across markets mean that a simple top ten measure will naturally represent very different shares of the total domestic market. For example, more than 1 600 different Chinese financial companies issued bonds in 2024, compared to 380 in the United States. In addition, because the largest issuers are identified on an annual basis, concentration may appear to decrease if certain very large issuers refrain from issuing in a given year, since the numerator (outstanding bond debt by the ten largest issuers in that year) would fall compared to previous years whereas the denominator (total outstanding bond debt that year) would remain similar.

To account for this, Figure 2.19 constructs a different measure of concentration using a Herfindahl-Hirschman Index (HHI). The HHI is a commonly used measure of market concentration which accounts for the size of individual firms in relation to their sector (refer to the Annex for more detail). This is useful for international comparisons when the market size differs between countries since it will provide an indication of relative concentration. For example, a market where the top issuers represent 90% of total debt in equal shares and the remaining 10% is assumed to be distributed in small shares across a large number of companies would have similar HHIs whether 90% of the market was represented by 100 (HHI 0.018) or 1 000 (HHI 0.018) companies. What is most important is instead the distribution among the largest firms. If a market has only ten issuers, the HHI concentration index would be very different if total debt was split evenly between them (HHI 0.1) compared to if one issuer represented 50% and the remaining nine represented equal shares (HHI 0.28). Contrarily, in Figure 2.18, both would show a concentration of 100%.

The HHI takes a value from 0 (perfectly competitive/no concentration) to 1 (full concentration). There are no exact definitions of what HHI would indicate a concentrated market for the purposes of global debt markets, but regardless of what thresholds are used, Figure 2.19 offers an indication of relative concentration between markets (whereas Figure 2.18 offers a measure of "absolute" concentration at the regional/country level). The results are broadly similar. Financial corporate bond markets are more concentrated than non-financial ones in all regions (Panels A and B). The Chinese non-financial bond market is the most concentrated, whereas the United States, by a small margin, has the highest level of financial bond market concentration. One notable difference compared to Figure 2.18 is that Chinese markets appear to be more concentrated for both financial and non-financial companies using this measure.

Figure 2.19. Herfindahl-Hirschman concentration index for global corporate bond markets, 2024

Relative issuer-level concentration is highest in China and the United States



Note: The Herfindahl-Hirschman Index is an index of market concentration. Here it is calculated based on individual companies' outstanding debt as a share of the total debt within each region/industry combination, see Annex for details.
Source: OECD Capital Market Series dataset, LSEG, see Annex 2.A for details.

Investor-level concentration

Investor concentration (i.e. ownership concentration) can expose markets to sector-specific (or even investor-specific) shocks, adding volatility to bond prices (Huang, Wang and Wang, 2024[14]). Evidence from the banking sector also suggests that high creditor concentration can negatively impact financing costs for companies (Bonini et al., 2016[15]). Previous studies have established relatively high levels of investor concentration in major corporate bond markets (Li and Yu, 2022[16]; Boermans, 2015[17]). It is particularly important to consider the degree of concentration among investors that are prone to pro-cyclical behaviour, which can add to sales pressures during a downturn. Vehicles in which final investors can redeem their shares at will, such as an open-ended mutual fund or an ETF, are more prone to this than when investors have limited redemption opportunities (such as closed-end funds or pension funds). The problem is exacerbated when the underlying asset is illiquid, as is the case for corporate bonds. It should be noted that the debate about corporate bond mutual funds and ETFs' impact on market liquidity and fire sale dynamics is inconclusive and studies do not unequivocally find that open-ended bond funds contribute to fire sales. In addition to fund structure, regulation also plays an important role (OECD, 2024[3]; Shim and Todorov, 2021[18]; Choi et al., 2020[19]; Mirza et al., 2020[20]; Wang, Zhang and Zhang, 2020[21]).

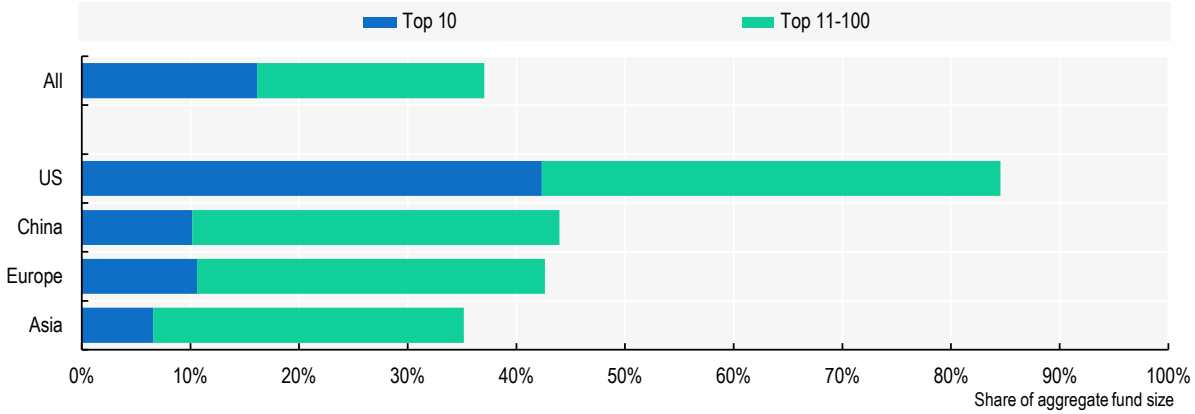
Nevertheless, high concentration among investors who are exposed to redemption pressures remains a legitimate area to monitor. It also bears noting that domestic non-bank investors have largely offset the demand gap left by central banks following the cessation of QE, with investment funds playing an important role in certain countries (Du, Forbes and Luzzetti, 2024[12]). The rapid growth of open-ended investment funds and ETFs as dominant investors in corporate bond markets (see OECD (2024[3])) makes it important

to identify the characteristics of this sector. This analysis therefore focuses on concentration among these funds (defined as open-ended funds and ETFs with at least 25% net exposure to corporate bonds).

There appears to be significant concentration in this fund sector. Globally, the ten largest funds represented 16% of global fund assets in 2024, a figure that grows to 37% when considering the top 100 funds (the total universe contains more than 12 000 funds with aggregate assets of USD 7.9 trillion in 2024). This concentration is particularly evident for funds focusing on investment in the United States, where the top ten (100) funds represent as much as 42% (84%) of total assets (Figure 2.20). However, while a relatively small number of funds own a substantial share of the total market, this does not by itself imply that the fund sector is prone to fire sale dynamics. Funds are collective investment vehicles, so what matters is ultimately the degree of concentration of end investors in these funds and the extent to which their trading behaviours correlate. At present, these data are not available for systematic analysis.

Figure 2.20. Largest funds' shares in total corporate bond investment fund assets, end-2024

The world's 100 largest corporate bond funds represent well over a third of global assets



Note: Refers to open-ended funds and ETFs registered globally that have at least 25% net exposure to corporate bonds (as a share of the total portfolio). Based on funds' reported geographical focus area. The "All" category does not apply any restrictions based on investment area. The regional categories (Asia, Europe) include funds with country-specific focus (meaning e.g. China is fully included in the Asia category).
Source: Morningstar Direct, OECD calculations, see Annex 2.A for details.

Portfolio-level concentration

Investment fund portfolios are concentrated across at least two dimensions: in terms of the share of the largest holdings in the aggregate portfolio and in terms of geographic exposure.

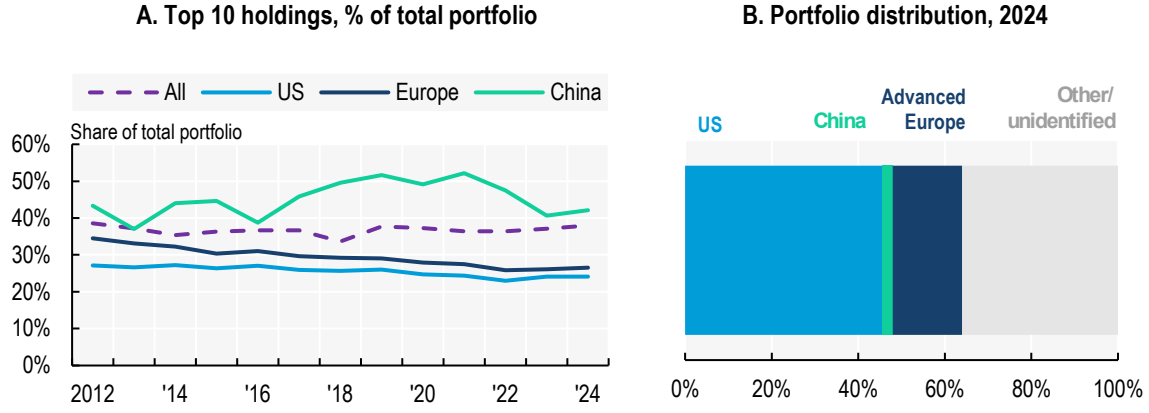
There are notable differences across markets in the extent to which portfolios are concentrated in the top holdings, but average concentration is significant globally. Using the share of the top ten holdings in total portfolio value as a proxy, concentration is greatest among China-focused funds (42%), but the average for all funds globally is broadly similar (38%). US and Europe-focused funds exhibit lower levels of concentration, at 24% and 27%, respectively (Figure 2.21, Panel A). Concentration is typically lower in ETFs than in other open-ended funds.

In terms of geographic concentration, nearly half (46%) of total assets of corporate bond-focused funds globally are invested in the United States (Figure 2.21, Panel B). This US dominance has remained stable over time, even increasing somewhat, but the relative weights among other geographies have changed significantly. The last edition of the OECD Global Debt Report (2024[3]) illustrated a change in the geographic distribution of outstanding bonds globally over time, with the rapid growth of China and the relative decrease of Europe and the United States. There has naturally been a corresponding development

on the investor side. Among corporate bond-focused funds, although investments in China represent only 2% (lower bound) of global assets, average exposure has grown almost nine times since 2012, with average exposure to advanced European markets decreasing by over nine percentage points in the same period.

Figure 2.21. Investment fund portfolio concentration

The ten largest holdings make up a sizeable average share of portfolios globally



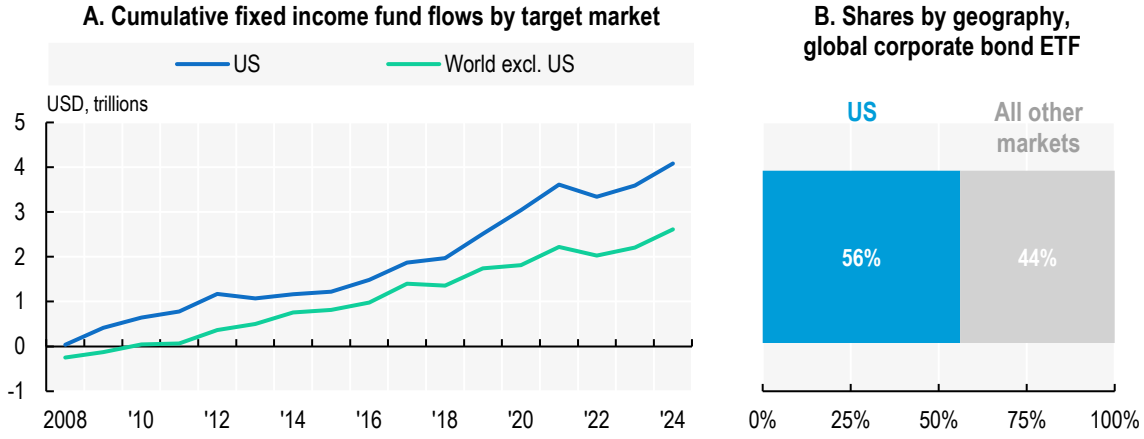
Note: Refers to open-ended funds and ETFs registered globally that have at least 25% net exposure to corporate bonds (as a share of the total portfolio). Panel A is based on reported geographical focus area of funds; the "All" category does not apply any restrictions based on investment area. It shows equal-weighted averages and refers to all holdings, including potential sovereign and sub-sovereign securities. Panel B shows the distribution in USD terms (based on the latest available fund size, weighted by average fund exposure in 2024). Geographic exposures refer to the entire fixed income portion of the portfolio.
Source: Morningstar Direct, OECD calculations, see Annex 2.A for details.

Concentration in US assets is visible both in broader fixed income markets and in corporate bond markets more specifically. US debt assets – sovereign, municipal and corporate – have attracted nearly USD 1.5 trillion more in cumulative net inflows since 2008 than the rest of the world together (Figure 2.22, Panel A). This is not just due to extensive sovereign borrowing in the United States (see Chapter 1), but also to the weight of US companies in global corporate bond market borrowing. In a major corporate bond ETF offering exposure to global investment grade companies by tracking the Bloomberg Global Aggregate Corporate Bond Index, nearly 56% of the holdings at the start of 2025 were US companies (Panel B). As suggested by Figure 2.15, a very substantial share of this investment refers to foreign investors. Global bond market developments are, in other words, very tightly linked to developments in a single market.

In sum, corporate bond markets appear to be concentrated across at least three dimensions. First, at the issuer level, a relatively small number of companies make up a substantial share of global debt. Second, at the investor level (for funds), the largest entities represent sizeable portions of total assets. Finally, at the portfolio level (also for funds), assets are largely concentrated among the top holdings and in one market (the United States). This should be considered against a backdrop of a long build-up of corporate bond indebtedness, rapidly changing financial conditions and a shift in the global investor base, most notably with respect to foreign participation and the withdrawal of central banks.

Figure 2.22. Geographic concentration of investment fund flows

Bond investment is highly concentrated in the United States



Note: Panel A includes sovereign, municipal and corporate securities. US fixed income flows refer to US dollar denominated debt (Morningstar Global Categories "US Fixed Income" and "US Municipal Fixed Income"). The world excluding US refers to the total value for the Morningstar Global Broad Category "Fixed Income", subtracting US fixed income. Panel B shows the weight of holdings by market for a major ETF tracking global investment grade corporate bond markets, using the Bloomberg Global Aggregate Corporate Bond Index as a benchmark.
Source: Morningstar Direct, OECD calculations, see Annex 2.A for details.

Developments in other corporate debt markets

Corporate bond markets are public and therefore allow for detailed analyses of changes in market dynamics, size, creditworthiness, investor base and so forth. With an aggregate size of USD 35 trillion, they serve as a powerful indicator of developments in corporate debt markets more broadly. However, they remain only one part of total corporate borrowing. Corporate indebtedness has also been growing outside of bond markets, including in markets with less public disclosure and regulatory oversight. The syndicated loan market is another important component, roughly comparable in size to the corporate bond market. In addition, the private credit market, while still much smaller than the bond and syndicated loan markets, has been growing very rapidly in recent years, raising concerns about transparency, deteriorating lending standards and unidentified interconnections between private credit and other market segments.

Syndicated loans

Syndicated loans offer firms access to large-scale financing from multiple lenders. A group of lenders jointly provide credit to a borrower, with one lender (the agent) coordinating the process on behalf of the syndicate. These transactions are typically structured either as term loans, which provide a lump sum with a fixed repayment schedule, or as revolving credit facilities that allow borrowers to draw funds up to a specified limit throughout the loan term.

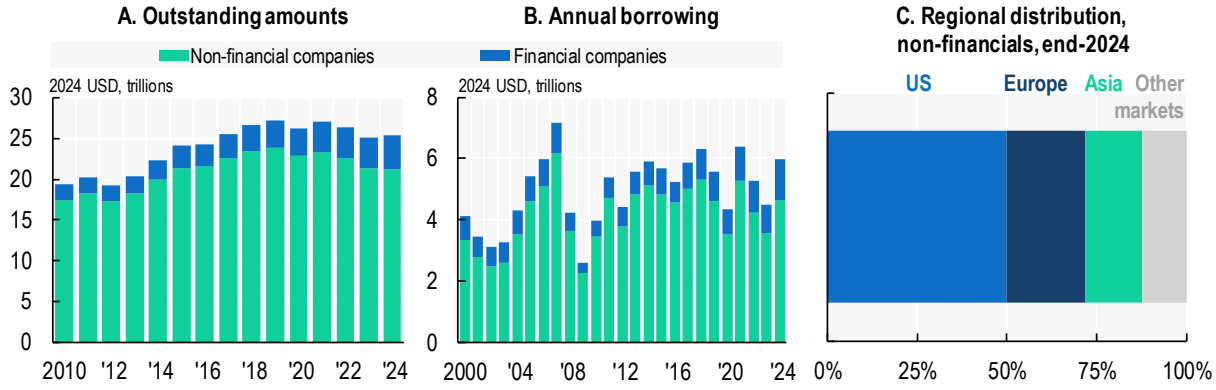
The syndicated loan market has been active for decades and saw significant expansion in the 1990s (Armstrong, 2003[22]). Initially dominated by banks, syndication primarily functioned as a risk-sharing mechanism in corporate lending. However, the market has since evolved considerably, with non-bank lenders playing an increasingly prominent role. Institutional investors now participate not only through direct investments but also by repackaging syndicated loans into mutual funds and structured products like collateralised loan obligations (CLOs). The emergence of a large secondary market has further broadened access to a diverse range of investors, including retail participants (Mason and Goldwasser, 2024[23]).

At the end of 2024, the total outstanding volume in the syndicated loan market amounted to USD 25.4 trillion globally, reflecting a 31% real term increase since 2010, half the growth in corporate bond debt (Figure 2.23, Panel A). Issuance volumes peaked at USD 7.2 trillion in 2007 just before the global financial crisis, following a five-year upward trend. In subsequent years, issuance declined due to stricter banking regulations and capital requirements aimed at reducing risk in the banking sector. However, activity has picked up over time, and despite a sharp decline during the COVID-19 pandemic in 2020 – counter to developments in corporate bond markets, which continued to expand – issuance reached the second-highest level on record in 2021 (Panel B).

The syndicated loan market shows signs of greater procyclicality than the corporate bond market, with steeper contractions during economic downturns. While the two markets are roughly comparable in terms of outstanding volumes and annual issuance, they differ in borrower composition. Syndicated loans are more heavily used by non-financial companies, which accounted for 84% of outstanding syndicated loan amounts at the end of 2024, compared to 45% in the corporate bond market. In terms of geographic distribution, US companies dominate borrowing, like in the bond market, representing half of all outstanding syndicated loans to non-financial firms worldwide (Panel C). European (22%) and Asian (16%) firms have slightly higher weights than in bond markets (OECD, 2024[3]).

Figure 2.23. Syndicated lending to corporations

Non-financial companies are the main users of the syndicated loan market



Note: Panel C is based on outstanding amounts.
Source: LSEG, OECD calculations, see Annex 2.A for details.

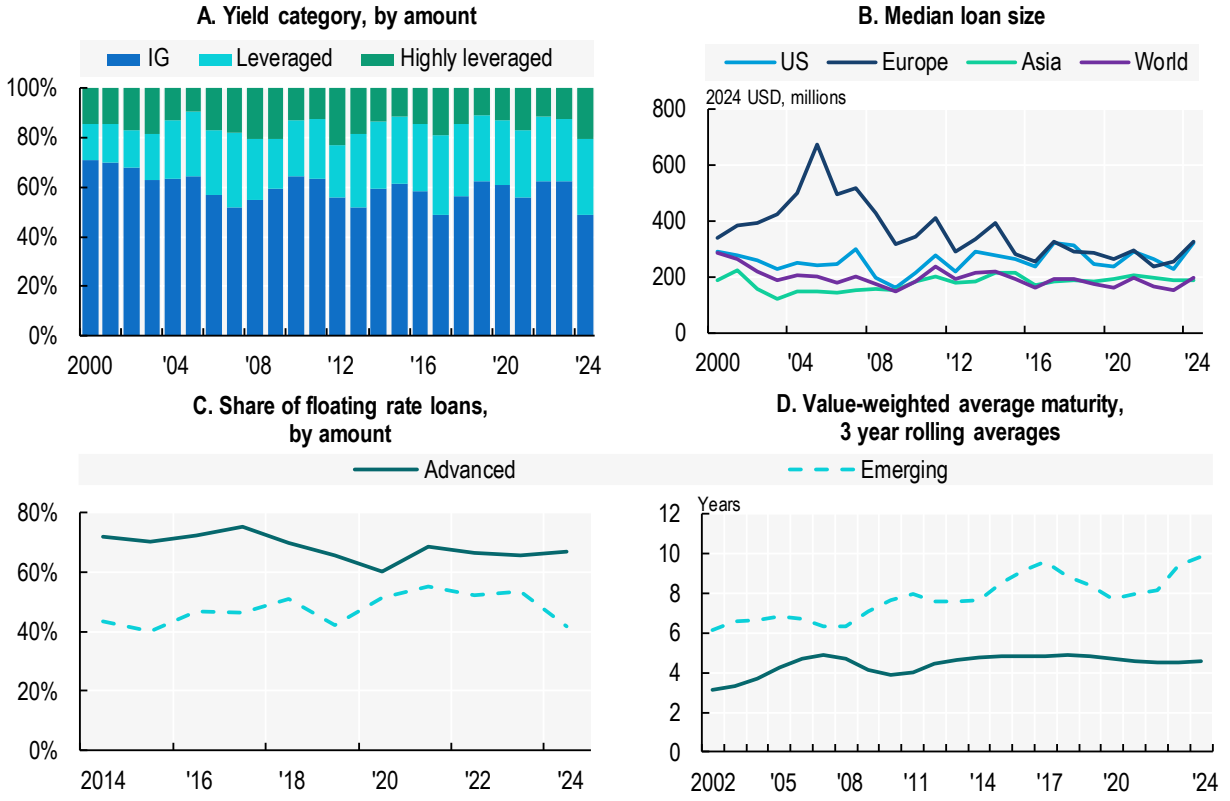
Albeit less pronounced than in the corporate bond market, there has also been a shift towards riskier borrowers over time in the syndicate loan market, as interest rate decreases have led to higher risk appetite among lenders (Lee, Liu and Stebunovs, 2017[24]). Between 2000 and 2012, investment grade loans represented 62% of annual non-financial borrowing on average, a share that declined to 57% between 2013 and 2024 (Figure 2.24, Panel A). In 2024, investment grade loans represented less than half (49%) of total borrowing. This trend is partly a reflection of rising demand from high yield investors and an increase in credit rating downgrades following economic downturns (McKinsey, 2024[25]). However, the growth in risk exposure has been concentrated in leveraged loans rather than in highly leveraged loans.

Syndicated loans are generally smaller in size than corporate bonds. In the US, the median loan size ranged between USD 161 million and USD 322 million from 2000 to 2024, whereas corporate bond issue sizes have been on a steady upward trend since 2000 with a median size of nearly USD 650 million in 2024. Europe has exhibited a different pattern, where the median syndicated loan was larger than the median corporate bond in the period before the 2008 financial crisis, reaching USD 675 million in 2005.

However, over the last decade, the median loan size in Europe has converged with that in the US and is now smaller than the median corporate bond (Figure 2.24, Panel B).

Figure 2.24. Characteristics of non-financial syndicated bank lending

Credit quality has deteriorated somewhat in the syndicated loan markets; floating rate loans are common



Note: Panel A is based on a restricted sample of observations with available yield information. Yield categories are based on spreads over base rate, see Annex.
Source: LSEG, OECD calculations, see Annex 2.A for details.

Another key difference between the two markets lies in the interest rate structures. While the vast majority of corporate bonds are issued at fixed rates, syndicated loans are predominantly floating. This difference is particularly evident in advanced economies: from 2014 to 2024, an average of 69% of syndicated loan issuance to non-financial firms had floating rates (Figure 2.24, Panel C). In the same period, the share of corporate bonds issued with floating rates was less than 10% in all years (OECD, 2024[3]). In terms of maturity at issuance, globally, syndicated loans typically have medium-term durations, with annual weighted average maturities around five years, shorter than those of corporate bonds. However, maturities of loans to companies in emerging markets have trended upwards, particularly during the last decade, with annual value-weighted maturities ranging between 7 and 11 years (Figure 2.24, Panel D).

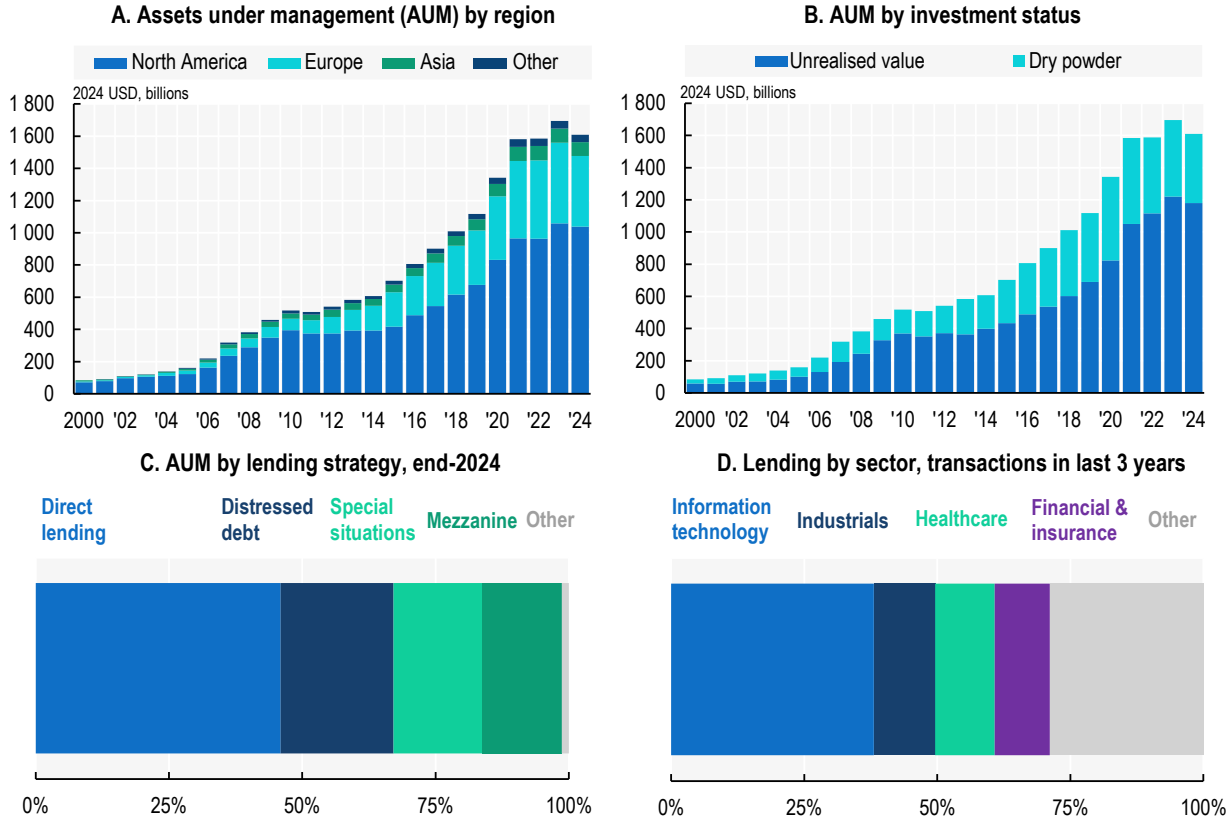
Private credit

Once a small and specialised part of global finance, private credit has grown into a significant and diverse segment of corporate debt markets. This form of financing is provided by specialised non-bank entities outside the public bond market through direct loans or structured products. In 2024, private credit assets totalled at least USD 1.6 trillion globally, including USD 431 billion of undeployed committed capital ("dry

powder"). By adding listed funds and middle-market CLOs, as well as semi-liquid and open-ended structures, estimates reach total volumes of around USD 2.1 trillion of private credit assets in the market (IMF, 2024[26]). The North American market accounted for 65% of the total, followed by Europe and the relatively smaller Asian market (Figure 2.25, Panel A). Growth has been very strong in recent years. In North America, the market grew at a real annual compound rate of over 11% between 2018 and 2023. Stricter regulations and tighter capital requirements on banks in the aftermath of the 2008 financial crisis were catalysts for growth, as it opened up an ideal segment for private credit of middle-market companies that were too large or too risky for commercial banks, but too small for public bond markets. In the United States, the sector today accounts for around 6% of total credit to non-financial corporations, comparable to the shares of leveraged loans and high-yield corporate bonds (Sløk, 2024[27]).

Figure 2.25. Overview of the global private credit market

The global private credit market has grown 19-fold since 2000, driven primarily by US funds



Note: AUM data refer to closed-end, unlisted private credit funds.
Source: Preqin, OECD calculations, see Annex 2.A for details.

The most common private credit strategy is direct lending, representing about half of the total global volume. In this structure, loan agreements are negotiated directly with lenders, typically structured as senior secured term loans with a floating interest rate held to maturity. Other less frequently used options are distressed debt, special situations debt and mezzanine financing (Figure 2.25, Panel C). Similar to private equity funds, private credit investment vehicles are usually closed-end funds with a capital call structure and limited life cycle, accounting for around 81% of the total market (IMF, 2024[26]). Other vehicles include CLOs and, in the United States, Business Development Companies (BDCs).

Most private credit worldwide is allocated to companies active in the information technology (38%), industrials (12%), healthcare (11%) and financial & insurance (11%) sectors (Figure 2.25, Panel D). Proceeds are typically used for different financial operations. In the United States, 47% of deals disclose their intended use of proceeds as "general corporate purposes", 26% for PE buyouts/leveraged buyouts (LBOs) and 21% for debt refinancing. In other words, almost half of private credit proceeds are used for financial operations rather than for productive investment. This is a lower bound, since the category "general corporate purposes" usually includes operations such as share buybacks or working capital needs (Federal Reserve, 2024[28]).

The appeal of private credit to borrowers and investors

For borrowers, private credit offers significant advantages in terms of speed, flexibility and privacy. Unlike syndicated bank loans, direct lending involves fewer parties (often a single lender) and avoids the strict prudential regulations imposed on banks. The transactions are tailored to the borrower's specific needs and offer easier renegotiation in case of financial distress. Additionally, private credit avoids the extensive disclosure requirements of public markets (Ellias and de Fontenay, 2025[29]). There is also some evidence that private credit might remain more accessible during crises than public bond markets. In March 2020, at the height of the turmoil induced by the COVID-19 pandemic, private credit lending did not dry up, contrary to the high-yield bond and leveraged loan markets, both of which contracted significantly (IMF, 2024[26]).

For investors, private credit ensures portfolio diversification, constant income streams and the possibility of higher returns than many other fixed income products. The closed-end nature of most private credit funds, limiting the volume of redemptions during economic downturns, is well aligned with the long-term investment strategies of e.g. pension funds and life insurance companies. The floating rate structure of the loans also offers investors upside exposure when interest rates rise. In recent periods, private credit has offered higher returns than similar products such as high-yield bonds or leveraged loans. The main reasons for these higher returns are the lower levels of (visible) volatility and the illiquidity premium of private credit, since the loans are not traded on secondary markets and usually held until maturity. Moreover, borrowers may be willing to pay higher rates for quicker execution and the ability to avoid disclosing sensitive financial data (Ares, 2024[30]). According to industry analysis, between 2016 and 2023 senior private lending averaged annualised returns of 9%, outpacing leveraged loans and high-yield bonds (BNP Paribas, 2024[31]). However, some studies suggest that these excess returns disappear when accounting for fees charged by private credit funds and greater investment risk owing to certain equity-like exposures inherent to private credit products (Erel, Flanagan and Weisbach, 2024[32]). Some private credit deals in fact include equity-linked instruments such as warrants, which can account for 25-30% of the overall return, although the use of these instruments remains limited (PitchBook, 2024[33]).

Certain regulatory structures also favour private credit. In Europe, the regulatory capital requirement on insurance companies for direct loans is similar to investment grade bonds, and in the United States private loans do not trigger any additional capital charges above those required for equivalent public assets, while in both cases offering higher returns (Barings, 2023[34]; Candriam, 2021[35]).

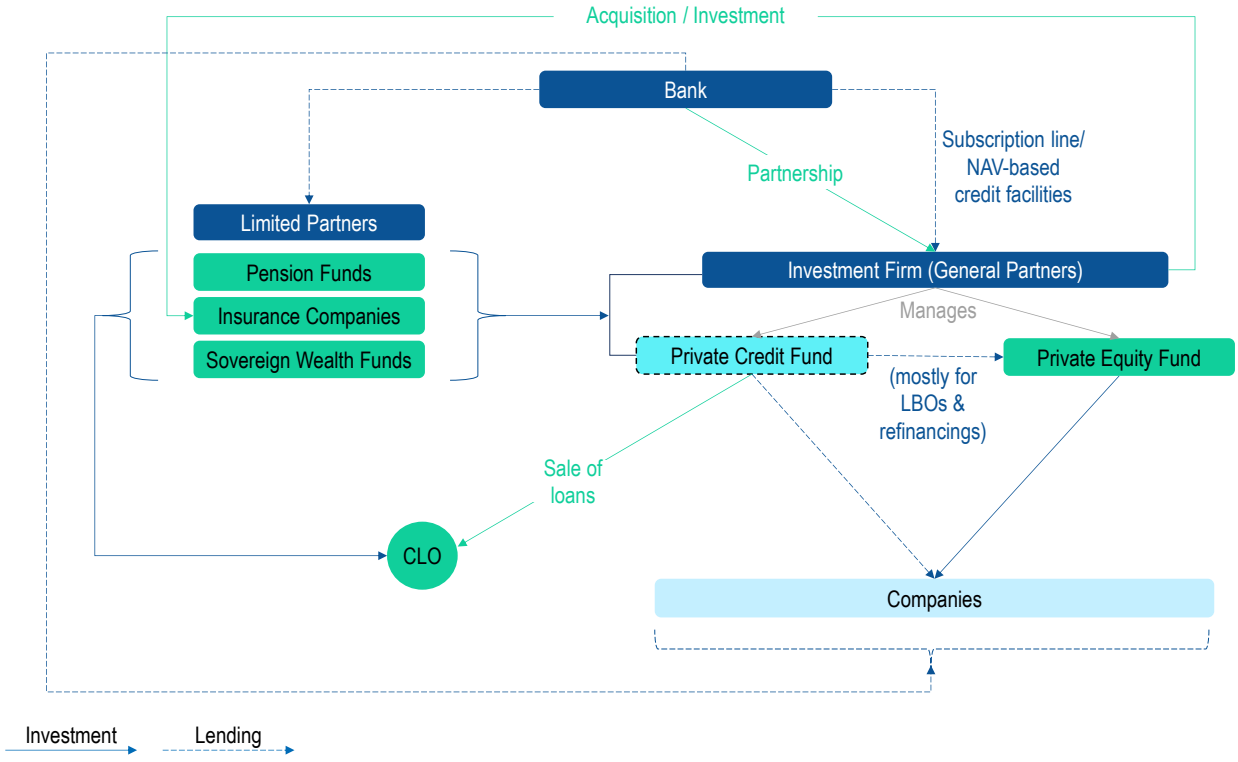
Banks, insurance companies and pension funds are increasingly exposed to private credit

Private credit markets have significant links, both direct and indirect, to the traditional financial system. Globally, insurance companies and pension funds account for 86% of investment into private credit funds, followed by smaller entities such as sovereign wealth funds and family offices (ECB, 2024[36]; BIS, 2021[37]). In advanced economies, insurers and pension funds have increased their exposure to private credit funds by a factor of five over the last decade, in search of higher yields during a period when traditional fixed income offered very low returns (IMF, 2024[26]). Banks are also connected to private credit, both directly through credit facilities with the funds, and indirectly through bank loans to companies that are also

financed through private credit (Figure 2.26). There has also been an increase in partnerships between banks and private credit investment firms recently, offering the latter access to banks' extensive customer networks to source deals, and allowing banks to transfer loans that do not meet regulatory requirements (such funds operate outside of banks' balance sheets) and offer clients new financing options. Banks also rely on so-called "synthetic risk transfers" to manage regulatory requirements, which allow them to sell part of the credit risk on loans to private credit funds, thereby reducing capital requirements and boosting revenues while keeping the loans on their balance sheet and maintaining existing client relationships. However, despite this growing interconnectedness, banks' direct exposure to private credit remains low on aggregate. In 2023, a global survey of 32 banks actively engaged with private credit showed that banks' private credit loan commitments represented less than 4% of total loans (Moody's, 2024[38]). Indirect exposures to risks in the market, however, may be significantly larger but are difficult to estimate given the multi-layered and complex structure of the ecosystem coupled with limited disclosure requirements.

Figure 2.26. Stylised overview of the private credit ecosystem

Private credit funds are interlinked with the traditional financial system both directly and indirectly



Note: This figure seeks to illustrate possible connections between the main actors in the private credit ecosystem. This does not mean that every single actor is always and simultaneously exposed to all other actors in the way shown here.

It is also worth emphasising the strong links between private credit and private equity. Eighty-one percent of investment firms managing private credit funds also manage private equity funds (weighted by private credit assets under management), and about 70% of private credit deals come from companies sponsored by private equity firms. Additionally, over 86% of US private equity-backed companies' borrowing in 2023 was through direct lending or institutional leveraged loans (IMF, 2024[26]). This is significantly higher than the aggregate composition of corporate credit in the United States, where loan financing represents only around a third of total credit, with bond financing accounting for the majority of debt capital (OECD, 2021[39]). Private equity firms are increasingly shifting their focus to private credit to address commercial

banks' growing reluctance to fund LBO activity, having private credit funds either directly finance LBOs or purchase bank-originated LBO debt (IMF, 2023[40]). In 2024, private credit funds financed as much as 77% of global LBOs (S&P Global, 2025[41]).

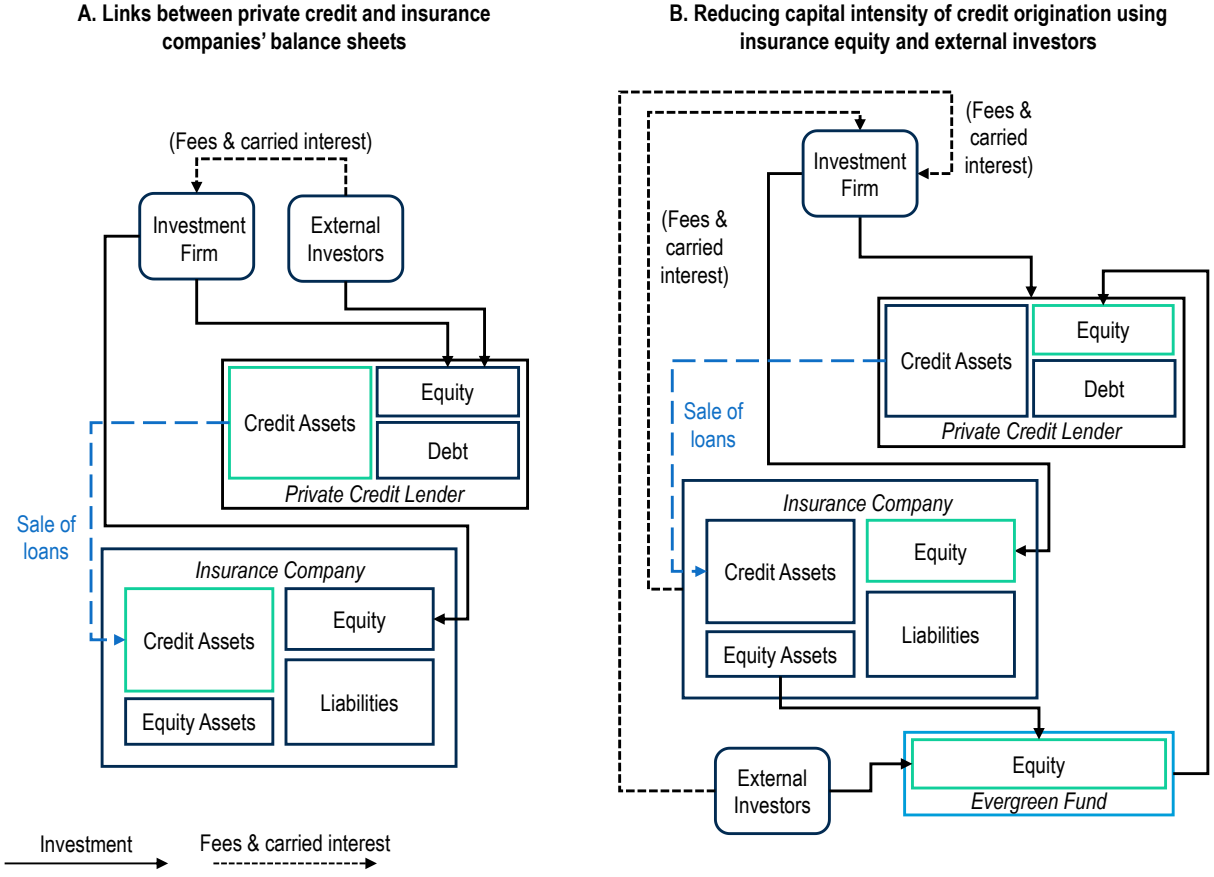
Another notable development in recent years is the growing interconnection between private credit/equity firms (investment firms) and insurance companies, in particular life insurers. Investment firms have had stakes in life insurers for a long time, but the connection has both intensified and changed in character in recent years. This was partly triggered by the low-interest rate environment in the wake of the 2008 financial crisis rendering life insurance annuities unprofitable for insurers, allowing investment firms to buy blocks of these annuities at discounts and reinvest them in higher-yielding assets. Some investment firms have since expanded their engagement with insurance capital by taking direct equity stakes in (and sometimes full ownership of) insurance companies. The investment firms thereby get access to additional long-term capital to fund their private credit origination. The long-term assets can then be invested in structured credit products like CLOs, generating steady, fee-related earnings. As a result, insurers' risk profiles are changing, with studies showing that private equity-influenced insurers hold more illiquid assets than other insurers (IMF, 2023[40]; Vandevelde and Indap, 2021[42]).

Indeed, following a series of high-profile acquisitions and partnerships in the last years, the insurance industry is now a cornerstone of the private credit market. While the aggregate exposure to private credit of insurers and pension funds remains low at around 3.6% of total assets, they are very prominent in certain market segments (IMF, 2024[26]). Insurance companies funded 43% of the top seven listed private market firms' credit assets at the end of 2024, representing more than half of inflows (Oliver Wyman, 2025[43]). For investment firms with private credit operations, there are two main incentives to take stakes in insurance companies. First, there is, as noted, a virtuous cycle between their capacity to originate credit (through the private credit operations) and insurance companies' need for high-quality credit assets. Second, it allows the investment firm to use the insurance company's balance sheet, together with external investment, to reduce the capital intensity of credit origination and, again through external investment, gain additional revenue through asset management fees and carried interest. Figure 2.27 illustrates one particular model of this approach. In Panel A, the investment firm controls an asset-backed private credit lending operation in which external investors also take a stake. This serves to simultaneously reduce its own capital intensity and generate fees and carried interest. In this simplified example, the lender's originated credit (i.e. its loans to companies) are then allocated to (bought by) the insurance company. That can happen e.g. through allocation of part of a syndicated transaction, or as a structured product such as a CLO.

The insurance company may also invest directly in the private credit lending operation (controlled by the investment firm), earning the investment firm additional asset management fees. Panel B illustrates a specific example of a structure like this, whereby the insurance company's equity assets are used to invest in the private credit fund, using an evergreen fund with external investors, further reducing capital intensity. As long as the insurer continues to grow its business (increasing annuity liabilities), it can use this continuous inflow of long-term capital to channel credit assets from the private credit operation onto its balance sheet, thereby shrinking the share of equity assets, thus freeing up space for more equity investment for a given equity-to-asset ratio. This new equity can then be invested into the evergreen fund again, creating a sort of virtuous capital cycle. Through these dynamics, the investment firm's initial equity investment in the insurance company is transformed into a much larger injection into the private credit operation, first by using the insurance company's equity assets, complemented by external investment in the evergreen fund. In essence, acquisitions of insurance companies by investment firms allow them to upscale their investments, while earning management fees and carried interest along the way.

Figure 2.27. Stylised overview of an investment model linking investment firms, insurance companies and private credit

Investment firms can upscale their investments through insurance companies



It bears noting that this is not the only model investment firms use to earn money through exposure to insurance companies. Another strategy used by some major firms has been to simply take a minority stake in an insurer, increase its asset allocation towards alternative assets, and earn fees for managing those investments (IMF, 2023[40]).

Private credit expands corporate access to financing, but broader financial stability risks remain largely obscure

The rise of private credit can expand credit access to sectors of the economy that would not otherwise have it. Studies show that borrowers in the private credit sector are often characterised by high leverage, low or negative earnings, lack of credit ratings and limited collateral, which are typical traits of early-stage and high-growth companies (S&P Global, 2021[44]; Federal Reserve, 2024[28]; IMF, 2024[26]).

A growing private credit market also carries potential risks. Because the loans are usually unrated, rarely traded and valued "marked to model", meaning in a non-standardised way, and therefore sensitive to changes in assumptions, it is more difficult to properly assess risks in advance. While default numbers have been low compared to other similar instruments, the recent rise in payment in kind (PIK) provisions, which allow borrowers to defer interest payments by adding them to the principal, typically at higher interest rates, has raised concerns regarding the visibility of risks in the sector (Fitch Ratings, 2024[45]). Furthermore, the floating-rate nature of private credit can become a problem for debtors when interest rates rise rapidly.

Finally, two recent developments could also impact the market and the risk for investors and borrowers. First, while private credit funds are typically closed-end, the last years have seen an increase in semiliquid funds (i.e. allowing for more frequent redemptions), increasing the liquidity risk during episodes of economic downturn and financial distress. The recent emergence of private credit ETFs offering daily trading to attract retail investors adds to that risk. Second, recent announcements from major alternative investment managers seeking to build secondary marketplaces for private credit could fundamentally change the perception of risk in the sector (Bloomberg, 2024[46]). While this could provide end investors with greater visibility into the firms they are lending to, it would also increase the likelihood of fire sales and liquidity shortages in periods of volatility. Therefore, as private credit continues to grow, the risks inherent in the system, and especially its link to the broader financial ecosystem, demand further scrutiny.

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Annex 2.A. Methodology – Corporate debt

Corporate bond data

Data presented on corporate bond issues are based on OECD calculations using deal-level data obtained from LSEG on new issues of corporate bonds that are underwritten by an investment bank. The database provides detailed information for each corporate bond issue, including the identity, nationality and sector of the issuer; the type, interest rate structure, maturity date and rating category of the bond; and the amount of proceeds obtained from the issue and intended uses thereof.

Convertible bonds, deals that were registered but not consummated, preferred shares, sukuk bonds, bonds with an original maturity less than or equal to one year or an issue size less than USD 1 million are excluded from the dataset. Industry classifications are based on The Reference Data Business Classification (TRBC) from LSEG. Yearly issuance amounts initially collected in USD were adjusted by 2024 US Consumer Price Index (CPI).

Given that a significant portion of bonds are issued internationally, it is not possible to systematically assign issues to a certain country of issue. For this reason, the country breakdown is carried out based on the country of domicile of the issuer. The advanced/emerging market classification is based on IMF country classifications.

Rating data

Rating information is based on OECD calculations using data obtained from LSEG that provides rating information from three leading rating agencies: S&P, Fitch and Moody's. For each bond that has rating information in the dataset, a value of 1 is assigned to the lowest credit quality rating (C) and 21 to the highest credit quality rating (AAA for S&P and Fitch and Aaa for Moody's). There are eleven non-investment grade categories: five from C (C to CCC+); and six from B (B- to BB+). There are ten investment grade categories: three from B (BBB- to BBB+); and seven from A (A- to AAA).

If ratings from multiple rating agencies are available for a given issue, their average is used. Some issues in the dataset, on the other hand, do not have rating information available. For such issues, the average rating of all bonds issued by the same issuer in the same year (t) is assigned. If the issuer has no rated bonds in year t, year t-1 and year t-2 are also considered, respectively. This procedure increases the number of rated bonds in the dataset and hence improves how representative the rating-based analysis is. When differentiating between investment and non-investment grade bonds, the final rating is rounded to the closest integer and issuances with a rounded rating less than or equal to 11 are classified as non-investment grade.

Early redemption data

When calculating the outstanding amount of corporate bonds in a given year, issues that are no longer outstanding due to having been redeemed before their maturity date are deducted. The early redemption data are obtained from LSEG and cover bonds that have been redeemed early due to being repaid via final default distribution, called, liquidated, put or repurchased. The early redemption data are merged with the primary corporate bond market data via International Securities Identification Numbers (ISINs).

Cost of outstanding debt

The weighted average cost of debt is approximated for fixed-rate debt by calculating the total outstanding amount of debt across 26 coupon buckets between 0 and 1 250 basis points (increasing in increments of 50 basis points, i.e. 0 to 50, > 50 to 100, etc.). The resulting amounts are then multiplied by the midpoint cost of the corresponding bucket (e.g. 25 basis points for the 0 to 50 bucket, 975 basis points for the 950 to 1000 bucket) and divided by the total outstanding amount of all fixed-rate bond debt. The sum of those products yields an estimated value-weighted interest rate for all outstanding debt. All debt with coupons above 1 250 basis points are given a midpoint value of 1 275. Where coupon data are not available, the yield to maturity at issuance is used. For bonds that are not issued at par, this may differ from the coupon rate.

Investment fund data

Investment fund analyses are based on OECD calculations using fund-level data obtained from Morningstar Direct. The dataset is split into nine broad categories (Morningstar Global Broad Category Group) based on the primary asset class orientation of the fund: Allocation, Alternative, Commodities, Convertibles, Equity, Fixed Income, Miscellaneous, Money Market and Property. In total, the dataset includes over 281 000 open-ended funds and ETFs.

To identify funds that actively participate in the corporate bond market, the dataset is restricted to a subset of funds with at least 25% net exposure (long exposure minus short exposure, as a share of the total portfolio) to corporate bonds as of the latest available observation (typically early 2025).

All-time series data (number of bond holdings, the share of the top ten holdings in the total portfolio, geographic exposure) are observed monthly. However, not every fund has data available in every month. Therefore, an average annual number (based on available month-end observations), is calculated for each fund. To calculate fund exposure in absolute terms, total fund size is multiplied by this average exposure. Only observations for which fund size is disclosed in 2024 or later are included in the analysis. Time series analyses include all funds that were alive in a given year, even if they have since been liquidated.

For analyses that are split by region, the fund's investment area is used. This denotes the geographic area that the fund focuses its investments in and may be different from the fund's domicile or region of sale. Broader regional categories (e.g. Asia, Europe) are manually classified and include funds with country-specific focus (meaning e.g. China is fully included in the Asia category). The advanced and emerging economy classifications are provided by Morningstar.

Herfindahl-Hirschman Index of market concentration

The Herfindahl-Hirschman Index (HHI) is a commonly used measure of market concentration. It is calculated by squaring the market share of each firm active in a given sector and then summing those terms. To analyse concentration in global corporate bond markets, the outstanding amount of debt of each company in the dataset is calculated. That is then divided by the total outstanding amount in the relevant market. The resulting share is squared. This is repeated for each company in the relevant group, after which all the terms are summed up. In general terms:

$$HHI_s = \sum_{i=1}^{N} \left(\frac{Outstanding\ amount_{i,s}}{Tot.\ outstanding_s}\right)^2$$

Where $Outstanding\ amount_{i,s}$ is the outstanding amount of firm i in sector s, $Tot.\ outstanding_s$ is the total outstanding amount in that sector and N is the number of firms in the sector. "Sectors" here refer to the different groups used for analysis (e.g. non-financial companies in advanced economies).

The HHI can be presented either on a scale from 0 to 1 (if the market shares are given in decimal form) or 0 to 10 000 (if they are given as integers). Commonly used thresholds for what is considered a concentrated market have been established through regulatory guidelines and case law in the field of competition law, where the measure is often used to evaluate the effect that a merger would have on market competition. For example, in their merger guidelines the US Department of Justice and Federal Trade Commission (2023[47]) consider markets with a HHI above 0.1 to be concentrated ("moderately concentrated" if it is between 0.1 and 0.18 and "highly concentrated" if it is above 0.18). The merger guidelines use a 10 000-point scale which has here been converted to a 0-1 scale for comparability.

Syndicated loan data

The syndicated loan figures presented in Chapter 2 are based on OECD calculations using deal-level data from LSEG. This database provides detailed information on each loan, including the borrower's identity, nationality and sector, as well as the interest rate structure, maturity date and loan amount. The loan credit rating category is defined based on the following criteria:

- Investment grade: Initial pricing up to 299 basis points above the base rate
- Leveraged: Initial pricing between 300 and 399 basis points above the base rate
- Highly leveraged: Initial pricing 400 basis points or more above the base rate

Only loans classified as "syndicated" or "club syndicate" are included in the analysis. Deals with maturities of less than 90 days are excluded. Annual data are based on the closing date, which is when the syndication on all levels/tiers has been signed and completed. Industry-level analyses follow LSEG's Business Classification (TRBC), while country breakdowns are based on the borrower's domicile. To account for inflation, issuance amounts originally recorded in USD were adjusted using the 2024 US Consumer Price Index (CPI).

Private credit data

The private credit figures presented in Chapter 2 are based on OECD calculations using deal-level and fund-level data from Preqin. This database contains detailed information on private credit deals including the year, the lenders' identity, the volume, the sector and the lending strategy. It also includes information on funds' exposure to private credit, including their assets under management, the sectors they lend to and the regional focus.

Assets under management are calculated at the end of a calendar year, with the exception of the datapoint for 2024 that is calculated at the end of June. The figures only consider closed-ended, unlisted private debt funds, which includes unlisted Business Development Companies (BDCs). Collateralised debt obligations (CDOs) are not included. Sectoral analyses follow Preqin's internal taxonomy, while regional breakdowns are based on the borrowers' country of domicile. Lending strategies follow internal classifications.

For the regional breakdowns, North America includes Bermuda, Canada, Cayman Islands, the United States and US Virgin Islands. Europe includes the EU27, Albania, Alderney, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, the Faroe Islands, Georgia, Gibraltar, Greenland, Guernsey, Iceland, Isle of Man, Jersey, Kosovo, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia, San Marino, Serbia, Switzerland, Türkiye, the United Kingdom and Ukraine. Asia includes Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Democratic People's Republic

of Korea, Fiji, Hong Kong (China), India, Indonesia, Japan, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Macau (China), Malaysia, the Maldives, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Singapore, Korea, Sri Lanka, Chinese Taipei, Tajikistan, Thailand, Timor-Leste, Turkmenistan, Uzbekistan and Viet Nam.

To account for inflation, issuance amounts originally recorded in USD were adjusted using the 2024 US Consumer Price Index (CPI).

Corporate document analysis

Mentions of different risk indicators in corporate disclosures refer to corporate filings and earnings call transcripts by companies included in the Russell 3000 (US), Euro STOXX 600 (Europe) and NIKKEI 225 (Japan) indices that are included in the Bloomberg Document Search database. Document types include annual, semi-annual and quarterly reports, 10-K, 10-Q, 8-K, 6-K, as well as earnings call transcripts, conference presentation calls, shareholder meeting calls and company presentations. The results are obtained through natural language processing built into the Bloomberg search function. Keywords shown in graphs are complemented with near or exact synonyms to expand results, such as "bond", "credit" and "loan" for "debt" and "world political" and "geo political" for "geopolitical".

3 Sovereign debt markets in emerging market and developing economies

Emerging market and developing economies' sovereign borrowing from markets continued to rise in 2024 despite borrowing costs hovering near 15-year highs.

Lower-middle and low-income countries faced particularly challenging funding conditions, with many struggling to access global bond markets.

With the number of countries with high credit risk close to record levels, large refinancing needs and high borrowing costs threaten to further constrain fiscal space. Countries relying on foreign markets are especially vulnerable. Accelerating the development of local currency bond markets is crucial for ensuring sustainable and resilient sovereign financing for these countries.

Introduction

The monetary policy tightening cycle since early 2022 has been one of the fastest in recent decades, and rising global interest rates having historically been a major trigger of financial crises in emerging market and developing economies (EMDEs). EMDEs, which often have limited domestic savings and revenue, need to borrow to finance investments that promote economic growth and stability. This chapter analyses EMDE sovereign bond markets in this challenging environment. It examines issuance trends, borrowing costs, foreign market access, and credit rating developments and concludes with a refinancing outlook. The chapter predominantly uses available market data sources on central government bond issuance. Annex 3.A provides methodological details.

Key findings

- **Emerging market and developing economies' sovereign bond markets have grown substantially since 2007.** Outstanding bond debt reached nearly USD 12 trillion in 2024, up from USD 4 trillion in 2007. During the same period, EMDE annual borrowing from markets tripled from around USD 1 trillion to over USD 3 trillion, with issuance amounts increasing by 12% in 2024**.** China accounted for 45% of total issuance in 2024, up from 17% in 2007-14.
- **Local currency borrowing costs have increased since 2022, with the greatest impact on low-income countries and those with a credit rating of single B or lower.** Real yields at issuance rose from negative levels to nearly 4% between 2020 and 2024 in EMDEs, excluding China. In low-income countries, they climbed from 4% to over 7%. The shorter average maturity of their debt makes the outstanding stock more sensitive to rate changes. Half of the current outstanding debt was issued over the past three years with higher yields, adding pressure on government finances.
- **EMDEs rely more on foreign currency debt than advanced economies, increasing currency risk and borrowing costs.** Excluding China and India, foreign currency denominated debt accounts for around 20% of the total EMDE debt, compared to just 6% for the OECD average. For smaller EMDEs, foreign currency debt has made up around 40% of total outstanding debt since 2018. Importantly, the total cost of foreign currency debt often significantly exceeds that of local currency debt in the long term, when accounting for currency depreciation.
- **USD-denominated bond borrowing costs in EMDEs rose from around 4% in 2020 to over 6% in 2024**, exceeding 8% for lower non-investment grade countries. As a result, these countries have had negative net borrowing from foreign markets since 2022.
- **About half of the rated EMDEs in 2024 were graded as high risk, and 10 as very high-risk or in default.** Despite this, the investment grade share of total outstanding EMDE sovereign debt reached a high of nearly 80% in 2024, up from less than half in 2007, driven mainly by increased issuance from larger investment grade EMDEs.
- **Over USD 4.5 trillion in EMDE bond debt, about 40% of the total outstanding, will mature by 2027.** Low-income and high-risk countries face the greatest refinancing risks, as more than half of their debt comes due during this period, with over 20% maturing in 2025 alone.
- **Sovereign issuers in EMDEs should prioritise deepening local currency bond markets to reduce reliance on external debt and mitigate exchange rate risks.** This requires strong market infrastructure, transparency, investor diversity, a credible yield curve and stability.

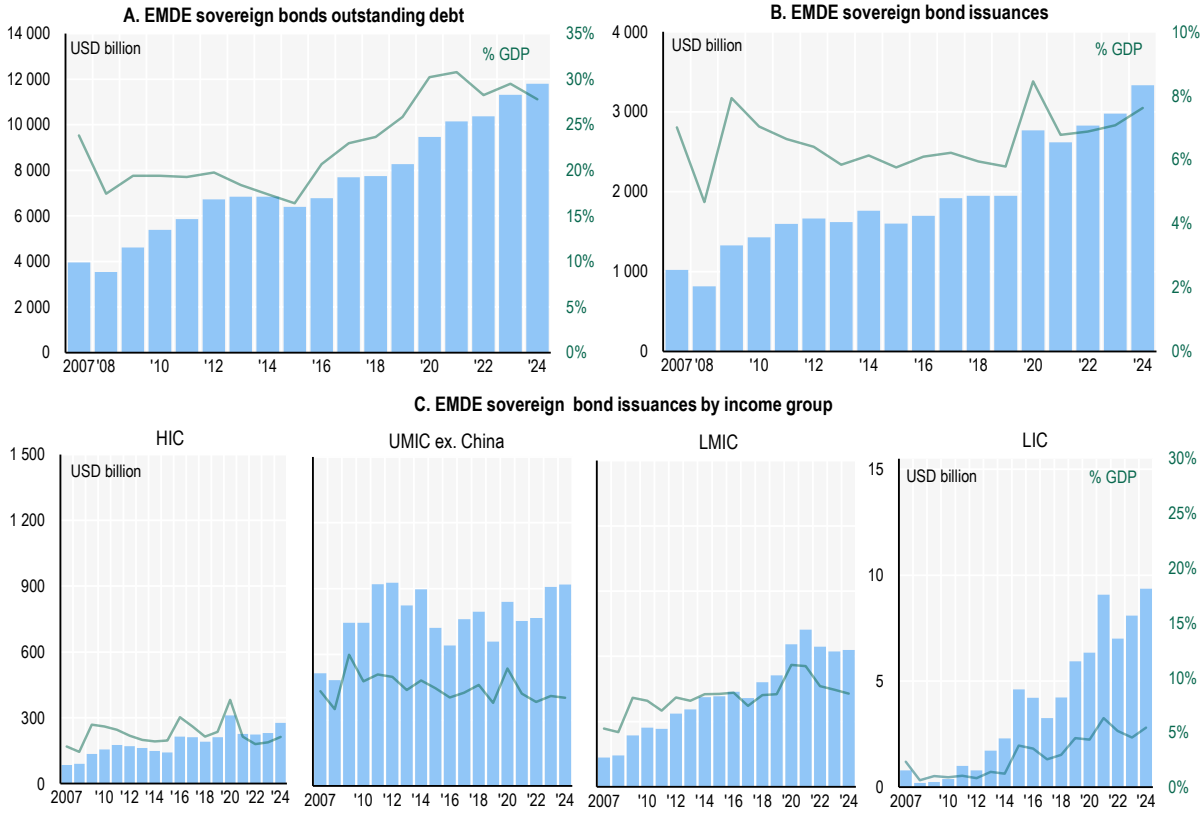
Bond issuance

Issuance by lower income sovereigns has grown more than that of higher income EMDEs since 2007

EMDEs' sovereign bond markets have grown significantly across all income groups since 2007. Outstanding sovereign bond debt in EMDEs reached nearly USD 12 trillion (around 30% of GDP) in 2024, up from less than USD 4 trillion in 2007 (around 20% of GDP) (Figure 3.1, Panel A). During the same period, annual issuance by EMDEs tripled, from approximately USD 1 trillion in 2007 to over USD 3 trillion in 2024 (Figure 3.1, Panel B).[1] This represents an annual growth rate of almost 7% in US dollar, a substantial increase considering that the US dollar appreciated more than 80% against EMDE currencies during this period.

Figure 3.1. EMDEs' sovereign bond issuance and outstanding bond debt

EMDEs' sovereign bond outstanding and issuance levels increased in both nominal terms and relative to GDP



Note: Only the GDP values of sovereign issuers with outstanding bonds (Panel A) or issuing (Panels B and C) in that year were included in the denominator of the right-hand side figures.
Source: LSEG and OECD calculations.

The growth in issuance has been particularly marked since the onset of the COVID-19 pandemic. Between 2007 and 2019, annual issuance by EMDEs rose by approximately 90%, reaching just below USD 2 trillion in 2019. Following the pandemic, issuance increased by more than one trillion, reaching over USD 3 trillion in 2024.This trend is strongly influenced by China, whose central government's issuance accounted for

45% of EMDE sovereign bond market issuance in 2024, compared to around 2% on average during 2015-19 and around 17% in 2007-14. The significant increase in China's borrowing is explored further in Box 3.1.

EMDEs in all income groups increased their sovereign bond issuance, albeit at varying rates (Figure 3.1, Panel C). LICs saw the most significant growth, with sovereign bond issuance increasing 12 times between 2007 and 2024, followed by LMICs (5 times), HICs (3 times), and UMICs, where issuance almost doubled. Despite this rapid growth, LIC sovereign bond markets remain underdeveloped, with gross issuance-to-GDP ratios significantly lower than in other income groups, reaching only 4% of GDP in 2024, compared to nearly double that amount for EMDEs in general.[2]

LMICs' share of total EMDE sovereign bond issuance rose from approximately 13% in 2007 to 19% in 2024. In contrast, the share of UMICs, excluding China, declined from 50% to 28%. Meanwhile, the shares of HICs and LICs remained largely stable at around 8% and less than 1%, respectively.

The growth in LMICs' sovereign bond markets was partially reversed following the monetary tightening in advanced economies from 2022, and sovereign debt issuance declined between 2022 and 2024, both in nominal terms and as a share of GDP. This decline was not reflected in aggregate EMDE issuance which was mainly driven by upper middle-income countries where issuance continued to expand after 2023.

Local currency bond markets in EMDEs have strengthened, but maturities remain shorter than in advanced economies, and some countries still rely heavily on foreign currency

Past debt crises during global tightening cycles have shown that the mix of debt instruments and their maturities is crucial for reducing a country's vulnerability to global shocks. The Original Sin Hypothesis posits that countries unable to borrow in their local currency over the long-term face more fragility due to currency or maturity assets-liability mismatches (Eichengreen and Hausmann, 1999[1]).[3] Such countries may incur liabilities in foreign currencies without corresponding revenues in that currency, raising currency risk. They might also finance long-term projects with short-term debt, increasing exposure to interest rate shifts. Consequently, changes in market conditions and borrowing needs can more readily precipitate a crisis.

Although funding conditions and high borrowing needs are major sources of vulnerability and often beyond the control of debt managers, prudent debt management helps mitigate these risks by minimising refinancing pressures, and reducing exposure to currency and interest rate fluctuations. When setting borrowing strategies, sovereign issuers take a long-term perspective and consider a trade-off between foreign currency-denominated and local currency bonds that involves balancing funding costs, investor demand, refinancing risk, and interest rate and exchange rate risks.

EMDE sovereign issuers face particular challenges in improving the risk profile of their public debt portfolios due to shallow local currency bond markets, high borrowing costs, and exchange rate volatility, which limit their ability to issue long-term local currency debt. Foreign currency-denominated debt benefits from lower interest rates, strong global demand and longer maturities, but it exposes issuers to exchange rate risk, volatile debt servicing costs, and external shocks.

Box 3.1. China's growing share of EMDEs' government debt market

Growth in China's central government bond market has greatly outpaced that in other EMDEs since 2007 and especially after the outset of the COVID-19 pandemic. The central government's annual issuance, which averaged less than 5% of the country's GDP between 2007 and 2019 with no clear upward trend, reached more than 8% in 2024, at USD 1.5 trillion, accounting for 45% of EMDE sovereign issuance.

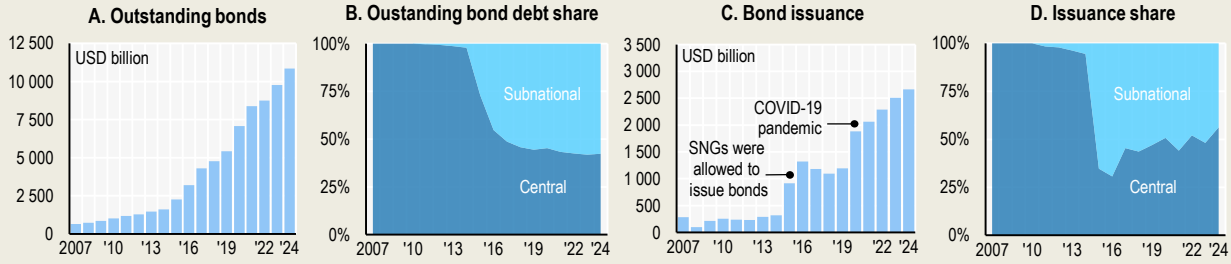
The share of China's central government issuance understates the size of its general government bond market, which includes subnational government (SNG) debt. China's SNGs have a larger amount of outstanding debt than the central government,[1] with more than USD 6 trillion in 2024 compared to less than USD 5 trillion (Figure 3.2, Panels A and B). The outstanding amount of China's SNG bonds is bigger than the sovereign bond market of every OECD country except Japan and the United States.

The Chinese SNG bond market officially began in late 2014, when the central government allowed SNGs to issue bonds up to a ceiling set annually (Figure 3.2, Panels C and D). Before this, local governments were generally prohibited from issuing debt,[2] and funded part of their public spending through land right sale revenues and off-balance sheet borrowing, primarily via local government investment vehicles (IMF, 2024[2]). These operations were substantial, with the estimated outstanding debt issued by these vehicles reaching around 60% of GDP by 2019 (OECD, 2022[3]). Consequently, over half of the SNG issuance since late 2014 may represent the conversion of existing local government investment vehicles debt into marketable debt.

Central government issuance surged after 2020, driven by the fiscal needs from COVID-19 mitigation measures and efforts to stimulate the economy amidst the slowdown. Looking ahead, general government debt issuance is projected to keep rising in the near term (OECD, 2024[4]). Local governments may face fiscal challenges as land concession revenues, which represented a substantial part of their budgetary revenues before the pandemic, depend on real estate markets (Kim and Dougherty, 2020[5]). If Chinese monetary policy remains accommodative, this may reduce the impact of higher borrowing on interest expenses, especially since China's government borrows almost exclusively in local currency.

Figure 3.2. Central and subnational government issuance and outstanding bond debt in China

Subnational governments account for a big share of China's government bond markets



Notes:
[1] Other EMDEs with reasonably sized SNG bond markets include India and South Africa. Combined, they have nearly USD 600 billion in outstanding SNG bonds (Brochado and Dougherty, 2024[6]). In advanced economies, the SNG bond market amounts to around USD 7 trillion, with the United States comprising over half of it.
[2] Although SNG bond issuance was forbidden before 2014, the central government could issue on their behalf. Moreover, there were some SNG bond issuance before 2014 under a pilot programme for selected jurisdictions.
Source: LSEG and OECD calculations.

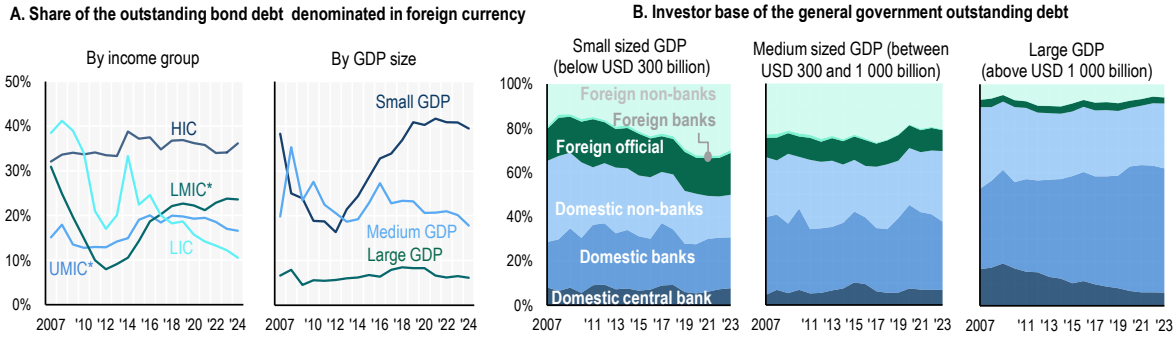
Several macro-financial factors contributed to the development of local currency bond markets in some EMDEs. First, the 2000-14 commodities boom allowed some EMDEs to strengthen their fiscal balances and boost their foreign exchange reserves. Second, quantitative easing programmes to tackle the global financial crisis have depressed long-term rates in US dollars, prompting some investors to diversify their portfolios towards EMDEs. Third, under these favourable conditions, many EMDEs were able to enhance their balance sheets and monetary policy credibility, increasingly adopting more inflation-targeting frameworks and floating exchange rates (Kalemli-Ozcan and Unsal, 2024[7]), all of which reduced the risks associated with holding EMDE local currency debt.

The share of foreign currency bond debt declined notably in lower income countries (LICs and LMICs) from 2007 to the mid-2010s, continuing a broader movement from the early 2000s as these countries developed their local currency bond markets. In LICs, the share dropped from around 40% in 2007 to 20% in 2015, while in LMICs it fell from just above 30% to below 15% (Figure 3.3, Panel A). In contrast, the share of foreign currency bond debt increased in UMICs, though it remained below 20%, and fluctuated around 35% in HICs.

Since 2018, the share of the outstanding bond debt denominated in foreign currency has been the highest in HICs, followed by LMICs, UMICs and LICs (Figure 3.3, Panel A). One reason for this is the differences in funding sources. LICs and some LMICs rely more on loans, including concessional ones, for foreign currency financing, reducing their need to issue foreign currency bonds in markets. In contrast, UMICs and HICs are more likely to access capital markets for foreign currency funding.

Figure 3.3. EMDEs' share of outstanding bond debt in foreign currency and investor base

Smaller EMDEs rely more heavily on foreign currency debt and on foreign investors



Note: UMICs* exclude China and LMICs* exclude India. Values in all Panels are weighted averages based on outstanding bond debt.
Source: LSEG (Panel A), IMF (Panel B) and OECD calculations.

Despite these improvements, EMDEs remain far more reliant on foreign currency debt than advanced economies. In OECD countries, the average share of foreign currency-denominated debt stood at 6% in 2024, with much of this exposure hedged. Among EMDEs, it represents approximately 20%—excluding China and India, the two largest EMDE issuers, both of which have well-developed local currency bond markets.

While there is no clear relationship between a country's income group and the share of its sovereign debt denominated in local currency, GDP size appears to correlate with the development of local currency bond markets. EMDEs with large GDPs (exceeding USD 1 000 billion) have consistently maintained foreign currency bond debt below 10% of the total outstanding (Figure 3.3, Panel A). In contrast, in countries with GDP between USD 300 billion and USD 1 000 billion, it has fluctuated between just under 20% and around

30% over the past decade. For countries with a GDP below USD 300 billion, foreign currency debt has been around 40% of total outstanding debt since 2018.

There were exceptions with some EMDEs with a GDP above USD 300 billion having more than one quarter of their outstanding bond debt denominated in foreign currency in 2024. These are Argentina, Chile, Colombia, Egypt, Romania, Saudi Arabia and Türkiye. In all of these countries, though, foreign currency bond debt accounted for half or less than half of the total outstanding in 2024. In contrast, all the 16 countries with more than half of their bond debt denominated in foreign currency had a GDP below 300 billion USD in 2024. Of these 16, 5 are LMICs, 5 are HICs, and the remaining 6 are UMICs, indicating that the reliance on foreign currency markets is not directly correlated with income, but rather with size.

One factor supporting the development of local currency bond markets in larger economies is their ability to more easily cultivate a diverse domestic investor base. Larger economies often have local investors with a wider range of investment horizons and risk profiles, enabling deeper and more resilient local markets (Figure 3.3, Panel B). Such an investor base includes, for instance, commercial banks and money market funds, which typically buy shorter-dated bonds, and pension and insurance companies, which typically buy longer-dated bonds. Institutional investors with a long-term investment horizon might be particularly useful to alleviate selling pressures in times of crisis as they do not seek short-term gains but rather to maximise long-term returns.

A key element of investor diversification is not being too reliant on any one group of investors, especially foreign investors. Countries that predominantly rely on foreign investors, even if their debts are mainly denominated in local currency, may face the "Original Sin Redux" risk (Carstens and Shin, 2019[8]), which occurs when foreign investors rapidly withdraw from a market during crises. Such withdrawals occurred during both the global financial crisis and the COVID-19 pandemic (Onen, Shin and von Peter, 2023[9]) and are triggered by the combined and reinforcing effects of duration (bond price sensitivity to interest rate changes) and currency risks to bond prices.

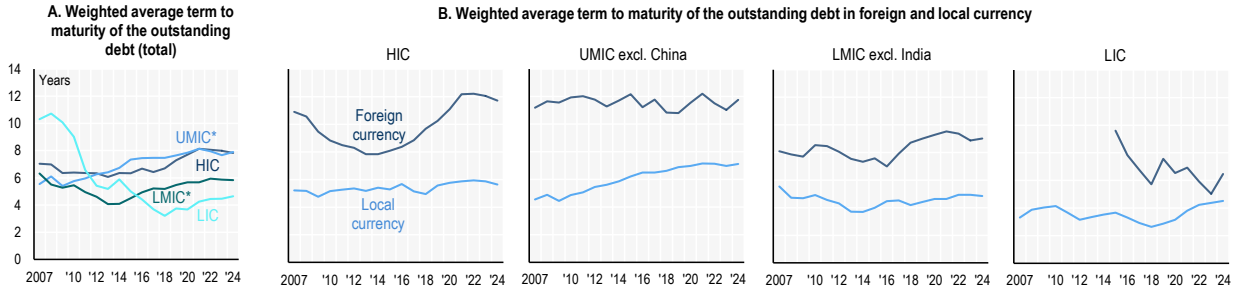
Over-reliance on local banks as investors for sovereign bonds can also pose risks due to the sovereign-bank nexus. The exposure of domestic banks to sovereign debt in EMDEs has grown rapidly over the last decade (Dunz et al., 2024[10]). When domestic banks hold large amounts of domestic government debt, and, thus, the public and financial sectors are closely linked, the stress in one can destabilise the other. A drop in sovereign bond values weakens the financial institutions that hold them, increasing financial stability risks. If these institutions require government support, the resulting fiscal strain can further undermine confidence in public finances, negatively affecting bond prices and creating a self-reinforcing cycle.

Lengthening the debt portfolio reduces refinancing risks by spreading repayment obligations over a longer period, making it less likely that a country will need to roll over large amounts of debt during unfavourable market conditions. This approach also decreases exposure to short-term interest rate volatility, providing greater stability in debt servicing costs. For EMDE sovereign issuers, longer maturities can help ensure smoother access to financing during periods of financial stress, as they reduce the frequency of market exposure and increase investor confidence in the country's debt sustainability.

The weighted average term to maturity (ATM) of the outstanding sovereign debt has been shorter in LICs and LMICs than in UMICs and HICs since the early 2010s (Figure 3.4, Panel A). Since 2015, the ATM in LICs has varied between three and five years. In LMICs, it has remained between five and six years since 2017, while in UMICs and HICs, it has exceeded seven years since 2015 and 2019 respectively. All these figures are below the average ATM in OECD countries of around eight years in 2024 (see Chapter 1).

Figure 3.4. EMDEs weighted average term to maturity of outstanding bond debt

Since the mid-2010s, EMDEs have extended debt maturities, but lower-income countries still lag behind higher-income peers



Note: UMICs* exclude China and LMICs* exclude India. India is excluded from this figure as it accounts for over half of LMICs' outstanding bond debt and skews the analysis with its unusually high weighted average term-to-maturity of over 15 years. The ATM of LICs' outstanding debt in foreign currency began in 2015 as only a very limited amount of these countries' foreign currency bonds was outstanding before that year. Values in all Panels are weighted averages based on outstanding bond debt.
Source: LSEG and OECD calculations.

The ATM of sovereign bond debt increased across all income groups before the pandemic but declined after 2022, except in LICs where it continued to rise slowly. Most EMDEs took advantage of favourable funding conditions over the past decade to lengthen the maturities of their outstanding debt. However, following the tightening of monetary conditions in advanced economies after 2022, the ATM of sovereign debt in these countries began to decline, reversing a long-term trend of lengthening maturity.

The decline in LICs' ATM in the early 2010s does not necessarily reflect an increase in their risk profile, as part of this decline was the result of an increase in the proportion of debt denominated in local currency. The ATM for debt denominated in foreign currency is consistently higher than that for debt in local currency across all income groups (Figure 3.4, Panel B).[4] Due to currency risk, the demand for long-dated bonds in EMDEs' local currencies is lower than that of foreign currency debt. Therefore, as countries issue more debt in local currency, they tend to shorten their ATMs. In this case, countries are reducing their foreign currency exposure while slightly increasing their refinancing and interest risk exposure, thus likely reducing the overall risk exposure of their debt portfolios.

EMDEs have made progress in developing local currency bond markets and extending debt maturities. However, progress has been unequal across larger and smaller issuers, and lower and higher income countries. Larger issuers tend to have more developed local currency bond markets, supported by broader domestic investor bases that improve market depth and resilience, while smaller issuers lag behind. Further, LICs and LMICs have shorter ATMs than UMICs and HICs, making them more vulnerable to refinancing and interest rate risks. Strengthening local currency bond markets and lengthening their debt portfolios remain critical for EMDEs to help mitigate external shocks.

Borrowing costs and market access

Monetary tightening cycles in advanced economies, particularly in the United States, can have significant spillover effects on global bond markets. These effects often include increased yields across the curve, depreciation of EMDE currencies and elevated credit risks. Borrowing costs are pressured not only by higher yields in both local and foreign markets but also by the impact of currency depreciation on liabilities denominated in foreign currencies. Together, these factors can restrict market access for vulnerable issuers and, in some cases, lead to defaults.

Spillovers occur because hikes in US dollar yields, coupled with US dollar appreciation, typically increase the cost of imports priced in local currencies, raising inflation uncertainty and premiums and compelling central banks in EMDEs to increase interest rates to control prices. Additionally, in scenarios of slower global economic growth, foreign investors—crucial to the sovereign issuers' investor base in EMDEs for both foreign and local currency debt, as seen in the last section—may favour issuers with higher credit ratings, a phenomenon known as the "flight to quality."

US monetary tightening since 2022 has impacted EMDEs heavily, with a high policy rate in the US coinciding with elevated global inflation, appreciation of the US dollar and slower economic growth. In this monetary tightening cycle, the rise in yields in the USD 2-year and 10-year benchmarks has been the largest since at least 1994, with the US dollar index rising to a near 25-year peak. The current economic environment is also marked by relatively slow global growth prospects and relatively high macro-economic and geopolitical uncertainties, which can contribute to supply shocks and higher inflation (OECD, 2024[11]). Empirical evidence shows that spillovers of US tightening cycles to EMDEs are intensified when the US dollar appreciates and global inflation expectations increase (Caballero and Upper, 2023[12]).[5]

Although several central banks in advanced economies started loosening monetary policy in 2024 (see Chapter 1), long-term rates remain elevated and have increased in some countries, including the United States. Long-term rates are now at or near their highest levels for 15 years in a number of advanced economies. In this environment, funding conditions remain tight and are projected to remain so this year.

These worsening funding conditions come in the aftermath of the COVID-19 pandemic, during which EMDEs experienced a significant increase in debt burdens. EMDE debt-to-GDP ratios were 47% in 2000 and 35% in 2007.[6] By the end of 2021, just before the US Federal Reserve's first policy rate increase in Q1 2022, this ratio had reached 64%. This elevated indebtedness can lead to greater market pressures and limit overall fiscal capacity.

EMDE borrowing costs have surged since 2022, hitting lower income and high-risk countries the hardest

The typical first consequence of global monetary tightening cycles for sovereign issuers is the rise in borrowing costs, as evidenced by yield movements in the primary markets (i.e. yield at issuance). This increase can limit fiscal space, as more government revenue is diverted to interest payments, thereby elevating the levels of primary balances necessary for governments to maintain sustainable debt-to-GDP trajectories.

The fundamentals influencing EMDE sovereign bond yield movements depend on whether they are denominated in local or foreign currency. Yields from sovereign bonds denominated in local currency typically serve as the benchmark for that currency, effectively acting as the best proxy for the nominal risk-free rate of return. This rate of return comprises inflation compensation, a real rate of return, a term premium (to compensate investors for the future uncertainties of inflation and yields), and credit risk to a limited extent.

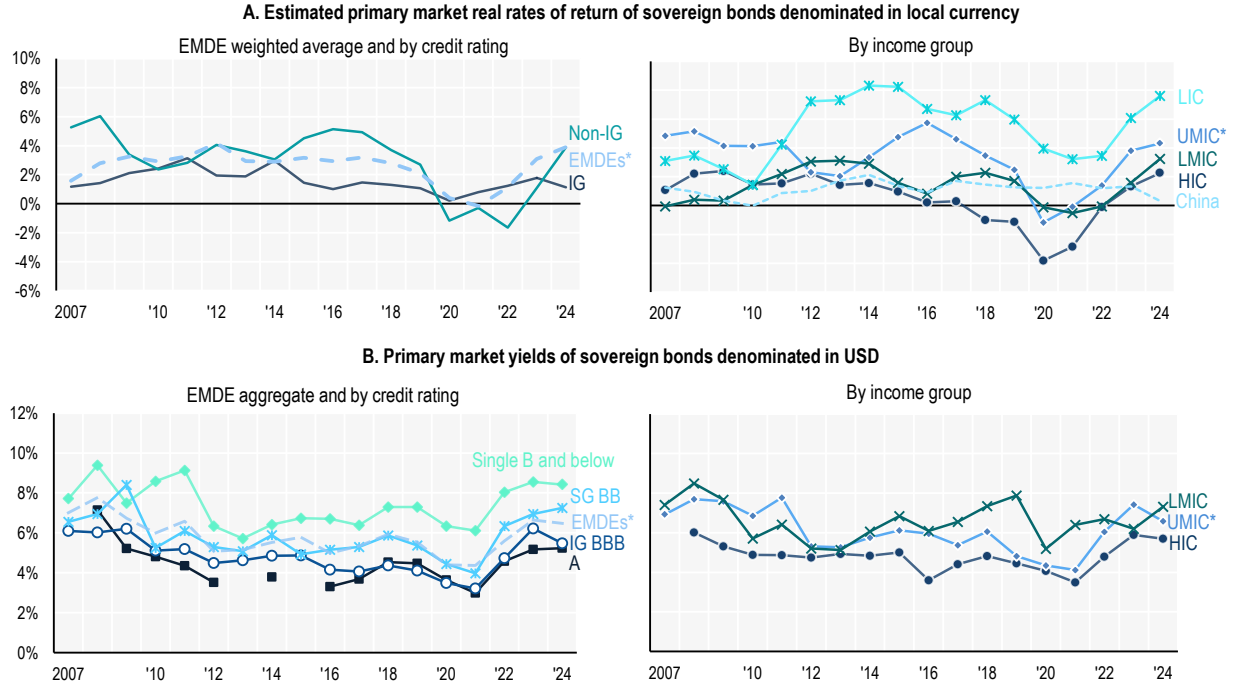
Comparing nominal yields is only meaningful when bonds are denominated in the same currency; real rates are more indicative of the actual borrowing costs and fiscal constraints governments face in local currency debt. Due to significant differences in inflation across currencies, countries may experience widely varying nominal and real returns—some with double-digit nominal yields yet negative real returns and others with single-digit nominal yields but positive real returns. From a fiscal sustainability perspective, debt-to-GDP ratio dynamics are influenced by real rather than nominal rates. For example, high nominal yields may not be problematic for debt sustainability if real yields are low or negative. In contrast, movements in real rates can significantly alter debt-to-GDP trajectories even if nominal yields remain stable.

Primary market estimated real yields on sovereign bonds issued in local currency rose from negative levels to nearly 4% in EMDEs (excluding China) between 2020 and 2024 (Figure 3.5, Panel A).[7] This level is comparable to the peak real yields observed in EMDEs' local currency bond markets in the mid-2010s and during the aftermath of the global financial crisis. In OECD countries, real yields, although rising, remain significantly lower, at around 2%—less than half the level in EMDEs (see Chapter 1). This rise in borrowing costs is particularly significant, as most market-based financing in EMDEs relies on local currency bond markets.

Although real yields at issuance have increased across all income and credit rating groups, they remain higher in LICs and speculative-grade economies. In HICs, yields shifted from negative territory in 2018-21 to over 2% in 2024 (Figure 3.5, Panel A). In UMICs and LMICs, they increased from negative territory in 2020 to 4% and 3%, respectively, in 2024. In LICs, real yields rose from around 3% in 2020 to more than 7% in 2024, significantly higher than other income groups. At the same time, investment-grade countries' real yields at issuance were around 1% in 2024, while they rose to nearly 4% in non-investment grade countries, a level also seen in the aftermath of the global financial crisis.

Figure 3.5. EMDEs primary market yields in local currency and USD

EMDEs yields at issuance have risen in both local and foreign currency markets



Note: IG and Non-IG refer to investment and non-investment grade, respectively. EMDEs* exclude China. The figures comprise a sample of bonds with primary market yield to maturity available in LSEG. All values are averages weighted by issuance amounts in the respective instrument by country. Real rates of returns are estimations as they can only be precisely computed for matured bonds. These were estimated by adjusting nominal yields from a sample of primary market issuance for realised and projected inflation from 2007 to 2029. Bonds excluded from Panel A are those maturing after 2029, with no available yield-to-maturity at issuance data in LSEG and from China and countries with relatively high inflation, namely Argentina, Lebanon, Türkiye, Venezuela and Zambia. In Panel B, China was excluded as it is not a frequent issuer of USD-denominated bonds, and LICs' data is sparse due to the scarcity of issuance in USD-denominated bonds for this income group.
Source: LSEG for bond yields and IMF WEO for inflation, OECD calculations.

Outliers include China, where real rates fell to nearly zero in 2024 amid a struggling real estate market; Egypt, where real rates rose by four percentage points (from nearly 0% in 2021 to 4% in 2024) due to

heightened economic distress; and Ukraine, where real rates exceeded 8% in 2024 amid the continuing war. Several LICs and LMICs also experienced sharp increases approaching or exceeding 5% in real yields. These include Kenya, Mali and Nigeria—all in Sub-Saharan Africa (SSA), with credit ratings indicating high risk.[8]

For EMDE sovereign bonds denominated in USD, primary market yields rose from around 4% in 2020 to over 6% in 2024 (Figure 3.5, Panel B). This increase was slightly smaller than that of the US 10-year benchmark yield, which climbed from around 1% in 2021 to over 4% for much of 2023 and 2024. As a result, spreads narrowed slightly on average, as the US benchmark yield rose more than EMDE USD-denominated debt yields. However, yields in USD-denominated debt remained at their highest point since 2011 (excluding 2023), while borrowing costs in foreign currency-denominated debt extend beyond yields and also include the effects of currency appreciation on coupon and principal repayments (see Box 3.2).

Non-investment grade issuers faced their highest USD borrowing costs in more than a decade, with weighted average costs of 7% to 8%, nearing the 10% threshold, a level indicative of market distress.[9] Precisely, yields at issuance between 2021 and 2024 increased from 6% to over 8% for EMDEs with high-risk credit ratings,[10] from 4% to over 7% for countries with a speculative BB grade, and from 3% to over 5% for investment-grade countries.

LMICs faced higher borrowing costs for USD-denominated bonds than UMICs and HICs. In 2024, LMICs' borrowing costs exceeded 7%, while those from UMICs and HICs remained below 7% and 6%, respectively. This trend of lower income countries having higher borrowing costs for USD-denominated bonds is common—this was the case in all years since 2007 except in 2023 and in 2010-13.

Box 3.2. The higher cost of USD-denominated debt for countries with low credit ratings

The cost of USD-denominated debt in EMDEs includes two main components: nominal yield and currency effect. Yields on EMDEs' local currency debt are generally higher than on USD-denominated debt as a currency risk premium is priced in higher macro-economic instability and inflation in EMDEs. However, since the USD has tended to appreciate against EMDE currencies over time, coupon and principal payments typically become costlier when converted to local currencies (the currency effect).

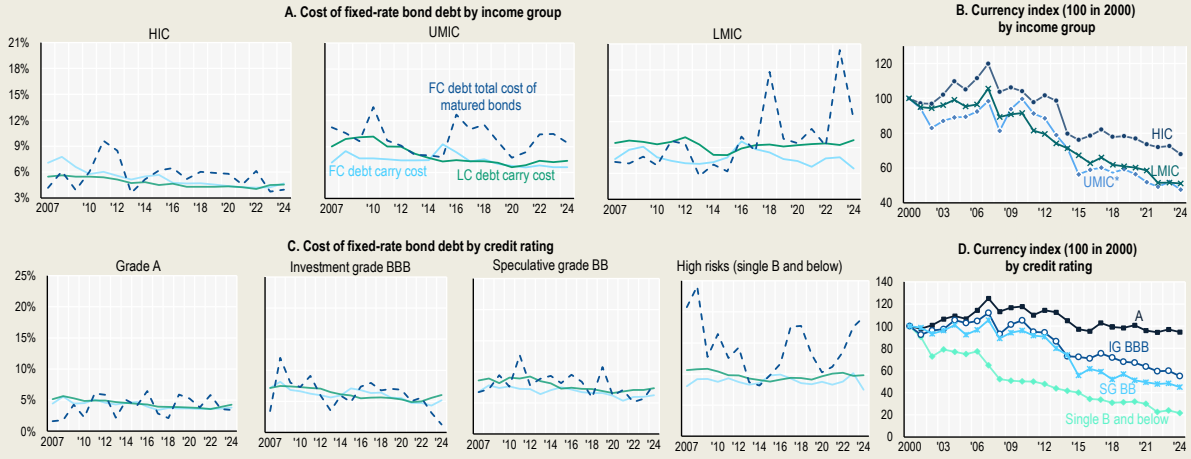
Owing to lower nominal yields, USD-denominated debt's carry costs are often lower than that of local currency debt. However, its total costs are often higher (Figure 3.6, Panels A and C). Calculating the total cost of foreign currency debt in local currency before maturity is not possible because the value of the principal and coupons in local currency on the due date is uncertain. Consequently, calculations rely on current data estimates, which can underestimate future expenses with EMDE currencies typically depreciating over the long-term.

This is exacerbated by foreign currency debts often having longer maturities (Figure 3.4), and often highly volatile foreign exchange (FX) rates. Over the lifespan of a bond, FX rates can fluctuate significantly, particularly in high-risk credit countries (Figure 3.6, Panels B and D). These countries saw the value of their currency fall by nearly 80% against the US dollar from 2000 to 2024, with the cost of redeeming the principal of a 20-year USD bond issued in the early 2000s being five times higher in 2024.

When this is factored into the total cost, issuing USD-denominated debt can become prohibitively expensive in certain conditions, especially for high-risk countries. In this group, the median of the estimated FX-adjusted annual yield to maturity of USD-denominated debt exceeded 15% during this tightening cycle. This underscores the link between currency depreciation and debt crises in vulnerable countries (Schuster et al., 2024[13]), and the stabilising role of local currency bond markets.

Figure 3.6. Cost of fixed-rate bond debt and EMDEs currency indexes

The cost of foreign currency debt is typically more volatile and can greatly exceed that of local currency debt



Note: UMIC* excludes China. All cost measures are median values for each group. Carry costs for local currency (LC) debt are the stock-weighted average yield to maturity. For foreign currency (FC) debt, carry costs are the yield to maturity adjusted by the FX rate ratio from issuance to year-end. Total costs of matured FC debt are the internal rate of return of cash flows converted to local currency at each cash flow approximate date, with each year including only securities that matured in that year. The currency index covers only sovereign issuers, weighted by each country's GDP.
Source: LSEG and OECD calculations.

The higher borrowing costs for non-investment grade and lower income countries in 2023-24 reflect a significant overlap between the two groups. Of the 42 EMDEs that issued USD-denominated bonds during this period, 14 were lower income countries and 16 had high-risk credit ratings. Ten of the countries belonged to both categories, as lower income with high-risk ratings. Among the remaining four lower income countries, three had a BB rating—non-investment but above high risk, while only one, the Philippines, held an investment-grade rating. As a result, high-risk issuers accounted for more than two-thirds of all lower income countries that accessed these markets. By contrast, high-risk issuers represented around 30% of UMICs and only 10% of HICs that issued USD-denominated bonds during this period.

Fourteen countries issued USD bonds with a yield to maturity above 8% in 2023-24.[11] Nine of those are LMICs, seven of which are from SSA, one is from Latin America and the Caribbean (LAC) and the last one, Uzbekistan, is from the Middle East and Central Asia (MECA). The remaining issuers include four UMICs, namely Colombia, Costa Rica, Mongolia and Türkiye, and one HIC, Panama.

The predominance of countries in the SSA region among those with high yields can be explained, to some extent, by this region's generally lower transparency in budget processes, less developed financial systems and public institutions, and a larger informal sector (Gbohoui, Ouedraogo and Some, 2023[14]). In fact, the region's average yield at issuance of USD-denominated bonds approached nearly 8% in 2024, while this rate remained between 5% and 7% in all other regions that year.

For other countries, the underlying reasons for these high-yield issuance vary. For example, in Türkiye, the cost of issuing USD-denominated bonds exceeded 9% in 2023, amid restrictive monetary policy with inflation reaching nearly 70%, and an earthquake that impacted economic output and fiscal policy (OECD, 2024[15]). In Mongolia, yields hit nearly 9% in the same year, influenced by its dependence on mining with reduced exports to China, high inflation and fiscal challenges (World Bank, 2023[16]). Colombia issued USD-denominated bonds with yields around 8% at a juncture of modest growth, high inflation, fiscal risks,

and rising debt (OECD, 2024[15]). Panama's credit rating outlook deteriorated amid growing fiscal risks (Moody's, 2024[17]).

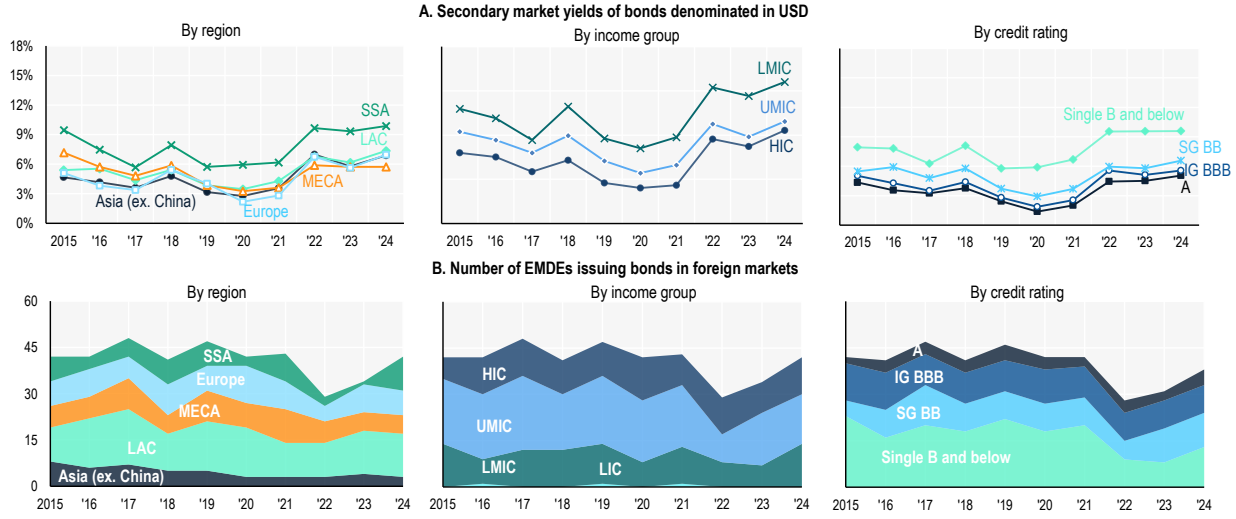
More lower income and high-risk countries borrowed from foreign markets in 2024 compared to 2022-23, but net borrowing from these markets remained low or negative

Primary market yields and effective interest rates reflect the true borrowing costs for sovereign issuers with market access. However, they do not include information on countries that were unable to issue due to unfavourable market conditions, like prohibitively high secondary market yields.[12] As such, primary market yields only represent countries whose economic and fiscal conditions allow access to markets at non-prohibitive costs. An analysis limited to primary market rates is then skewed by survivorship bias.[13] Secondary market yields, however, might capture a wider spectrum of investor sentiment across outstanding bonds, providing insights into the creditworthiness of countries, including those prevented from issuing new bonds due to adverse funding conditions.

Data from the end of 2024 on the secondary market yields of EMDE bonds denominated in US dollar indicates the highest borrowing costs since 2015, with highly unfavourable funding conditions for countries in the SSA region, lower income countries and high-risk countries (single B and below) (Figure 3.7., Panel A). Median yields across countries have risen from approximately 3-4% in 2021 to 6-7% in 2024 in EMDEs from Asia, Europe, LAC and MECA. This three-percentage point increase is of the same magnitude as the increase in the US 10-year benchmark during the period. In the SSA region, however, this rate rose by four percentage points, from around 6% to nearly 10%.

Figure 3.7. Market yields of USD bonds and number of EMDEs issuing in foreign markets

Secondary market yields have increased since 2022, prompting some EMDEs to avoid issuing foreign markets



Note: Panel A covers a sample of nearly 600 USD-denominated bonds from 71 countries with maturities of 2 to 15 years. Yields are median yields across countries. This panel begins in 2015 due to data limitations. In 2024, data availability declined sharply. To maintain continuity, the 2023 rate was used for 28 countries where no secondary market rate was available in 2024. LICs were excluded as this income group has limited access to foreign markets.
Source: LSEG and OECD calculations.

The sharp rise in secondary market yields for USD-denominated bonds in the SSA region, and amongst lower income and issuers in high-risk of default or with lower credit rating, is partly driven by 10 countries

that belong to all three groups simultaneously.[14] In 2023-24, sovereign bonds from these countries traded at yields above 8%. In contrast, outside SSA, only seven lower income countries with high-risk ratings had secondary market rates available in 2023-24.[15]

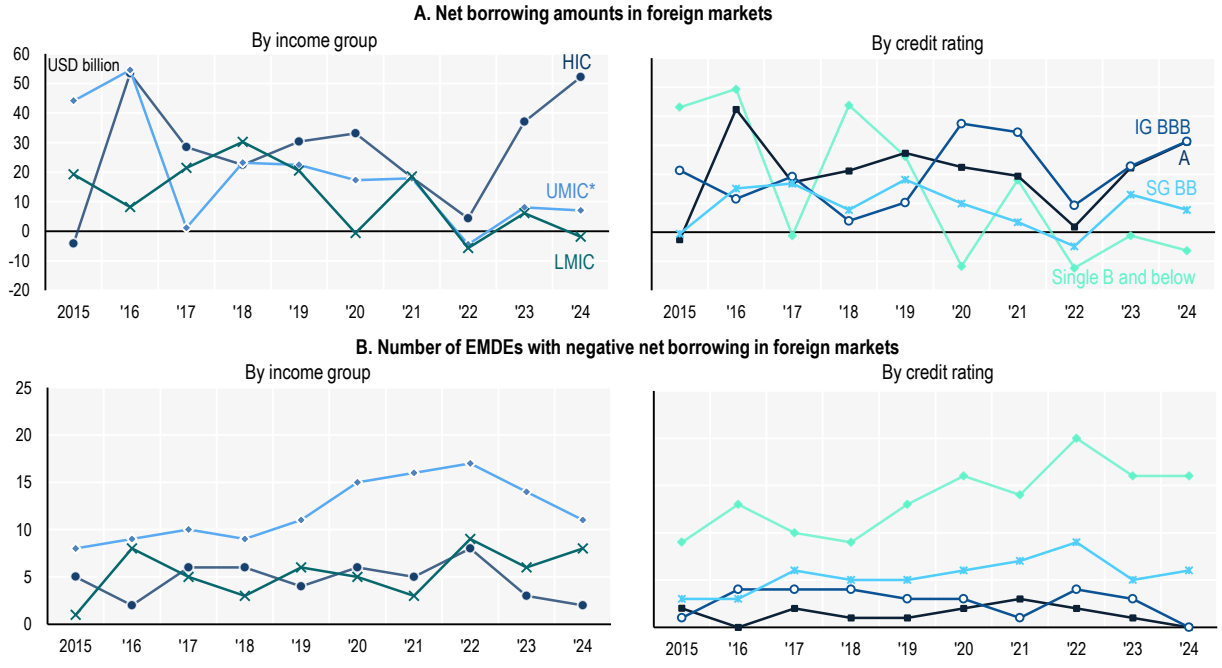
High borrowing costs in US dollar have prompted some EMDEs to avoid issuing in foreign markets since 2022. The number of EMDE sovereign issuers in foreign markets, which fluctuated between approximately 40 and 50 in 2015-21, declined to 29 in 2022 (Figure 3.7., Panel B). It increased again in 2023 and reached 42 countries in 2024, close to the pre-pandemic average.

However, the reversal in the decline was uneven, with the number of high-risk countries issuing in foreign markets remaining below 2021 pre-tightening levels in 2024. Between 2015 and 2021, an average of 20 high-risk countries issued in foreign markets. This number dropped to 9 in 2022 and 8 in 2023, before increasing to 13 in 2024. This remains below the levels seen in any year between 2015 and 2021.

Despite a rise in the number of EMDEs issuing in foreign markets in 2024, net borrowing from these markets remained low for UMICs and LMICs.[16] From 2015 to 2019, UMICs and LMICs had an average annual net borrowing from foreign markets of approximately USD 30 billion and USD 20 billion, respectively (Figure 3.8, Panel A). However, in 2022, both groups experienced net repayment of around USD 5 billion. Although net borrowing rebounded in 2023, returning to positive territory, LMICs saw a renewed decline in 2024, turning negative once again. Meanwhile, UMICs maintained positive net borrowing in 2024, but at only a quarter of pre-pandemic levels.

Figure 3.8. EMDEs net borrowing from foreign markets

Net borrowing from foreign markets remained low or negative for LMICs and high-risk countries since 2022



Note: Panels begin in 2015 due to data limitations.
Source: LSEG and OECD calculations.

High-risk countries saw the most pronounced decline in net borrowing from foreign markets, with levels remaining negative each year since 2022. In contrast, net borrowing from foreign markets by investment-grade EMDEs in 2024 exceeded pre-pandemic averages. Non-investment grade BB-rated countries maintained positive net borrowing from foreign markets in aggregate over the period 2022-24, though

volumes remained below pre-pandemic levels and values in 2022 were negative. This indicates that foreign investors avoided high-risk countries amid heightened macro-financial volatility and geopolitical risks, but were willing to invest in low-risk countries.

In 2024, the number of HICs and UMICs with negative net borrowing from foreign markets declined to around pre-pandemic levels (Figure 3.8, Panel B). Meanwhile, this number increased in 2024 for LMICs and remained stable at a high level in high-risk countries. Ten different LMICs or LICs had negative net borrowing in foreign markets in aggregate in 2022-24.[17] This shows that the decline in net borrowing in foreign markets by LMICs and high-risk countries was widespread (not concentrated among a few large issuers), suggesting reduced investor appetite and/or reluctance by sovereigns to increase issuance in foreign markets amid adverse funding conditions, which would lock-in high prevailing rates in US dollar and lead to further exposure to currency risk through the life of the bond.

Credit rating developments

An uneven recovery in credit ratings

The number of rating upgrades of EMDEs exceeded the number of downgrades in 2024, for the first time since 2019 (Figure 3.9, Panel A). During the pandemic, in 2020-21, EMDEs received 20 upgrades and 123 downgrades; while in 2022-23, they received 42 upgrades and 73 downgrades. In 2024, there were 52 upgrades and 21 downgrades, a significant improvement, with three former high-risk countries (Albania, Costa Rica and Jordan) improving their ratings to the category Speculative Grade BB.

Improvements in credit quality were, however, distributed unevenly with respect to countries' income levels. In HICs, UMICs and LMICs, around 75% of all credit rating updates were upgrades in 2024. In contrast, LICs experienced no upgrades at all, but three downgrades for two countries: Uganda (Fitch and Moody's) and Niger (Moody's). Therefore, while worsening credit ratings following the pandemic and the subsequent monetary tightening reversed in 2024, this trend was not observed in LICs.

The number of countries in very high-risk or in default remained at a 25-year high at 10 in 2024,[18] representing around 10% of EMDE sovereign issuers assessed (Figure 3.9, Panel B). This number has been constant since 2022, when it rose from 3 in 2021. Of these 10 countries, 2 are LICs, 4 are LMICs and 4 are UMICs. Regionally, 4 are from SSA, 2 from Asia and Europe each, and 1 from the LAC and MECA regions each.[19] This record high number of EMDEs in very high-risk or in default comes at a time when global debt restructuring has become more complex (Box 3.3).

In contrast to the debt crises of the 1980s and 1990s, most of the countries in default are, however, relatively small in terms of GDP and outstanding debt, limiting the significance of the defaults with respect to the global financial system. During the tightening cycles of the 1980s and 1990s, EMDEs with a combined GDP in 2023 values of USD 15 trillion defaulted on at least part of their debt. As of 2024, the combined GDP of countries in very high-risk or in default has only slightly exceeded USD 1.1 trillion.[20] Despite accounting for only around 1% of global GDP, these countries have a population of 315 million, or 4% of the global population.

Box 3.3. Debt restructuring challenges amid a more diverse creditor base

A record number of EMDEs are currently facing default or are at a very high risk of default. Multiple global macro-financial headwinds have weakened their shock absorption capacity. This comes as the global debt restructuring process has become more complex. Still, in recent years, important advances at the international level have been made to manage sovereign debt restructurings more efficiently.

Sovereign defaults and restructurings are costly for debtors and issuers and are generally considered a last-resort option. Debt restructuring requires reaching an agreement between the debtor and various creditors, who all have different expectations, portfolios and exposures to risk. For the debtor, it can lead to a loss of, or at least very restricted, market access during the time between the default and its resolution and increase the cost of issuing debt once access is regained. For creditors, restructuring means either a modification in the payment terms or, in more extreme cases, a reduction in the principal amount of the debt — commonly known as a haircut. An empirical study examining sovereign debt restructuring over 200 years found that on average, two restructurings have been necessary to resolve a sovereign debt crisis, with a default period of eight years and haircuts of around 45% of the principal.

Sovereign debt restructuring has become increasingly complex over the last two decades due to a higher level of defaulted debt and a much broader creditor base. The private sector and China as a creditor are playing increasingly important roles. Of the total defaulted sovereign debt (including non-bond debt), which reached USD 530 billion in 2023 compared to an annual average of around USD 230 billion in 2011-20, 15% was owed to Paris Club countries in 2023, down nearly 30% from 2011. Simultaneously, the share of debt owed to China rose from zero in 2011 to around 9% in 2023, while the share of private creditors rose from around one-quarter to nearly half in the same period. Thus, initiatives aimed at broad debt restructuring now require coordination with a much more varied creditor base, leading to lengthier and more arduous negotiations and higher uncertainty.

As a consequence, multilateral initiatives have been developed to adapt debt restructuring to this new environment. The G20 Common Framework for Debt Treatments beyond the Debt Service Suspension Initiative (Common Framework) was set up in 2020 to provide LICs with orderly and coordinated debt restructurings with broad creditor participation with G20, Paris Club and other official creditors in a single committee. The restructuring process under the Common Framework is closely intertwined with the implementation of an IMF program to help achieve debt sustainability. As of December 2024, four countries have applied to the Common Framework: Chad, Ethiopia, Ghana and Zambia.

To strengthen multilateral co-operation and coordination, the Global Sovereign Debt Roundtable (GSDR) was established in 2022 by the IMF, the World Bank and the G20. The GSDR aims to enhance debt transparency, accelerate restructuring processes, and address challenges in resolving sovereign debt crises. Moreover, the IMF revised the rules governing its role in debt restructurings, explicitly taking China's importance as a creditor into account. These policy innovations can increase the efficiency and timeliness of future restructurings. Despite these positive developments, important issues, such as the hierarchy of claims in debt restructuring, remain areas where greater multilateral coordination and standard setting are necessary. Furthermore, the Common Framework is only applicable to LICs, with a comparable framework for countries with higher income levels missing.

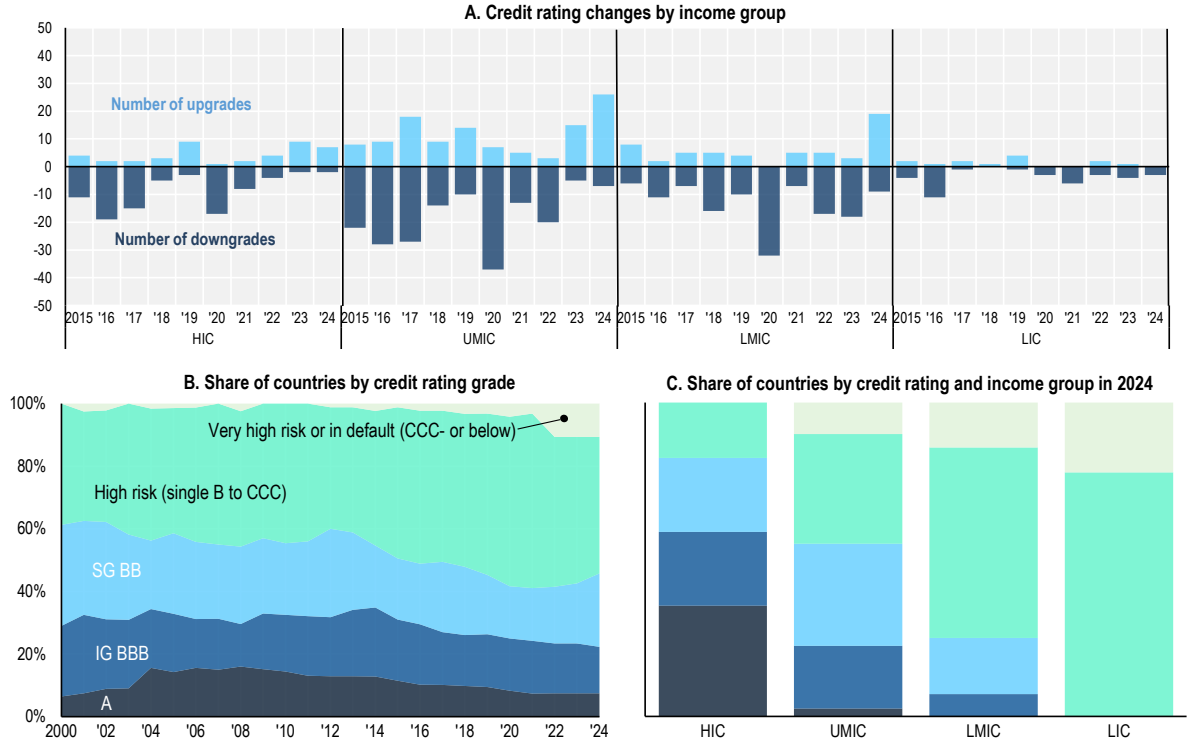
Source: Beers, D. et al. (2024[18]), "BoC–BoE Sovereign Default Database: What's new in 2024?", BoC–BoE Staff Analytical Note, https://doi.org/10.34989/san-2024-19; Makoff, G., et al. (2025[19]), "Sovereign Debt Restructuring with China at the Table: Forward Progress but Lost Decade Risk Remains.", M-RCBG Associate Working Paper Series No 248, https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/working.papers/Final_AWP_248_0.pdf.; and von Luckner, C. et al., (2023[20]), "Sovereign Debt: 200 years of creditor losses", 24th Jacques Polak Annual Research at the IMF, https://www.econstor.eu/bitstream/10419/283945/1/1881643514.pdf.

Despite the overall positive rating dynamics in 2024, the share of investment grade countries continued its gradual long-term downward trend, falling from 23% in 2023 to 22% last year (Figure 3.9, Panel B).[21] Therefore, despite the absence of widespread macro-economic instability and debt crises, and the increasing issuance of local currency debt, many EMDEs have failed to maintain their investment grade ratings. At the same time, the share of countries with credit ratings corresponding to high risk (single B to CCC) decreased from 47% to 44% in 2024, after reaching a high of 56% in 2021.

Lower income countries tend to have lower ratings, with all LICs currently rated either (very) high risk or default (Figure 3.9, Panel C). This long-standing trend underlines the difficulties of weak economic fundamentals and of accessing market finance at favourable rates. The picture is similar for LMICs, 75% of which are rated single B and below. Conversely, in 2024, no single HIC faced default or was at a very high risk of default, while more than half of UMICs had an investment grade.

Figure 3.9. EMDEs credit rating changes and share of countries by credit rating

Upgrades outnumbered downgrades in EMDEs in 2024 for the first time since 2019, slightly reducing the share of high-risk countries, though lower-income economies remain predominantly high-risk



Source: LSEG and OECD calculations.

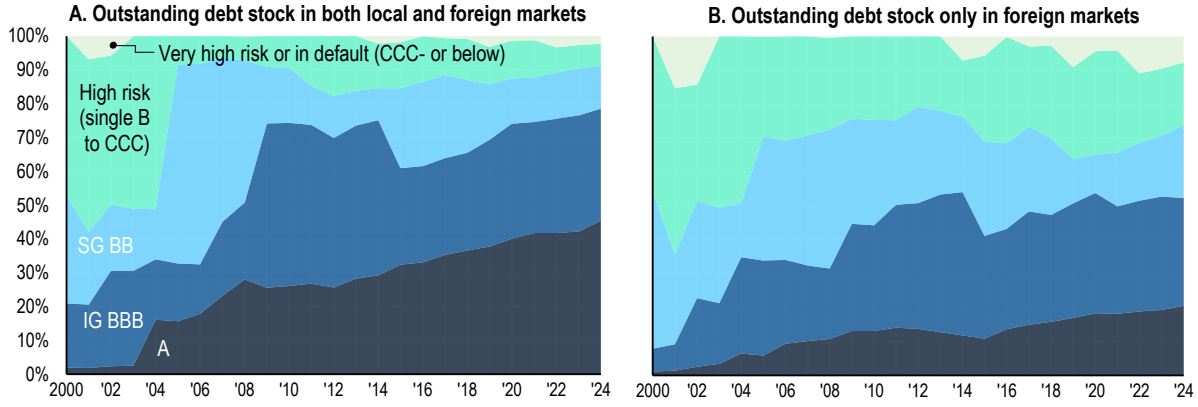
Investment grade issuers account for a higher share of EMDEs debt markets

While the share of EMDEs with investment grade has been declining, their share of EMDE outstanding bond debt reached a 25-year high in 2024. Investment grade EMDEs account for nearly 80% of outstanding EMDE sovereign debt, up from about 20% at the start of the 2000s (Figure 3.10, Panel A). Even when focusing solely on debt issued in international markets, excluding the high local debt of large investment grade economies such as China and India, the figure remains close to record highs at around 50% (Figure 3.10, Panel B).

Meanwhile, the proportion of outstanding debt from sovereign issuers with a credit rating corresponding to (very) high risks or default (single B and below) has reached multi-year lows for both total debt and foreign debt. This record-high number of high-risk EMDEs, in conjunction with their record-low share of outstanding debt, is the result of increased issuance levels of investment grade EMDEs over the last decades, and especially since 2020.

Figure 3.10. EMDEs outstanding debt by market and credit rating

The proportion of outstanding EMDE debt from investment-grade sovereign issuers has reached record highs



Note: Although the chart for local bond markets is not provided, its trend mirrors those of both local and foreign markets, as local bonds represent nearly 90% of the total outstanding debt stock as of Q1 2024. IG and SG refer to investment and speculative grades, respectively.
Source: LSEG and OECD calculations.

A cause for concern is the proportion of bond debt in foreign markets from EMDEs in very high risk or in default, which remained at 2% in 2024, after increasing from zero in 2016 to approximately 3% in 2022 (this considers both local and foreign markets). In foreign markets, this share rose from virtually zero in 2016 to 11% in 2022 and remained at 8% in 2024.

As outlined in Box 3.3, the debt restructuring landscape for countries is now more complex. Some smaller countries that have concurrent credit and climate risks have turned to debt-for-nature swaps, with several deals since 2022 helping to restructure record amounts of debt (Box 3.4).

Box 3.4. Debt-for-nature swaps in EMDEs

Debt for nature swaps (DFNs) work through an exchange between debtor and creditor, with a portion of a sovereign's debt retired or restructured, conditional on the reduction in debt burden being partly allocated towards nature conservation. The most common forms of DFNs are bilateral and multilateral swaps (IMF, 2024[21]). Bilateral swaps involve reallocating debt service cash flows, principal reductions, or debt cancellation by the creditor. Multilateral swaps secure buyback funding through a third party (e.g. NGOs and MDBs), which may provide credit enhancement, concessional loans, or retire sovereign debt entirely.

DFNs have taken place in more than 40 countries since the very first transaction in 1987, but they have rarely exceeded USD 20 million in deal size. They are neither a recent innovation nor have they become more popular over time. On average, 10 deals took place annually in the 1990s, compared to less than two a year since 2010 (Figure 3.11, Panel A). Although the frequency has decreased, average deal size has increased notably in the 2020s, at approximately USD 713 million (Figure 3.11, Panel B). Larger recent transactions include Ecuador in 2023 (USD 1.6 billion) and El Salvador in 2024 (USD 1 billion).

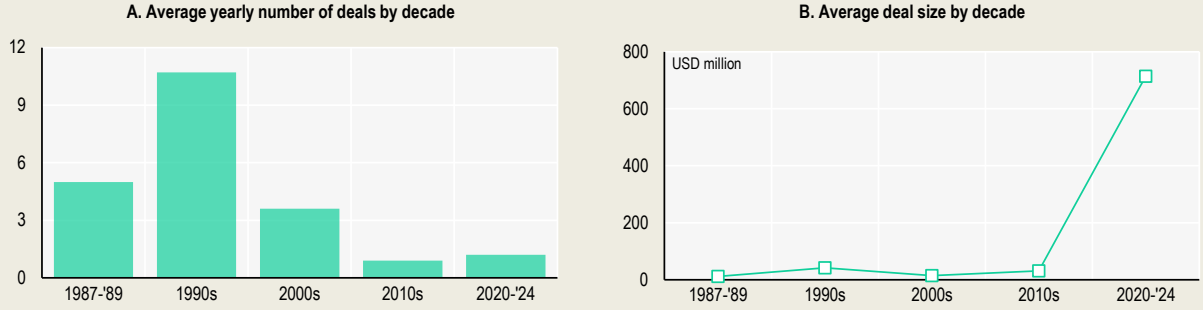
Among EMDEs, the pool of countries with concurrent credit risk and climate vulnerability issues is deep, particularly amongst lower income countries, where economic growth can be highly sensitive to climate events. A DFN can, in principle, help to optimise a country's debt portfolio, generate funds for climate programmes, and reduce the risk of costly comprehensive debt restructurings. DFNs can also have positive spillover effects, such as improvements in the credit of the sovereign due to debt restructuring. For example, Belize's S&P rating was upgraded after a multilateral swap in 2021.

Without greater creditor concessions or third-party involvement, though, the value and scalability of DFNs remain limited. High execution costs that stem from instrument complexity and the need for cross-institutional coordination, and extensive monitoring, tend to prolong implementation and ultimately reduce the net debt relief achieved. A swap is only efficient when its volume offsets these costs and the country's debt is trading well below par beforehand. However, except for a few recent cases, volumes have generally been insufficient for DFNs to serve as a major debt management or restructuring tool.

Enhancing instrument structure and increasing Multilateral Development Banks' involvement can improve DFN usability, as they facilitate efficiency by providing credit guarantees, risk insurance, monitoring, and technical support, fostering necessary economies of scale.

Figure 3.11. Number of debt-for-nature swaps deal and sizes

The number of debt-for-nature swaps per decade has been declining, but the average deal size has increased



Note: Panel B refers to averages on the value of debt to be restructured for 129 deals.
Source: LSEG, Notre Dame Global Adaptation Initiative (ND-GAIN), OECD data and calculations.

Refinancing outlook and policy implications

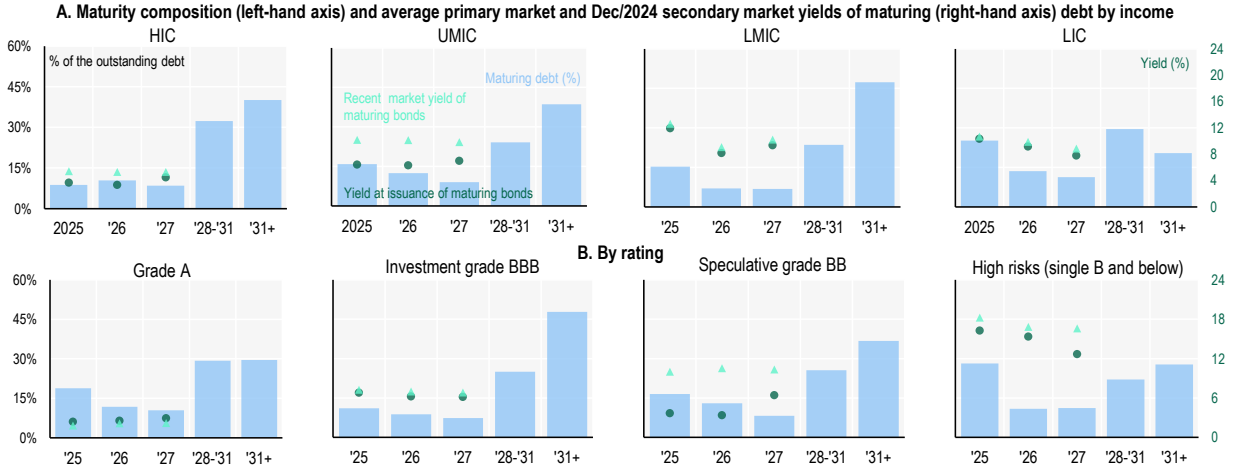
High-risk and low-income issuers have higher short-term refinancing needs

Despite recent reductions in inflation, global funding conditions are expected to remain unfavourable. Inflation remains above central bank targets in many advanced economies and EMDEs, with disinflation progressing more slowly in recent months. Thus, monetary policy will need to remain prudent, with carefully judged policy rate reductions (OECD, 2024[4]). Additionally, high borrowing needs and quantitative tightening in advanced economies have significantly increased the supply of bonds to be absorbed by markets. Geopolitical tensions also remain elevated, posing potential risks to global trade, which could impact the outlook for global growth and inflation. Under these conditions, borrowing costs are likely to remain high for some time.

Against this backdrop, almost USD 4.5 trillion of sovereign bonds, corresponding to nearly 40% of the EMDE bond debt stock as of December 2024, will mature between 2025 and 2027. Additionally, 40% of that amount corresponds to bonds issued before or in 2021, a period of more favourable funding conditions. As a result, refinancing this debt will likely lead to an increase in interest payments.

Figure 3.12. EMDEs maturity composition of debt and average primary and secondary market yields for all bonds

A significant share of outstanding bond debt will mature within three years amid wide yield gaps between primary and secondary markets for higher-risk issuers



Note: This figure covers a sample of nearly 8 700 bonds from 95 countries. Both the maturity composition and the yields are weighted averages calculated based on the outstanding amounts of the corresponding debt. Due to the unavailability of primary and secondary market yields for all maturing bonds, the values presented are a weighted average of those bonds with the available secondary market as of 2024 or the closest year up to 2022. These yields are shown only for their relative differences, representing an average across bonds in different currencies and nominal terms. Four countries with disproportionately high nominal yields were excluded from the yield analysis.
Source: LSEG and OECD calculations.

Low income and high-risk countries (graded single B or below), two significantly overlapping groups, are especially vulnerable. In LICs, the share of bond debt maturing in 2025 is around 25%, and in high-risk countries, it is close to 30% (Figure 3.12). Meanwhile, the share of the outstanding debt of other income groups that matures in 2025 averages less than 15%. Over the next three years (i.e. 2025-27), half of the debt of low income and high-risk countries is expected to mature, compared to nearly 40% in EMDEs as a whole.

A sample of bonds maturing over the next three years shows that secondary market yields are higher than their yields at issuance, particularly in non-investment grade countries and UMICs. For non-investment grade countries, secondary market yields on maturing debt often exceed 10%, and their averages are higher than the average rates of the maturing debt in all three years (2025, 2026 and 2027). Thus, countries refinancing this debt in the market will likely face a significant rise in borrowing costs, straining public finances over the life of the new bonds.

Twenty-four EMDEs will see more than half of their outstanding bond debt mature by 2027.[22] Fifteen of these countries had a credit rating corresponding to high-risk or lower at the end of 2024. This group includes nine countries with debt-to-GDP ratios above 60%: Argentina, Brazil, Grenada, Guinea-Bissau, Lao People's Democratic Republic, Namibia, Pakistan, Togo and Yemen.[23] In all 24 countries except Albania, Bosnia Herzegovina, Grenada, Kuwait, Lao People's Democratic Republic, Namibia and Seychelles, over 80% of the bond debt maturing over the next three years is denominated in local currency. This high share of local currency debt maturing over the next three years reflects these countries' short maturity profile - the ATM of all 24 except Namibia is close to or below four years.

A short maturity profile for local currency debt raises refinancing and interest rate risks. For sovereign issuers with a short maturity profile, when conditions worsen, interest payments rise quickly as a big portion of the debt is refinanced under higher rates. Thus, they start to pay higher interest payments less gradually than the issuers with a longer maturity profile.

This explains why secondary market yields on maturing bonds over the next three years tend to be close to their issuance yields in LMICs and LICs. Lower income countries tend to have a shorter debt profile and, thus, much of the local currency bonds have already been refinanced under higher rates. This differs from HICs, UMICs and, especially, OECD countries, where a larger share of the debt is yet to be refinanced at higher rates as they have a much longer maturity profile.

As foreign currency debt tends to have higher maturities, a lower portion of them have already been refinanced at higher rates. Around half of the outstanding local currency debt in EMDEs was issued in 2022-24, already reflecting, to some extent, higher rates, compared to only one-third of the USD-denominated debt. Refinancing the latter, therefore, poses additional risks to EMDEs reliant on foreign markets.

Around 20% of the USD-denominated debt issued by EMDEs will mature by 2027, with high-risk countries facing a slightly higher share, exceeding 25% (Figure 3.13). At the same time, secondary market rates at the end of 2024 for the debt of this group are around two percentage points higher than their yield at issuance, suggesting a significant increase in interest rates when they are refinanced. These interest rate differentials are also large for LMICs, especially in 2026 and 2027, when they are close to five, affected by high differentials in Egypt and Pakistan.

Elevated refinancing needs, tight funding conditions and high debt levels are straining EMDE government budgets. As new debt is issued at higher rates, interest payments increase. While much of the local currency debt has already been issued at higher rates, the remaining amounts are still significant and borrowing costs will be sensitive to changing funding conditions. Higher debt servicing costs reduce fiscal space for EMDEs to invest in development, provide public services, and absorb future shocks amid geopolitical and macro-financial uncertainty.

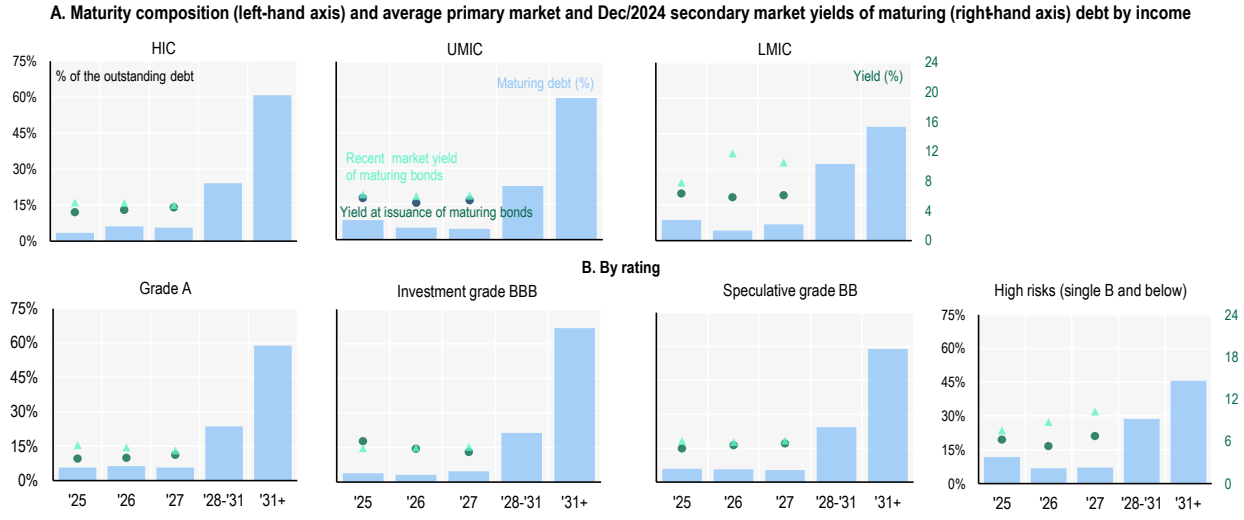
For foreign currency debt, large bond redemptions amid local currency depreciation can force governments to either absorb substantial costs in local currency or refinance at higher rates, further increasing borrowing costs and foreign currency risks. In extreme cases, countries may default on maturing debt, and this dynamic has contributed to a near-record number of sovereigns with credit ratings equivalent to very high risk or near default over the past three years.

Against this backdrop, sovereign debt strategies, as part of wider structural, regulatory, and policy measures, should aim to enhance liquidity, attract investors, and deepen financial markets to reduce

reliance on foreign borrowing over time (IMF and WB, 2021[22]). These measures should involve developing reliable benchmark yield curves, enhancing clearing and settlement systems, and promoting market making mechanisms.

Figure 3.13. EMDEs maturity composition of debt and average primary and secondary market yields for USD-denominated bonds

Around one fifth of EMDE foreign currency debt will mature by 2027, with 2024 market rates significantly higher than issuance yields in LMICs and high-risk countries



Note: This figure covers a sample of nearly 790 bonds denominated in US dollars in 66 countries. Both the maturity composition and the yields are weighted averages calculated based on the outstanding amounts of the corresponding debt. Due to the unavailability of primary and secondary market yields for all maturing bonds, the values presented are a weighted average of those bonds with the available secondary market as of 2024 or the closest year up to 2022. These yields are shown only for their relative differences, representing an average across bonds in different currencies and nominal terms. Four countries with disproportionately high nominal yields were excluded from the yield analysis.
Source: LSEG and OECD calculations.

Further development of local currency bond markets is crucial for ensuring sustainable and resilient sovereign financing

Of the nearly 100 EMDEs with sovereign bonds outstanding and a credit rating from one of the three main credit rating agencies, 73 have a GDP below USD 300 billion, as of the end of 2024. These countries accounted for around 90% of the EMDEs at (very) high risk or in default and just 40% of the EMDEs with an investment grade At the same time, only about one quarter of the countries with a GDP between USD 300 and 1 000 billion are at (very) high risk or in default. Conversely, of the eight EMDEs with a GDP above USD 1 000 billion, all except Brazil and Türkiye have an investment grade.

Many of these smaller economies have not developed their local currency bond markets. All 30 EMDE sovereign issuers whose foreign currency share of outstanding debt at the end of 2024 exceeded 30% were small countries (GDP below USD 300 billion), except Argentina and Türkiye. These countries comprise all 10 countries at very high risk or in default, except Niger. This shows a link between the development of local currency bond markets and the impact of the current global tightening cycle on debt sustainability.

In the past, when large EMDEs had not yet developed their local currency bond markets, they also struggled during global tightening cycles. In the 1980s, large EMDE issuers like Brazil, Mexico, and Peru either defaulted or underwent significant debt restructuring. By the late 1990s, this list included large

countries such as Indonesia, Thailand, and the Philippines. None of these countries have defaulted or undergone debt restructuring since the global tightening cycle began in 2022, partly due to their local currency bond markets being more developed. In fact, the share of debt denominated in local currency exceeds 90% in all these countries, except Peru.

These countries have developed a more strategic approach to debt management to foster their local currency bond markets. Opportunistic debt issuance might favour foreign currency debt because, in the short term and under more favourable funding conditions, they may achieve lower costs and longer maturities. However, during times of distress, the costs of foreign currency debt spike dramatically in local currency for countries with lower credit ratings. Governments mainly earn revenues in local currency, so this mismatch can affect a country's capacity to pay its debts, especially given the higher current refinancing needs.

For large EMDEs that developed their local currency bond markets, the main consequence of the current crisis is an increase in interest expenditures, pressuring government budgets and slowing development. With relatively high real rates in local currency bonds in EMDEs, the primary balance needed to stabilise the record-high post-pandemic debt-to-GDP ratios is higher. This reduces fiscal space for investments and expenditures necessary for development. However, this is much less harmful than the crises seen in past tightening cycles.

For smaller emerging market economies that lack developed local currency bond markets, tighter financial conditions not only raised local currency borrowing costs but also increased refinancing risks for foreign currency debt. These countries faced either the challenge of repaying debt in a currency that has likely depreciated against the US dollar, increasing costs substantially, or the need to refinance debt at higher rates, straining public finances in the long run. While these smaller economies account for a relatively small share of outstanding debt and global GDP, their debt distress could have significant social and political implications (Farah-Yacoub, von Luckner and Reinhart, 2024[23]).

The recent global tightening cycle underscores that the costs of not having developed local currency bond markets are high. Developing local currency bond markets is vital to build resilience against future global tightening cycles. The ability of large emerging market economies to rely on well-established local currency bond markets significantly mitigated the impact of the 2022-23 tightening cycle, helping to stabilise sovereign bond markets and limit defaults.

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Annex 3.A. Methodology

Primary sovereign bond market data and country groupings

Primary sovereign bond market data are based on original OECD calculations using data obtained from the London Stock Exchange Group (LSEG), which provides international security-level data on new issues of sovereign bonds. The data set covers bonds issued by emerging market sovereigns in the period from 1 January 2000 to 31 December 2024 and includes both short-term and long-term debt. Short-term debt ("bills") is defined as any security with a maturity less than or equal to 365 days but no less than 33 days, as bill issuance with a maturity less than 33 days are considered to be done for cash management purposes and excluded from calculations. Bonds issued by central banks that have no government budget financing purposes were excluded. The data provides detailed information for each bond issue, including the proceeds, maturity date, interest rate and currency structure.

This report's definition of emerging markets is consistent with the IMF's classification of Emerging Market and Developing Economies (EMDEs) used in its World Economic Outlook. The regional definitions are also those used by the IMF, while the income categories used (high income, low income, lower middle income, upper middle income) are those from the World Bank as of 2024, which is based on GNI per capita levels. EMDE sovereign bond issuers are:

- High income countries (HICs) are: Bahamas (LAC), Bahrain (MECA), Barbados (LAC), Bulgaria (EMDEs Europe), Chile (LAC), Hungary (EMDEs Europe), Kuwait (MECA), Oman (MECA), Panama (LAC), Poland (EMDEs Europe), Qatar (MECA), Romania (EMDEs Europe), Russian Federation (EMDEs Europe), Saudi Arabia (MECA), Seychelles (SSA), Trinidad and Tobago (LAC), United Arab Emirates (MECA), Uruguay (LAC).
- Upper middle income countries (UMICs) are: Albania (EMDEs Europe), Algeria (MECA), Argentina (LAC), Armenia (MECA), Azerbaijan (MECA), Belarus (EMDEs Europe), Belize (LAC), Bosnia Herzegovina (EMDEs Europe), Botswana (SSA), Brazil (LAC), China (EMDEs Asia), Colombia (LAC), Costa Rica (LAC), Dominican Republic (LAC), Ecuador (LAC), El Salvador (LAC), Equatorial Guinea (SSA), Fiji (EMDEs Asia), Gabon (SSA), Georgia (MECA), Grenada (LAC), Guatemala (LAC), Indonesia (EMDEs Asia), Iraq (MECA), Jamaica (LAC), Kazakhstan (MECA), Malaysia (EMDEs Asia), Maldives (EMDEs Asia), Mauritius (SSA), Mexico (LAC), Moldova (EMDE Europe), Mongolia (EMDEs Asia), Montenegro (EMDEs Europe), Namibia (SSA), North Macedonia (EMDEs Europe), Paraguay (LAC), Peru (LAC), Serbia (EMDEs Europe), South Africa (SSA), Suriname (LAC), Thailand (EMDEs Asia), Türkiye (EMDEs Europe), Ukraine (EMDEs Europe), Venezuela (LAC)
- Lower middle income countries (LMICs) are: Angola (SSA), Bangladesh (EMDEs Asia), Benin (SSA), Bolivia (LAC), Cameroon (SSA), Cote Ivoire (SSA), Egypt (MECA), Ghana (SSA), Honduras (LAC), India (EMDEs Asia), Jordan (MECA), Kenya (SSA), Lao PDR (EMDEs Asia), Lebanon (MECA), Morocco (MECA), Myanmar (EMDEs Asia), Nicaragua (LAC), Nigeria (SSA), Pakistan (MECA), Papua New Guinea (EMDEs Asia), Philippines (EMDEs Asia), Senegal (SSA), Sri Lanka (EMDEs Asia), Swaziland (SSA), Tanzania (SSA), Tunisia (MECA), Uzbekistan (MECA), Viet Nam (EMDEs Asia), Zambia (SSA)
- Low income countries (LICs) are: Burkina Faso (SSA), Chad (SSA), Congo (SSA), Ethiopia (SSA), Guinea Bissau (SSA), Malawi (SSA), Mali (SSA), Mozambique (SSA), Niger (SSA), Rwanda (SSA), Togo (SSA), Uganda (SSA), Yemen (MECA).

A number of bonds have been subject to reopening. For these bonds, the initial data only provides the total amount (original issuance plus reopening). To retrieve the issuance amount for such reopened bonds, specific data on the outstanding amount on each reopening date for the concerned bonds have been downloaded separately from LSEG. As the reopening data only provides amounts outstanding, the outstanding amount on the previous date is subtracted from the outstanding amount on that given date to obtain the issuance amount on each relevant date. These calculated issuance amounts are converted on the transaction date using USD foreign exchange data from LSEG. To ensure consistency and comparability, the same method is used for all bonds, including those not subject to reopening.

Sovereign bonds issuance plotted in Figure 3.1 and Figure 3.2 equal to the net borrowing requirement during each year plus the redemptions of long-term instruments in the same year and the redemptions of short-term instruments issued in the previous year. Therefore, this indicator captures the issuance of all securities excluding those that were issued and redeemed in the same calendar year. In other words, gross issuance in the calendar year amount to how much the country issued in nominal terms to fully pay back maturing debt issued in previous years plus the net cash borrowing requirement through any issuance mechanism. This follows the same method to compute gross issuance in Chapter 1 and is referred as the standardised method.

Outstanding debts in local currency are converted to USD using end-of-year foreign exchange rates.

Exchange offers and certain bonds in the dataset have been manually excluded when they did not have a Bond ID identifier (ISIN, RIC or CUSIP) and when they could not be manually confirmed by comparing them with official government data.

LSEG provides information on the market of issuance of each bond. When this variable is available, the market of issuance is classified as “Domestic” if LSEG classifies it as “Domestic” or “Domestic (others)” and as “Foreign” in all other cases.

Credit ratings data

LSEG provides rating information from three leading rating agencies: Fitch, Moody’s, and S&P. For each country with rating information in the dataset, a value of 1 is assigned to the lowest credit quality rating (C or below) and 21 to the highest credit quality rating (AAA for Fitch and S&P,and Aaa for Moody’s). Non-investment grade categories include ratings up to BB+ for Fitch and S&P, and up to Ba1 for Moody’s.

The rating in question is then assigned to each relevant bond issued by that country (as at issuance or transaction date). If ratings are available from several agencies, their average is used. Final ratings are categorised as follows: those equal to or higher than 15 are classified as Investment Grade A (IG A); ratings falling between 12 and 14 are designated as Investment Grade BBB (IG BBB); ratings between 9 and 11 are categorised as Speculative Grade BB (SG BB); and ratings below 9 are classified as Single B high risk (Single B and below). Within the high-risk category, ratings equal to or lower than 3.5 indicate a default or very high risk of default.

When computing the number of upgrades and downgrades, ratings data are observed on a monthly basis, excluding those equal to 1. If a country has received several ratings from the same agency in one month, the latest one is used.

The weighted debt quality analysis uses rating information from three rating agencies (Fitch, Moody’s and S&P). The rating valid at the end of the year for a country is assigned to the totality of its outstanding debt stock. The share is then computed as a stock-weighted average across rating groups.

Primary market yields

The computation of primary market yields relies on LSEG data regarding the prices and yields of each issuance. These data are available only for a limited amount of bonds.

Yields and prices are assigned to our dataset based on the Bond ID and its date of issuance.

When multiple prices or yields are available for the same bond on the same date of issuance, the average value is considered.

When a yield or a price has the same Bond ID but not the same date of issuance, we consider the price or yield as having the closest issuance date for those Bond IDs falling within a five-day range before or after, beginning with one day later, followed by one day before, and so on.

When yields are not readily available, they are computed using the corresponding price and the R package called jrvFinance. Prices below zero or higher than 999 are excluded.

Yields that exceed 100 or fall below -5 are excluded. Yields that are more than 10 times the median annual yields for each issuer, considering the same instrument type and maturity category, are also excluded.

Notes

[1] Annual issuance includes all issuance in the year excluding those issued and redeemed in the same calendar year.

[2] LICs' ratios have significantly increased since 2015, and for LMICs, growth has been consistent since 2007. In contrast, HICs and UMICs saw notable increases only during the global financial crisis in 2008-09 and the COVID-19 pandemic in 2020, with these ratios remaining largely stable from 2009 until 2019. Despite these trends, there is significant potential for further development in LIC markets, with their ratios remaining much lower compared to other income groups.

[3] It is worth noting that the original sin refers not only to sovereign debt but to all debt across sectors, including corporate debt.

[4] The significant drop in the average ATM of bonds denominated in foreign currency in LICs can be attributed to the relatively low number of outstanding bonds in 2015 issued by these countries. More precisely, in 2015, Congo, Ethiopia, and Rwanda were the only LIC with outstanding foreign currency bonds, one each. These bonds had an original 22-year maturity for Congo and a 10-year maturity for Ethiopia and Rwanda. They had been first issued in 2007, 2014, and 2013, respectively. Mozambique issued one bond with a 7-years maturity in 2016 and one bond with a 12 years-maturity in 2019, and Rwanda followed with a new 10-years maturity bond in 2021.

[5] Conditions that amplify spillover effects of US monetary tightening cycles include US dollar appreciation, increases in global inflation expectations and high US term premiums. This cycle features the first two but not the third, as US term spreads are nearly their lowest in recent history.

[6] These figures include China and were sourced from the IMF World Economic Outlook.

[7] This estimate excludes EMDEs with no available yield-to-maturity at issuance data in LSEG, countries with relatively high inflation (i.e. Argentina, Lebanon, Türkiye, Venezuela and Zambia) and China.

[8] Equivalent to single B or below.

[9] A 10% yield in a USD-denominated sovereign bond is considered a rule-of-thumb threshold for debt distress. Yields above that threshold are considered too expensive for countries to service their debt in the long-term, potentially leading to difficulties in meeting repayment obligations and increasing the likelihood of default.

[10] High-risk countries corresponds to those with a credit rating in the range from single B to CCC.

[11] These countries are Angola (LMIC from SSA), Benin (LMIC from SSA), Cameroon (LMIC from SSA), Honduras (LMIC from LAC), Ivory Coast (LMIC from SSA), Kenya (LMIC from SSA), Nigeria (LMIC from SSA), Senegal (LMIC from SSA), Uzbekistan (LMIC from MECA), Türkiye (UMIC ex. China from Europe), Colombia (UMIC ex. China from LAC), Mongolia (UMIC ex. China from Asia ex. China), Costa Rica (UMIC ex. China from LAC), and Panama (HIC from LAC).

[12] This includes both cases in which there is no investor demand for a country's bonds or when the country opts not to issue due to prohibitive high borrowing costs.

[13] Survivorship bias occurs when analyses focus only on entities that have endured over time, ignoring those that failed. This can lead to overly optimistic conclusions, as the dataset excludes unsuccessful cases that might provide a more balanced perspective.

[14] These are: Angola, Benin, Cameroon, Congo, Ghana, Kenya, Mozambique, Nigeria, Rwanda, Senegal, and Zambia.

[15] These include two from LAC (Bolivia and Honduras), two from Asia (Sri Lanka and Papua New Guinea), and three from MECA (Egypt, Jordan, and Pakistan).

[16] Net issuance (i.e. the amount issued minus the amount redeemed within a specific period) is a proxy for the marginal exposure investors take. While this net figure does not fully capture the issuers' reliance on foreign investors —since some will buy their bonds directly in the local rather than international markets— it does offer a useful gauge of foreign demand. LICs' net borrowing from foreign markets in absolute terms is negligible, averaging just USD 100 million annually from 2015 to 2024. Thus, they were excluded from the analysis.

[17] The LICs and LMICs with negative net borrowing from foreign markets over 2022–24 are (ordered in ascending order by net borrowing): Egypt (MECA, high-risk), Ghana (SSA, high-risk), Sri Lanka (Asia ex. China, high-risk), Morocco (MECA, speculative BB grade), Vietnam (Asia ex. China, speculative BB grade), Bolivia (LAC, high-risk), Kenya (SSA, high-risk), Congo (SSA, high-risk), Rwanda (SSA, high-risk), Nigeria (SSA, high-risk).

[18] Corresponding to CCC- and below in S&P and Fitch; and to Caa3 and below in Moody’s.

[19] As of December 2024, the countries with credit ratings currently at default or with a high risk of default are Argentina, Belarus, Ethiopia, Ghana, Laos, Lebanon, Maldives, Niger, Ukraine and Zambia. Due to a rating upgrade of Argentina by Moody’s in January 2025, the number of these countries has decreased to nine as of February 2025.

[20] Values from the 1980s and 1990s are based on computations from the Bank of Canada and Bank of England Sovereign Default Database (Beers et al., 2024[18]). The values for the current tightening cycle consider the GDP of the countries with very high risk or in default as of 2024.

[21] Importantly, this observation is not driven by composition effects (i.e. by the inclusion of new countries in the pool of rated countries over the period of the analysis): It holds in absolute numbers as well as when only considering countries for which ratings have been available since 2000.

[22] These are: Albania (UMIC), Algeria (UMIC), Argentina (UMIC), Bangladesh (LMIC), Bosnia Herzegovina (UMIC), Brazil (UMIC), Burkina Faso (LIC), Egypt (LMIC), Eswatini (LMIC), Grenada (UMIC), Guinea Bissau (LIC), Kuwait (HIC), Laos (LMIC), Mali (LIC), Mauritius (UMIC), Moldova (UMIC), Montenegro (UMIC), Myanmar (LMIC), Namibia (UMIC), Niger (LIC), Pakistan (LMIC), Seychelles (HIC), Togo (LIC) and Yemen (LIC).

[23] In these countries, the central government's marketable debt is above 60% of the GDP as of 2023 (IMF, 2024[24]).

4 Debt financing for the climate transition

This chapter's scenario analysis highlights the critical role that debt markets will play in financing the climate transition and underscores the impracticality of overreliance on either the public or private sector alone. While a narrow focus on investment needs for the transition fails to capture the full complexity of the challenge, scenario analysis offers a pragmatic approach to assessing the financial requirements of transitioning to a net-zero economy. It also allows the consideration of key variables such as the growth of climate mitigation investments, international climate finance for developing countries and foreign direct investment.

Introduction

This chapter examines the financing needs for transitioning to a low-carbon economy, focusing on corporate bonds. Its primary objective is to identify the necessary developments in corporate bond markets to enable energy sector companies to undertake the investments required for the climate transition. While the analysis spans the global economy, it places an emphasis on the role of capital markets in mobilising finance for the climate transition in emerging market and developing economies (EMDEs).

Key findings

- **In 2024, global clean energy investment reached USD 2 trillion, yet transitioning to a low-carbon economy while meeting rising energy demand requires over USD 4 trillion annually.** Despite this short-term funding gap, global clean energy investment has grown 10% annually since 2019, outpacing GDP growth of 3%.
- **Investment trajectories will vary significantly depending on whether most investments come from the public or private sector.** Scenarios do not prescribe recommendations for governments, nor do they represent the most likely projections of future developments. Instead, a scenario analysis may quantify the implications of public-sector-led versus capital-market-driven scenarios, helping governments assess their feasibility and determine policy actions.
- **In a baseline scenario,** assuming climate investment growth in both public and private sector continue along recent trends, **EMDEs other than China face a cumulative shortfall of USD 10 trillion to meet the Paris Agreement's ambition by 2050.** China's investments are on track to align with a net-zero pathway by 2028, while advanced economies would be aligned by 2041, provided recent investment trends continue.
- **In a scenario where the public sector provides all the additional financing to meet investment needs by issuing debt, the public debt-to-GDP ratio in advanced economies would rise by 25 percentage points over the 2024-50 period, and by 41 percentage points in China.** In EMDEs other than China, the debt-to-GDP ratio would grow from 59% in 2024 to 75% in 2040, beyond which further fiscal expansion may not be sustainable, necessitating climate finance support from advanced economies beyond the New Collective Quantified Goal on Climate Finance agreed at COP29.
- **In a scenario where the private sector provides all the additional financing to meet investment needs, capital markets would need to develop substantially.** This is particularly critical for the energy bond markets in EMDEs other than China, which would need to grow at an annual rate of 9% between 2024 and 2050.
- **Energy companies in advanced economies relied more on bond financing (30% of total debt and equity) than those in EMDEs other than China (12%) and China (4%) in 2023**. Greater access to market-based debt may be necessary for companies in the energy sector in EMDEs to finance long-term investments.
- **Across all three scenarios analysed in this chapter, the bond debt of energy companies in EMDEs grows at about twice the rate of projected GDP, while it expands in line with GDP in advanced economies.** These scenarios underscore the immense challenge of leveraging debt markets for the transition to a low-carbon economy. However, they also reaffirm the private sector's potential to drive this transformation.

Policy considerations

The latest numbers on climate transition investments are both a cause for optimism and concern. Total clean energy investments reached USD 2 trillion in 2024, a substantial increase of 61% from USD 1.2 trillion in 2019, reflecting a compound annual growth rate of 10%. However, these recent investments are less than half of the projected investment needs of USD 4.1 trillion a year for 2026-30 to align with a pathway to reach the ambition of the Paris Agreement. Bridging this gap poses challenges for advanced economies and China but is especially daunting for other EMDEs. Clean energy investments in EMDEs other than China must increase to five times their current level by 2035.

However, focusing solely on investment needs for the climate transition does not provide a complete picture of the challenge. First, while absolute values exceeding USD 4 trillion annually are significant, they must be considered against global GDP of USD 110 trillion in 2024, annual average equity capital raised by listed companies of USD 852 billion between 2019 and 2023, and, as discussed in previous chapters, total issuance of sovereign bond debt at USD 18 trillion on average annually during 2020-24, and corporate bond debt at USD 6 trillion. Second, companies may reinvest revenues from operational projects, gradually reallocating capital from high-carbon assets to clean energy where profitable. For instance, even disregarding the reinvestment of their profits, companies in the energy sector had USD 777 billion available for reinvestment in 2023 – equivalent to the depreciation and amortisation of their assets. Third, framing investments by 2050 solely for a net-zero transition overlooks the broader need for energy investments in regions with growing populations or dynamic economies (e.g. Sub-Saharan Africa and Southeast Asia) and to ensure energy security for countries lacking sufficient domestic oil and gas production (e.g. Europe).

Scenario analysis helps to pragmatically assess the challenge of financing the transition to a net-zero economy while considering the abovementioned points. The financing trajectories will look very different depending on whether the public or private sector finances most of the investment. In a baseline scenario, assuming climate investment growth and public sector investment continue along recent trends, China's investments are on track to align with a net-zero pathway by 2028, while advanced economies would not be aligned with the Paris Agreement goals until 2041. In this scenario continuing at current growth rates, EMDEs other than China face a cumulative shortfall of USD 10 trillion to meet the Paris Agreement's ambition, even with the New Collective Quantified Goal on Climate Finance (NCQG) agreed at COP29.

In a scenario where the public sector provides the necessary additional financing to meet the investment requirements rapidly, public debt levels would rise significantly. In EMDEs other than China, the public debt-to-GDP ratio (defined based on general government total debt) would grow from 59% in 2024 to 75% in 2040, assuming governments balance the revenues and expenditures, and finance only climate investments through new debt. In advanced economies, the debt-to-GDP ratio would rise from 115% in 2024 to 139% in 2050, partly due to increased climate-related development assistance for EMDEs other than China after 2040 when their public debt levels reach an assumedly unsustainable level. China's debt-to-GDP ratio is projected to rise from 90% to 131% over the same period. These high public debt levels may be sustainable only in a macro-economic environment with low interest rates and high economic growth.

In the opposite scenario where the private sector provides the additional financing to meet the investment requirements, public debt levels could remain stable, but capital markets would need to develop substantially. This is especially true of bond markets for energy companies in EMDEs other than China, which would need to grow at an estimated annual rate of 17% between 2024 and 2035. While this growth is theoretically feasible, it would be even higher than the noteworthy growth in China's corporate bond markets in the last decade (12% per year on average). An annual increase of 17% would require favourable macro-economic conditions and significantly improved regulatory frameworks in EMDEs other than China.

In all three scenarios in this chapter, it is notable that energy companies in advanced economies see their debt and equity developing in line with GDP growth: while annual GDP growth is expected at 1.4% between

2024 and 2050, bond and equity markets are projected to grow between 0.7-1.8% and 0.5-1.2% annually, respectively, depending on the scenario. In China, capital market growth in all scenarios is approximately double the expected GDP growth of 1.8% annually, with bond and equity markets for energy companies growing at 2.9-4.6% and 3.1-4.9%, respectively. In other EMDEs, the relationship between GDP growth and bond capital market development is similar to China (around twice) in two of the scenarios but diverges in the scenario where capital markets play a leading role. Here, bond markets for energy companies in EMDEs other than China are projected to grow 9.1% annually by 2050, compared to projected GDP growth of 2.5%.

The potential for growth in the sustainable bond market is even greater than that of the overall bond market, given the role of sustainable bonds in financing climate transition investments. In advanced economies, sustainable bonds accounted for 13% of outstanding bonds issued by energy companies as of 2024, with all scenarios indicating a rise to 94-97% by 2050 if sustainable bonds were to finance all climate transition investments. A similar trend is expected in China, where the share stood at 12% in 2024 and is projected to reach 97-98% by 2050. In EMDEs other than China, the initial share was lower at 10% in 2024, with projections for 2050 varying between 90% and 91%, depending on the scenario.

These scenarios underscore the immense challenge of leveraging debt markets for the transition to a low-carbon economy. However, they also reaffirm the private sector's potential to drive this transformation. To unlock this potential, financial regulatory reforms will be essential, particularly to enhance capital market development in EMDEs. With smart policies and well-functioning markets, countries can mobilise the necessary investment for growth and build a financial system that is not only resilient but also catalytic for a sustainable transition.

Past and future investments in the climate transition

This section reviews recent investments in the climate transition and provides estimates of the investments required to meet the Paris Agreement goals, broken down by economic sector and region.

Recent investments in the climate transition

Various organisations report estimates of recent investments in climate transition and clean energy, employing differing methodologies and scopes as well as varying reference years. Table 4.1 presents estimates from BloombergNEF (BNEF, 2024[1]), the Climate Policy Initiative (CPI, 2024[2]), the International Energy Agency (IEA, 2024[3]) and McKinsey & Company (McKinsey, 2022[4]). Both the IEA and McKinsey report total annual investments of USD 2 trillion, albeit for different reference years and scopes. The IEA's analysis provides estimates for 2024 that encompass clean energy investments, including power generation, electricity networks, end-use technologies and energy efficiency measures. McKinsey, reporting for 2021, focuses on low-emission assets, reflecting a broader scope that accounts for technologies with reduced but not zero greenhouse gas emissions.

BloombergNEF (BNEF) estimates USD 1.8 trillion in climate transition investments for 2023. The Climate Policy Initiative (CPI) provides the lowest estimate, ranging from USD 1.5 to 1.6 trillion for 2023, due to its different scope and focus on primary capital flows directed toward physical climate-related assets, excluding broader supply chain costs and indirect expenditures. Examples of broader supply chain costs include investments in manufacturing components for solar panels, such as photovoltaic cells, and indirect expenditures encompass policy-induced mechanisms, such as subsidies supporting clean energy projects.

Table 4.1. Global estimates for private and public climate transition investments

Source	Climate transition investments (in USD trillion)	Reference year
BNEF	1.8	2023
CPI	1.5-1.6	2023
IEA	2.0	2024
McKinsey	2.0	2021

Note: BNEF covers deployment of net-zero-aligned technology and infrastructure. CPI captures primary capital flows in clean energy and climate resilient infrastructure CPI (2023[5]), Global Landscape of Climate Finance 2023 Methodology, https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2023/. IEA data covers energy (power generation, electricity grids and battery storage), energy-efficiency in transport, buildings and industry, and clean fuels. McKinsey focuses on low-emission assets.
Source: BNEF (2024[1]), Energy Transition Investment Trends 2024, https://about.bnef.com/energy-transition-investment/; CPI (2024[2]), Global Landscape of Climate Finance 2024: Insights for COP29, https://www.climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2024/; IEA (2024[3]) World Energy Investment 2024, https://www.iea.org/reports/world-energy-investment-2024; McKinsey (2022[4]), The net-zero transition: What it would cost, what it could bring, https://www.mckinsey.com/capabilities/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring.

The IEA offers a granular breakdown of recent climate transition investments and future investment needs to meet net-zero targets, detailing requirements across subsectors and regions. While the IEA's investment scope focuses on climate change mitigation and partially includes cross-cutting elements (i.e. investments accounting for both climate change mitigation and adaptation goals), it does not comprehensively capture climate change adaptation investments, compensation for loss and damage, and nature preservation. Investments in climate adaptation and nature preservation are discussed below but are not part of the main analysis in this chapter.

The IEA describes total climate transition investments as "Total clean energy" investments and disaggregates them into low-emission power, transport, low-emission fuels and other sectors.

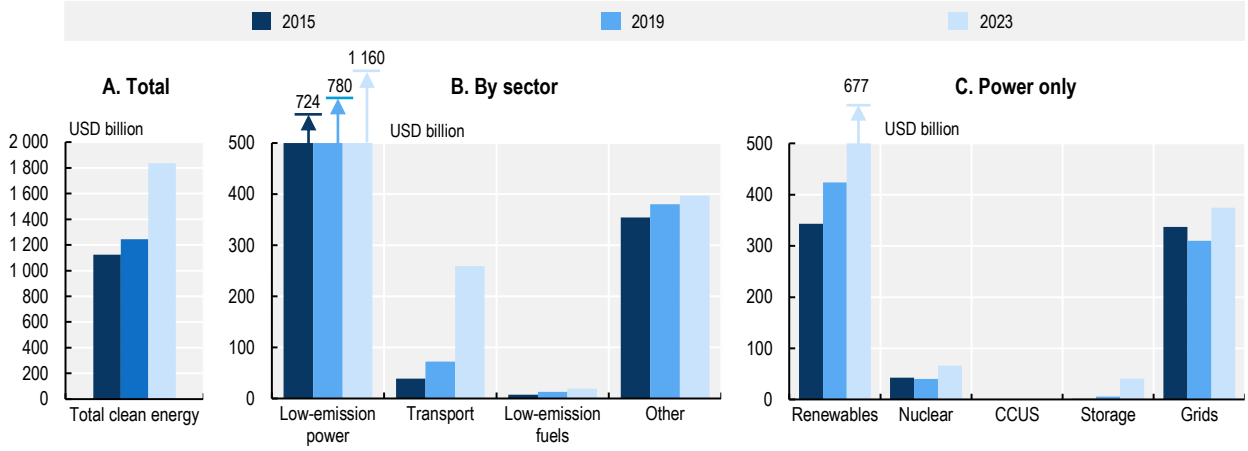
- **Low-emission power** includes power generation technologies such as renewables, nuclear energy, and fossil fuels with carbon capture, utilisation and storage (CCUS). This category also covers energy storage systems and electricity networks for integrating and distributing energy.
- **Transport** encompasses energy-efficiency and end-use investments in road vehicles, rail transport and aviation, electric vehicles and technologies related to clean fuels and batteries.
- **Low-emission fuels** include clean fuels such as hydrogen and biofuels, and transitional fossil fuels.
- **Other** describes investment in energy-efficiency and end-use in other sectors such as industry and buildings.

Figure 4.1 shows that total clean energy investments reached over USD 1.8 trillion in 2023, marking a significant increase of approximately 47% from USD 1.2 trillion in 2019, equivalent to a compound annual growth rate (CAGR) of approximately 10%. Investments in the low-emission power sector dominate, accounting for USD 1.2 trillion or 63% of the total in 2023. Within this category, power generation investments — comprising Renewables, Nuclear and CCUS — total USD 744 billion (41% of total clean energy investments), with renewables representing the vast majority at USD 677 billion (37%), growing 60% from 2019, equivalent to a CAGR of 12%. In contrast, although investments in nuclear power and CCUS have grown, they remain minimal. Investments in electricity networks reached USD 374 billion (20%), while energy storage saw significant growth, rising to USD 41 billion (2%) from just USD 5 billion in 2019, equivalent to a CAGR of 66%.

Investments in clean energy transport reached USD 259 billion in 2023 (14% of total clean energy investments), representing a 260% increase from USD 72 billion in 2019 and an equivalent CAGR of 38%. Investments in clean fuels reached USD 19 billion (1%) in 2023.

Figure 4.1. Estimate of private and public climate transition investments, globally

Total clean energy investment grew 47% in 2019-23, mainly driven by investments in renewables (60% growth) and transport (260% growth)



Source: IEA (2025[6]), Proprietary database; IEA (2021[7]), World Energy Investment 2021, https://www.iea.org/reports/world-energy-investment-2021; IEA (2016[8]), World Energy Investment 2016, https://www.iea.org/reports/world-energy-investment-2016.

Climate investment needs by 2030 and 2050

Estimates for annual global climate finance needs vary across organisations due to differences in scope, methodological approaches and assumptions (Falduto, Noels and Jachnik, 2024[9]). For instance, the forecast for economic growth (and, therefore, energy demand) and the future costs of implementing different technologies impact estimations of investments needed. The global estimates for 2030 and 2050 by BNEF, CPI, the IEA, the Independent High-Level Expert Group on Climate Finance (IHLEG), the Intergovernmental Panel on Climate Change (IPCC) and McKinsey are the following:

- BNEF estimates that meeting net-zero targets requires annual investments of USD 5.4 trillion by 2030 and up to USD 7.4 – 8.0 trillion by 2050 (BNEF, 2024[10]).
- CPI has the highest estimation of required financing based on a review of estimates developed by other institutions, with a range of USD 5.4 trillion to USD 11.7 trillion annually by 2030 and a range of USD 9.3 trillion to USD 12.1 trillion by 2050, reflecting a broader coverage of investment requirements including areas such as adaptation finance (CPI, 2024[11]; CPI, 2023[5]).
- The IEA, focusing on the sectors detailed in Figure 4.1, projects average annual investments of USD 4.1 trillion between 2026 and 2030, peaking at USD 4.5 trillion within this period. Investments are expected to rise further, reaching at least USD 4.9 trillion annually between 2031 and 2050.
- The IHLEG estimates annual financing needs at USD 6.3 – 6.7 trillion by 2030, emphasising the need to mobilise resources for emerging market and developing economies (IHLEG, 2024[12]).
- McKinsey estimates an annual average investment requirement of USD 6.5 trillion in low-emission assets by 2050, including a reallocation of USD 1 trillion from high- to low-emission investments (McKinsey, 2022[4]).

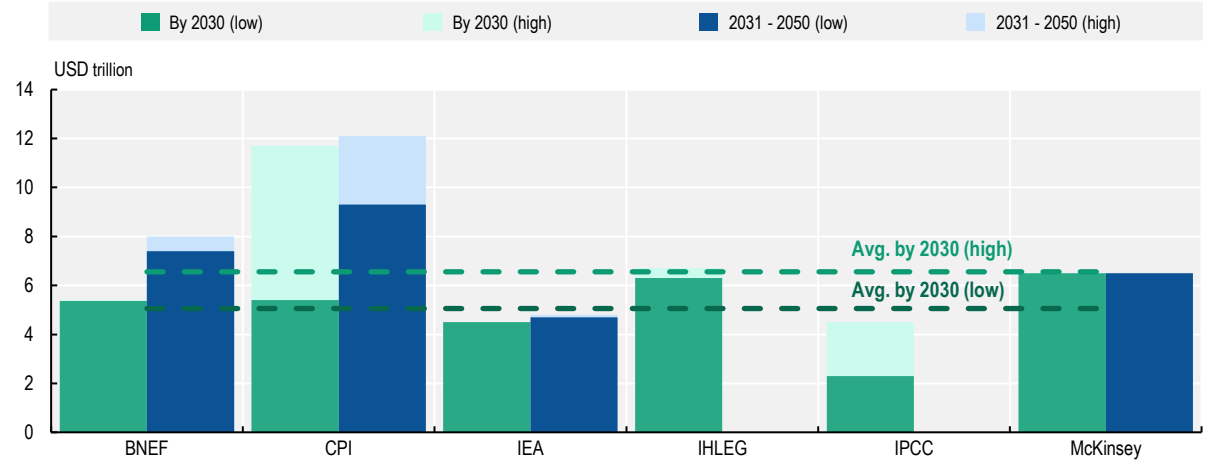
- The IPCC estimates an annual investment need between USD 2.3 trillion and USD 4.5 trillion by 2030 considering energy, energy-efficiency, transport and agriculture, forestry and other land use sectors, based on a review and synthesis of existing studies with varying scopes (Kreibiehl, 2022[13]).

The projected investment needs by BNEF, CPI, the IEA, IHLEG, IPCC and McKinsey are based on varying methodologies and target different net-zero emission timelines and global warming limits. For example, BNEF's scenario achieves net-zero emissions but limits global warming to only 1.75°C. In contrast, the IPCC provides an estimate range that keeps global warming broadly below 2.0°C compared to pre-industrial levels. The scenarios by CPI, the IEA, IHLEG and McKinsey achieve net-zero emissions by 2050 and limit global warming to 1.5°C, aligning closely with the highest ambition in the Paris Agreement.

According to the IEA, the energy sector accounted for 37.4 billion tonnes of CO_2 equivalent ($GtCO_2e$) in 2023 (IEA, 2024[14]). Meanwhile, the United Nations Environment Programme (UNEP) estimates total global GHG emissions at 57.1 $GtCO_2e$ for the same year (UNEP, 2024[15]), meaning that the energy sector was responsible for approximately two-thirds of total global emissions. Given the sector's substantial impact on global emissions and the scale of investments required for its transition (as outlined below in the "Estimates of future financing needs by economic sector" section), the following analysis focuses on the energy sector. The analysis relies on IEA estimates, which provide detailed regional and sectoral breakdowns, providing insights into investment needs and sources of financing.

Figure 4.2. Estimates of future climate transition annual financing needs

Estimated global climate financing needs range from USD 4.5 trillion to USD 12.1 trillion annually, where the lower-end estimate averages at USD 5.1 trillion by 2030



Source: BNEF (2024[10]), New Energy Outlook 2024, https://about.bnef.com/new-energy-outlook/;CPI (2024[11]), Top-down Climate Finance Needs, https://www.climatepolicyinitiative.org/publication/top-down-climate-finance-needs/;IEA (2024[11]), World Energy Outlook 2024, https://www.iea.org/reports/world-energy-outlook-2024; IEA (2023[16]) Net Zero Roadmap, https://iea.blob.core.windows.net/assets/4d93d947-c78a-47a9-b223-603e6c3fc7d8/NetZeroRoadmap_AGlobalPathwaytoKeepthe1.5CGoalinReach-2023Update.pdf; IHLEG (2024[12]), Raising ambition and accelerating delivery of climate finance, https://www.lse.ac.uk/granthaminstitute/publication/raising-ambition-and-accelerating-delivery-of-climate-finance/; Kreibiehl (2022[13]), Investment and finance. In IPCC, 2022: Climate Change 2022. Contribution of Working Group III to the Sixth Assessment Report of the IPCC, https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/; McKinsey (2022[4]), The net-zero transition: What it would cost, what it could bring, https://www.mckinsey.com/capabilities/sustainability/our-insights/the-net-zero-transition-what-it-would-cost-what-it-could-bring.

Estimates for future investment needs by region

Methodology and underlying 2050 net-zero scenario

The IEA estimates represent investment needs in its Net Zero Emissions by 2050 (NZE) scenario (IEA, 2023[17]; 2021[18]), which outlines a global pathway for energy-related climate transition investments to achieve net-zero CO_2 emissions by mid-century. This scenario aims to be consistent with limiting global warming to 1.5°C and meeting the goals of the Paris Agreement.

To calculate the financing requirements necessary to meet net-zero targets, the NZE scenario employs a bottom-up approach, aggregating investment needs across the subsectors outlined above. The IEA distinguishes between power sector investments, which include renewable energy generation, nuclear power and electricity networks, and end-use investments, which encompass energy efficiency and electrification in buildings, industry and transport. Transport investments within the end-use category include expenditures on batteries and charging infrastructure for electric vehicles (EVs) as well as other low-emission transport technologies. Energy efficiency investments focus on improving energy use in buildings, industry and transport, complementing electrification efforts to reduce energy intensity across these sectors. This chapter focuses on the power and transport subsectors and categorises all other investments as “Others”.

The IEA NZE scenario projects that the global population will grow to nearly 9.7 billion by 2050, implying a CAGR of about 0.7% from 2023, while the global economy is expected to grow at a CAGR of 2.7% under the same scenario. In comparison, the OECD long-term scenarios project a world GDP CAGR of 2.0% over the same period.

To align with the NZE scenario, renewable energy capacity must increase from 4,140 GW in 2023 to 11,000 GW by 2030, representing a 2.7-times expansion and a CAGR of 15% over this period. Solar photovoltaic (PV) and wind will be the primary drivers of this growth (IEA, 2023[17]; 2023[19]). By 2050, capacity must reach approximately 29,000 GW according to the IEA NZE scenario, which corresponds to a CAGR of 7.5% over 2023–50. The NZE scenario also anticipates cost reductions in key technologies by 2030, with solar PV costs projected to decline by 40% and battery storage costs by 60% relative to 2020 levels, driven by technological advancements and economies of scale (IEA, 2023[17]; 2021[18]).

Regional investment needs are projected based on differing energy system characteristics and economic structures. Advanced economies are expected to require substantial early investments to meet near-term targets, reflecting their mature infrastructure and existing high emissions levels. Similarly, EMDEs need rapid investments – but on a much larger scale relative to current investment levels – to address fast-growing energy demand and close infrastructure gaps. The projections incorporate factors mentioned above, such as population growth, economic development trajectories and technology adoption rates, emphasising the significant scale-up required in EMDEs to achieve net-zero goals.

Estimated investment needs by regions

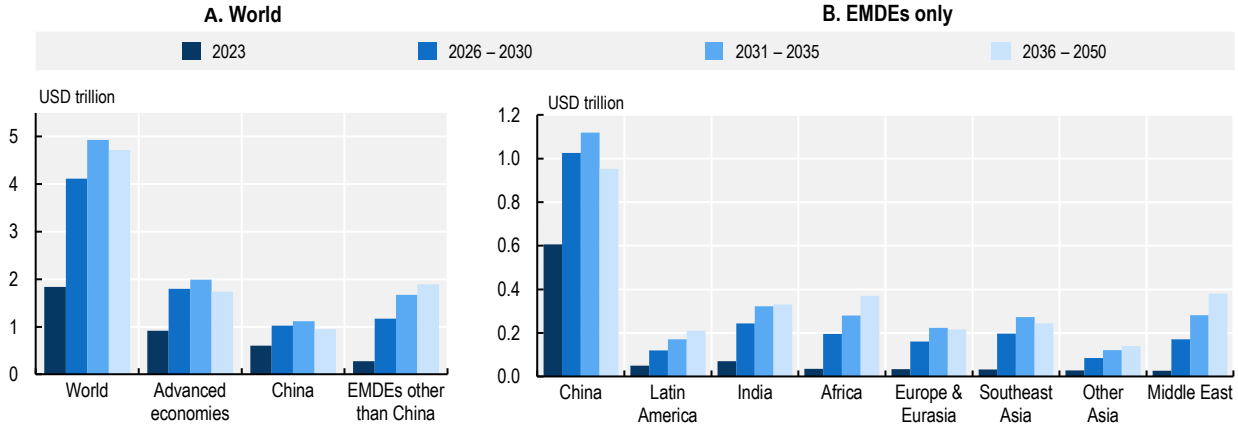
In 2023, investments in total clean energy totalled USD 1.8 trillion globally, with advanced economies contributing USD 918 billion, China USD 606 billion, and EMDEs other than China USD 276 billion. Looking ahead, global total clean energy investment requirements to achieve net-zero targets by 2050 average USD 4.1 trillion annually for the period 2026–30, rising to USD 4.9 trillion in 2031-35 before stabilising at USD 4.7 trillion per year over 2036-50 (Figure 4.3).

In advanced economies, annual needs are set to rise from USD 1.8 trillion (2026–30) to USD 2.0 trillion (2031–35) before declining to USD 1.7 trillion (2036–50). In China, they are expected to remain stable at USD 1.0–1.1 trillion through 2035 before falling to USD 0.9-1.0 trillion in 2036-50. In EMDEs other than China, needs are projected to increase from USD 1.2 trillion to USD 1.7 trillion, reaching USD 1.9 trillion annually over 2036–50.

In 2023, advanced economies represented 51% of total clean energy investments, while China accounted for 34% and other EMDEs contributed just 15%. Within EMDEs, China accounted for 69% of total clean energy investments in 2023. Over the last three years, China's clean energy investments grew at an 18% CAGR. In contrast, clean energy investments by all other EMDEs need to grow substantially from a 13% CAGR over the last three years to align with net-zero pathways. Annual investments in EMDEs other than China need to grow to four times their 2023 level by 2030 and seven times by 2050.

Figure 4.3. Estimates of annual investment needs by region

EMDEs other than China need to quadruple their climate transition investments by 2030 to align with net-zero pathways



Note: Figures are annual average investments for the periods, except for 2023, which reflects actual investments.
Source: IEA proprietary database.

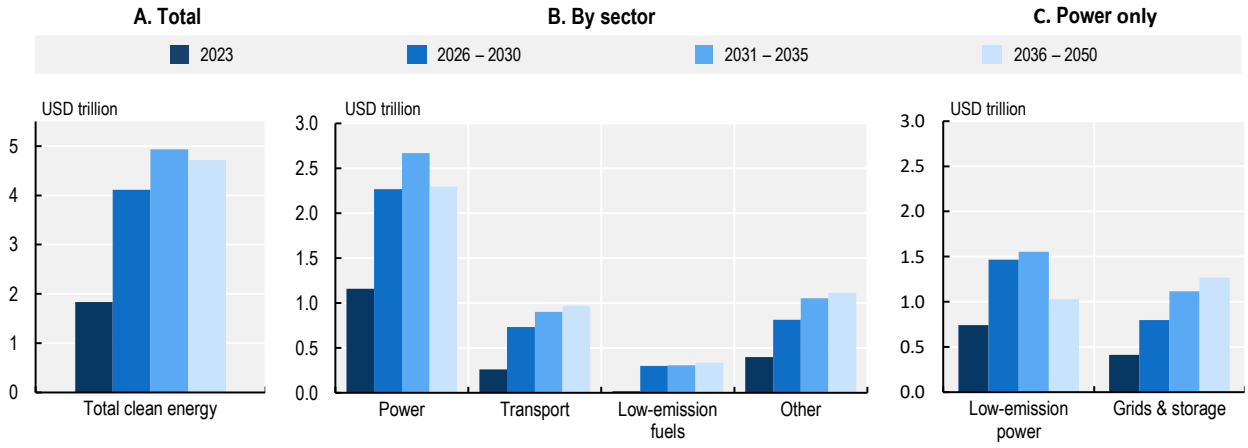
Estimates of future financing needs by economic sector

In 2023, the power sector accounted for the largest share of clean energy investments at USD 1.2 trillion. Under the NZE scenario, investments in the sector will rise to an average of USD 2.7 trillion in 2031-35 (54% of total clean energy investments) before moderating to USD 2.3 trillion by 2036-50 (49%). Transport investments, which stood at approximately USD 260 billion in 2023, would reach USD 0.9 trillion in 2036-50 (21%) of total clean energy investments. Low-emission fuels are expected to grow significantly from USD 19 billion in 2023 to USD 333 billion by 2036-50 (7%). Meanwhile, the "Other" category, encompassing investments in energy-efficiency and end-use in the buildings and industry sectors, would expand from USD 0.4 trillion to USD 1.1 trillion over the same period.

Within the power sector, low-emission power generation investments rise from USD 0.7 trillion in 2023 to USD 1.6 trillion in 2031-35 before moderating to USD 1.0 trillion in 2036-50, while grids and storage investments grow from USD 0.4 trillion to USD 1.1 trillion in 2031-35 before rising further to USD 1.3 trillion in 2036-50, reflecting the increasing need for infrastructure to support clean energy generation and integration.

Figure 4.4. Estimates of annual financing needs globally

By 2035, low-emission power investments must grow to 2.3 times their current level to align with net-zero pathways, while transport investments must grow 3.5 times



Note: The "Other" category includes energy-efficiency and end-use investments in the buildings and industry sectors; figures are annual average investments for the periods, except for 2023, which reflects actual investments.
Source: IEA proprietary database.

Investment and future financing needs for climate change adaptation

There are significant differences between current levels of adaptation and mitigation investments. Mitigation investments account for the majority of climate finance, with annual investments expected to have exceeded USD 2 trillion in 2024 (IEA, 2024[3]). Adaptation finance accounts for approximately 7% of total climate finance, totalling USD 46 billion annually (CPI, 2023[20]). The disparity in funding reflects underlying structural challenges: mitigation projects often involve scalable technologies with clear revenue streams, while adaptation projects require localised, often bespoke interventions that reduce the likelihood or negative impact of unexpected events. The benefits of these projects, such as reducing the risk of future damages or losses, depend on uncertain climate outcomes and often do not promise tangible revenues, making them less attractive to private sector investment (UNEP, 2023[21]; UNEP, 2024[22]).

Future adaptation needs are projected to rise to USD 140–300 billion annually by 2030 and up to USD 520 billion by 2050 (CPI, 2023[20]; UNEP, 2023[21]). Studies suggest that every dollar invested in adaptation generates USD 4–10 in economic benefits by averting climate damages (CPI, 2023[20]). While recognising the importance of adaptation activities in combatting climate change, this chapter focuses on mitigation investments contributing to the global climate transition, given their predominance in total climate financing needs and the more active role the private sector takes in funding these projects.

Financing sources of recent investments in the energy sector

This section explores the current capital structure of companies in the energy sector (which includes both energy and energy-related utilities, as defined in Annex 4.A), focusing on their use of conventional and sustainable bonds.

Public and private sector investments

In 2023, the public sector accounted for 24% of climate mitigation investments in advanced economies, 25% in EMDEs other than China, and 33% in China (IEA, 2025[6]). These shares have remained stable across regions in recent years. In advanced economies and China, public sector financing primarily reflects government spending.

Capital structure in the energy corporate sector

While climate change mitigation investments encompass various sectors, the remainder of the analysis in this section focuses on the energy sector. The main reason for this is that energy sector climate transition investments in the IEA's NZE scenario are substantially higher than in alternative scenarios that do not meet the Paris Agreement goals, such as the IEA's Stated Policies Scenario (STEPS) or Announced Pledges Scenario (APS), leading to an increase in the market size of the energy sector. The section Evolution of bond and equity markets in energy estimates the resulting energy sector's bond and equity market sizes.

In contrast, the *Transport Outlook 2023* (ITF, 2023[23]) shows that Paris Agreement-aligned transport investments, as outlined in its High Ambition scenario, lead to lower investment needs due to more efficient use of infrastructure and a shift towards sustainable transport modes. Core infrastructure investment needs are estimated at 1.7% of global GDP annually through to 2050 under the Current Ambition scenario, and marginally less (1.6%) under the High Ambition scenario. Therefore, climate change mitigation investments in the transport sector are unlikely to increase its bond and equity market size substantially.

The capital structure (i.e. the share of financing sources) of listed companies in the energy sector and its subsectors—such as fossil fuels and renewable energy—varies based on the nature of their business models and the development of the banking sector and capital markets in the countries they operate in. This section builds on a sample of 1 000 listed companies in the energy sector and breaks down their capital structure into bonds, non-marketable debt (and other liabilities) and equity. The sample covers around half of the number of listed energy companies globally and nearly half of the total assets in the energy sector (see Annex 4.A for more information). While non-marketable debt includes bank loans and finance leases, other liabilities include, for instance, accounts payable, deferred revenues, pension and other post-employment benefit obligations, and deferred taxes.

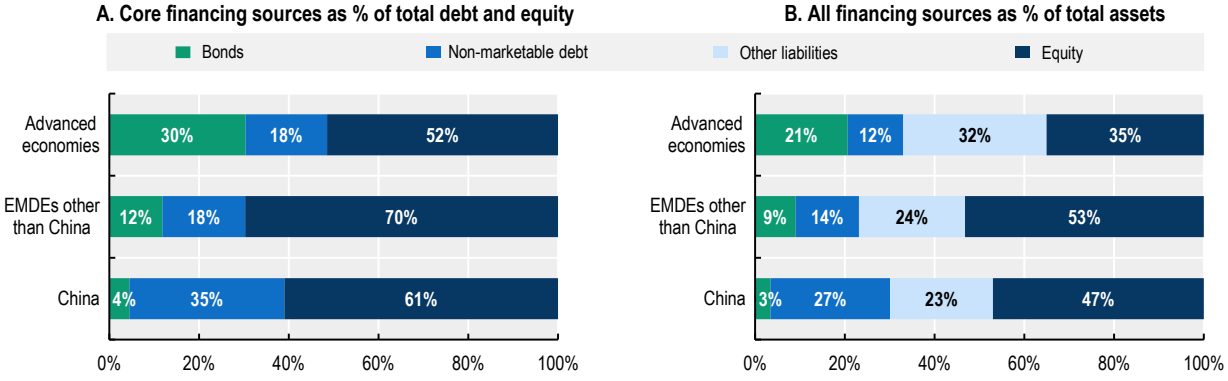
The results are presented following two distinct methodologies:

1. With bonds, non-bond debt, and equity as a share of total debt and equity, representing the financing instruments of companies in the sector (Figure 4.5, Panel A).
2. With bonds, non-bond debt, other liabilities, and equity as a share of total assets (i.e. equity + liabilities) providing a broader view of companies' sources of financing for their total assets (Figure 4.5, Panel B).

The section "Evolution of bond and equity markets in energy" estimates the development of energy sector assets based on the IEA NZE investment requirements, and using the fundamental accounting identity that assets must equal financing sources, it translates the increase in assets into the sector's total financing sources, according to methodology 2.

Figure 4.5. Energy sector capital structure in 2023

Bond financing is more prevalent in advanced economies, while EMDEs other than China rely more on equity financing



Note: Shares are shown for total values in the sector (i.e. larger companies have a higher weight in the calculations). This analysis is based on company financial data of 2023 as data for 2024 was not yet available for most companies at the time of publication.
Source: OECD Corporate Sustainability dataset, LSEG.

In 2023, companies in advanced economies relied more on bond financing (30% of total debt and equity) than companies in EMDEs other than China (12%) and China (4%). In contrast, non-bond debt accounted for a larger share in China (35%) compared to advanced economies and EMDEs other than China (18%), as shown in Figure 4.5 Panel A. Across regions, equity remains companies' primary source of financing, with EMDEs other than China having the highest relative share at 70%. In comparison, equity accounted for 52% of companies' financing in advanced economies and 61% in China.

When considering the relative shares out of total assets (i.e. incorporating other liabilities), as shown in Figure 4.5 Panel B, the regional differences mentioned above remain consistent while the absolute percentage of bonds and equity out of the larger denominator decreases. This effect is more pronounced in advanced economies as they have a comparatively greater share of other liabilities. Underlying reasons may include differences in supply chain complexity and financing models, as energy companies in advanced economies often rely on long-term contracts and corporate-backed financing, leading to higher deferred revenues and accounts payable. The energy mix in advanced economies, with a higher share of renewables requiring diverse supply chains and contractors, may also contribute to this difference.

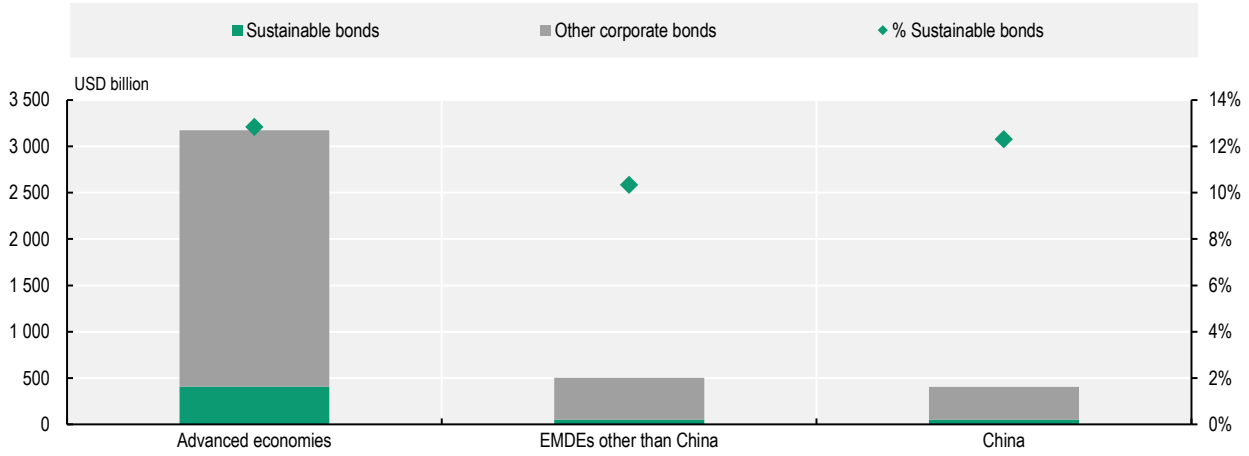
Corporate and sustainable bond market trends in the energy sector

In 2024, the total outstanding amount of corporate bond debt in the energy sector reached more than USD 3 trillion in advanced economies, USD 504 billion in EMDEs other than China and USD 406 billion in China. Sustainable energy bonds represented 13% of outstanding corporate energy bond debt in advanced economies, 10% in EMDEs other than China, and 12% in China.

Sustainable bonds are designed to support projects with environmental and social benefits and can be classified into two major categories: "use of proceeds bonds" and "sustainability-linked bonds" (SLBs) (ICMA, 2022[24]). Use of proceeds bonds, including green, social, and sustainability bonds (GSS bonds), require funds to be allocated to specific eligible projects, such as renewable energy, clean transportation, or social initiatives like affordable housing. SLBs, on the other hand, do not require proceeds to be tied to specific projects but instead adjust financial terms based on the issuer's achievement of sustainability performance targets. More information on the recent trends of sustainable bonds is included in Annex 4.B.

Figure 4.6. Outstanding corporate and sustainable bonds in the energy sector as of 2024

Total outstanding corporate bond debt reached USD 4 trillion globally in 2024, with sustainable bonds accounting for over 12%



Source: OECD Corporate Sustainability dataset, LSEG.

Cross-border financing flows

While local capital markets play a vital role in financing the climate transition, cross-border investments also provide a key complement by addressing gaps that domestic resources alone cannot fill, particularly in many EMDEs where local financial markets are relatively less developed. In the private sector, foreign direct investment (FDI) may channel funding to climate mitigation projects across borders. Meanwhile, international development finance provided by official bilateral and multilateral institutions provides essential support for projects that may lack commercial viability.

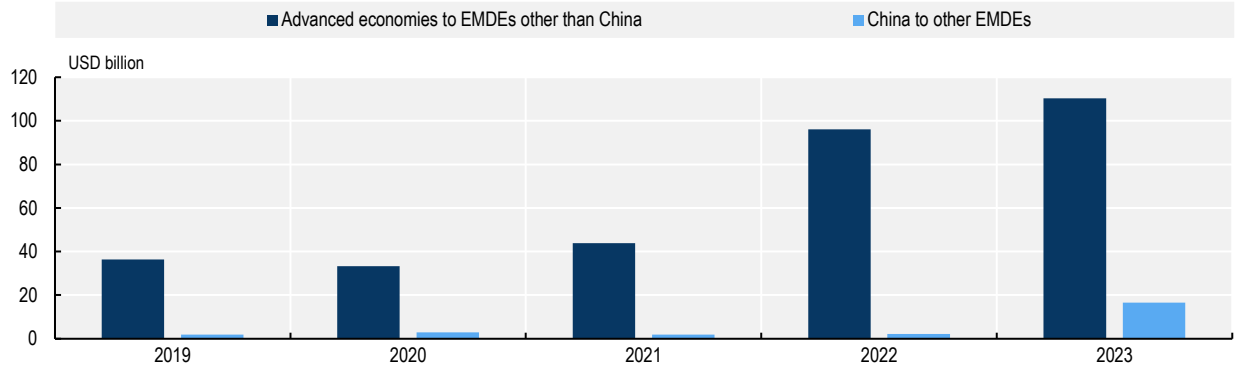
Foreign direct investment

Recent trends in FDI in renewable energy highlight a growing flow of capital from advanced economies to EMDEs. Reflecting only the net balance of investment flows between the two regions, net greenfield FDI in the renewable energy sector from advanced economies to EMDEs other than China grew significantly from an annual average of USD 38 billion in 2019-21 to USD 103 billion in 2022-23.

Meanwhile, net greenfield FDI in renewables from China to other EMDEs, which averaged USD 2 billion per year between 2019 and 2022, surged to USD 17 billion in 2023, driven by rising and unstable fossil fuel prices, especially since 2022, along with new policies worldwide on climate goals and energy security (OECD, forthcoming[26]).

Figure 4.7. Net greenfield FDI flows in renewable energy to EMDEs, 2019-23

Net greenfield FDI from advanced economies to EMDEs in renewable energy has grown rapidly since 2022



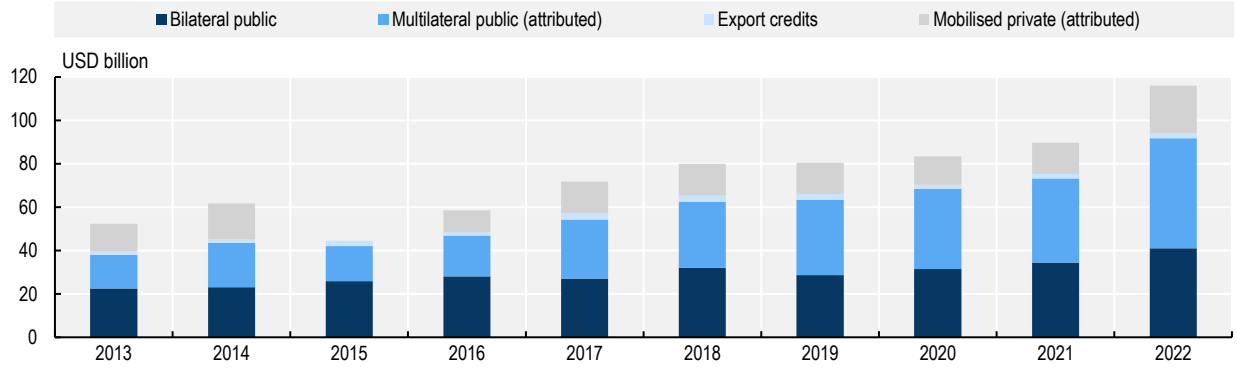
Note: This figure represents announced capital expenditures in renewable energy. Renewable energy includes solar electric power, wind electric power, geothermal electric power, marine electric power, biomass power, hydroelectric energy and other renewable electric power generation (e.g. clean tech hydrogen).
Source: OECD, Financial Times fDi Markets database.

Climate finance provided and mobilised by international providers

At the 15th session of the Conference of Parties (COP15) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2009, developed countries committed to a collective goal of mobilising USD 100 billion annually by 2020 for climate action in developing countries. In 2015, the goal was extended until 2025. In 2022, developed countries provided and mobilised a total of USD 115.9 billion in climate finance for developing countries, reaching the goal for the first time (Figure 4.8).

Figure 4.8. Climate finance provided and mobilised by developed countries for developing countries

Climate finance for developing countries reached USD 115.9 billion in 2022

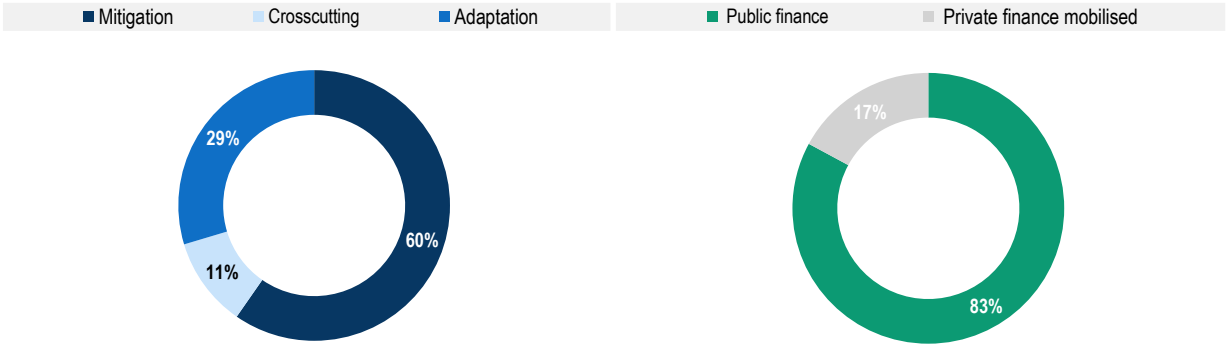


Note: The gap in time series in 2015 for mobilised private finance results from the implementation of enhanced measurement methods. As a result, grand totals in 2016-22 and in 2013-14 are not directly comparable. Multilateral public climate finance and private climate finance mobilised by multilateral institutions only take into account the share attributable to developed countries.
Source: OECD (2024[27]), Climate Finance Provided and Mobilised by Developed Countries in 2013-22, https://www.oecd.org/en/publications/climate-finance-provided-and-mobilised-by-developed-countries-in-2013-2022_19150727-en.html (based on Biennial Reports to the UNFCCC, OECD DAC and Export Credit Group statistics, complementary reporting to the OECD).

A large majority of climate finance for developing countries consists of public funding, delivered both bilaterally to developing countries and through multilateral organisations. In 2020-22, it accounted for 83% of total climate finance (Figure 4.9). The remaining part is private finance mobilised by public climate finance flows. In terms of climate themes, mitigation finance accounts for a significant share, representing 60% of total climate finance for developing countries, followed by adaptation finance with 29%, and crosscutting activities representing 11% (Figure 4.9). Mitigation represents 84% of private climate finance mobilised.

Figure 4.9. Climate themes and sources of climate finance for developing countries in 2020-22

Climate mitigation and public-sector climate finance account for the majority of climate finance for developing countries



Source: OECD (2024[27]), Climate Finance Provided and Mobilised by Developed Countries in 2013-22, https://www.oecd.org/en/publications/climate-finance-provided-and-mobilised-by-developed-countries-in-2013-2022_19150727-en.html.

In November 2024, at the 29th session of the Conference of the Parties (COP29) to the UNFCCC, the New Collective Quantified Goal on Climate Finance (NCQG) was established. Its aim is to mobilise at least USD 300 billion annually by 2035 in support of developing countries in addressing climate change. This new goal will supersede the previous USD 100 billion annual target from 2026 onward. This policy development reinforces commitments to developing countries for addressing climate change and sets expectations for further scaling up international climate finance, which will be examined in more detail in the next section.

Financing scenarios for future investments in the climate transition

This section presents three scenarios for financing future climate transition investments across all sectors, each offering readers a distinct angle on how capital markets might evolve, depending on fundamentally different choices made by governments and the private sector. These scenarios comprise a Baseline Scenario (BLS), a Public Sector Scenario (PSS), and a Capital Markets Scenario (CMS). Each scenario incorporates varying assumptions about overall climate mitigation investment growth, public-private sector investment split, climate finance for developing countries and greenfield FDI. Table 4.2 summarises the underlying assumptions and output metrics, which are also explained in greater detail in the following sections and in Annex 4.A.

These scenarios do not prescribe specific recommendations for governments to adopt any particular approach, nor do they represent the most likely projections of future developments. If anything, the BLS is arguably a more realistic scenario in the short term, with capital markets likely to be somewhere between the two extremes of the PSS and CMS cases in the long term. In fact, part of the value of this scenario

analysis exercise lies in illustrating how impractical an excessive reliance on either the public or private sector would be.

Relying predominantly on public funding could result in unsustainable public sector debt levels (and dynamics). Conversely, overreliance on the private sector to bridge the short- and medium-term investment gaps would require private sector investment growth, and the associated increase in market-based debt in EMDEs, to increase significantly from current levels. This effort to quantify the consequences of public-sector versus capital market-focused approaches allows to assess their viability and determine appropriate policy actions.

The following section presents the BLS, where climate investment growth, public sector investment shares, and greenfield FDI continue along historical trends, while development finance meets COP29 goals by 2035 (UNFCCC, 2024[28]). The subsequent section presents the PSS, where private sector investments are assumed to continue along past trends, and the public sector steps up to finance the remaining gap needed to meet the climate mitigation investment requirements of the IEA NZE scenario described in the "Climate investment needs by 2030 and 2050" section. This results in a variable public sector investment contribution and debt-to-GDP ratios, representing output metrics in this scenario.

Lastly, the CMS assumes that governments face debt-to-GDP limits (90% for advanced economies, 60% for EMDEs other than China, and 80% for China), while capital market-driven private sector investment meets the requirements set by the IEA NZE. The debt-to-GDP limits stem from the two triggers of debt reduction mechanisms in the new EU fiscal rules, which are established at 60% and 90% debt-to-GDP (European Parliament, 2024[29]). The CMS also assumes that greenfield FDI triples (as a proportion of private sector investment) by 2035.

The PSS and CMS build on baseline debt-to-GDP estimates from the OECD (for advanced economies) and the IMF (for EMDEs). These baseline figures do not account for public-sector climate transition expenditure in the IEA NZE. Therefore, future public-sector financing for climate transition investments in line with the IEA NZE represent an additional government debt-burden in the scenario analysis in this chapter. In all scenarios, the public sector debt-to-GDP ratio is assumed to remain at its baseline level in the absence of climate transition investments, abstracting from other pressures on public finances, such as those arising from ageing populations (Guillemette and Turner, 2021[30]).

Table 4.2. Scenario assumptions and output metrics

	Baseline Scenario	Public Sector Scenario	Capital Market Scenario
Public sector climate investment growth	Last three-year (L3Y) average; then declining	Meets requirements (offsetting any private sector shortfall)	L3Y average until debt-to-GDP limit; then zero
Private sector climate investment growth	L3Y average; then declining	L3Y average; then declining	Meets requirements (offsetting any public sector shortfall)
Public/private contribution (%)	Constant (as of 2023)	Output metric	Output metric
Investment gap	Output metric	None / Meeting NZE requirements	None / Meeting NZE requirements
Greenfield FDI	Constant as a proportion of private sector investment	Constant as a proportion of private sector investment	Triples by 2035 as a proportion of private sector investment
Public debt-to-GDP	Output metric	Output metric with a cap at 75% for EMDEs other than China	Output metric with caps (90% for AEs, 60% for EMDEs other than China, and 80% for China)
Climate finance provided and mobilised by international providers	Linear growth to USD 300 bn in 2035, then constant	USD 300 bn by 2035, further increase when EMDEs other than China reach debt-to-GDP cap	Linear growth to USD 300 bn in 2035, then constant

	Baseline Scenario	Public Sector Scenario	Capital Market Scenario
Debt/Equity for energy companies	Constant (as of Dec-23)	Constant (as of Dec-23)	Constant for AEs; EMDEs converge to AEs by 2050
Private sector bond/non-bond debt for energy companies	Constant (as of Dec-23)	Constant (as of Dec-23)	Constant for AEs; EMDEs converge to AEs by 2050
Equity market size for energy companies	Output metric	Output metric	Output metric
Corporate bond market size for energy companies	Output metric	Output metric	Output metric

Baseline scenario

The BLS scenario does not require climate mitigation investments to meet the annual targets set by the IEA NZE scenario and instead assumes that investment growth initially follows the average rate of the last three years (2022–24). The difference between projected actual and required investments is described as the investment gap, and annual gaps carried forward result in a cumulative investment gap. This simplified scenario does not account for increased future investment needs due to delayed investments in prior periods.

Initially, continued investments based on past growth rates create financing gaps across all regions. However, as shown in Figure 4.3, climate transition investment requirements decline on average after 2035 in advanced economies and China, facilitating a reduction and eventual closure of the investment gap. For EMDEs other than China, the IEA NZE scenario projects further increases in investment requirements after 2035.

The BLS assumes that investment growth converges to long-term GDP growth as the gap between actual and required investments narrows. Once the cumulative gap is closed and turns into a surplus—where actual investments exceed requirements—investment growth slows further to stabilise the surplus, as is the case for advanced economies and China. In contrast, EMDEs other than China do not achieve a zero cumulative gap in the BLS, reflecting their historically low investment levels. Their cumulative gap amounts to USD 10.1 trillion by 2050.

If investment growth in 2025 continues at the average rate of the last three years - 8% for advanced economies, 13% for EMDEs other than China, and 18% for China - the projected annual investment for 2025 is estimated to fall short of the required levels by 15-20% in advanced economies, 5-10% in China, and 45-50% in EMDEs other than China. The comparatively lower growth in advanced economies does not preclude them from closing the gap, given their relatively higher current levels of investment. China, with the highest growth and the smallest gap, is expected to close the gap by 2028, compared to 2041 for advanced economies.

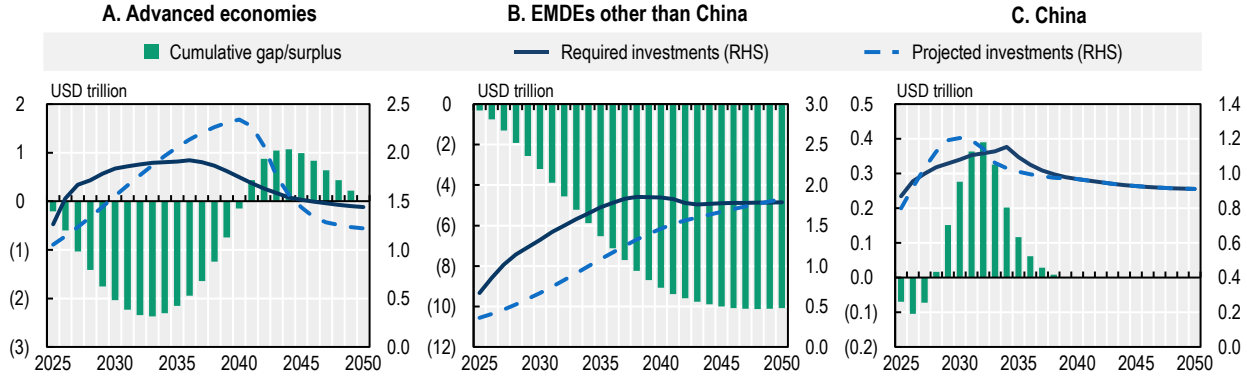
The BLS assumes constant public and private sector shares of climate mitigation investments as of December 2023, consistent with recent trends (IEA, 2024[3]). In 2023, the private sector accounted for 76% of total clean energy investments in advanced economies, 67% in China, and 75% in EMDEs other than China.

Greenfield FDI to EMDEs other than China remains constant as a proportion of private sector investment in advanced economies and China. The scenario does not impose sovereign debt-to-GDP limits and assumes that total development climate finance grows in a linear fashion to USD 300 billion by 2035, as per the COP29 agreement (UNFCCC, 2024[28]), and remains constant thereafter. Lastly, debt-to-equity and corporate bond-to-non-bond debt ratios are also assumed to remain at December 2023 levels.

As in all scenarios, the equity and bond market sizes required to finance future climate mitigation-related investments are treated as output metrics. Figure 4.10 shows projections for actual and required annual investments (secondary axis) and the resulting cumulative gap or surplus (primary axis).

Figure 4.10. Baseline scenario: Projected and required annual investments, and cumulative investment gap/surplus

Climate mitigation investments in AEs and China balance initial investment gaps while EMDEs other than China have a cumulative gap of USD 10.1 trillion by 2050



Note: Public sector investment includes the new COP29 development finance goals agreed on in November 2024. The scenario assumes a linear increase from USD 115.7bn in 2022 to USD 300bn in 2035 while subtracting the private sector contribution and development finance for climate change adaptation based on their average relative shares over the period 2019–22 (OECD, 2024[27]).
Source: OECD, IEA proprietary database.

Public sector scenario

The Public Sector Scenario (PSS) assumes that private sector investment continues to grow at the average rate of the last three years (L3Y), while the public sector provides the additional financing needed to meet the annual investment requirements of the IEA NZE scenario. As a result, there is no investment gap in this scenario. The analysis assumes that all public sector investment is financed through government debt rather than, for example, through additional taxes.

In contrast to the BLS, the PSS imposes a 75% public-debt-to-GDP limit for EMDEs other than China and assumes that any additional public sector investment required beyond this limit is financed through increased development finance contributions from advanced economies. Figure 4.11 illustrates the resulting projections.

While in the PSS all regions initially require increased public sector investment, this effect is most pronounced in EMDEs other than China. In advanced economies, the public sector's share of total climate change mitigation investment rises from 24% in 2023 to 37% in 2025 and 44% in 2026 and 2027, before gradually declining from 2028 onward. This implies a public sector climate change mitigation investment CAGR of 46% in 2023-25. In China, public sector investment would need to rise from 33% of total investments in 2023 to 38% in 2025 and then decline thereafter, implying a 2023-25 CAGR of 29%.

To meet investment requirements in EMDEs other than China, their public sector investment would need to grow at a CAGR of over 129% from 2023 to 2025 to meet the IEA NZE required investments. Similarly, the public sector investment share in EMDEs other than China would need to rise from 25% in 2023 to 59% in 2025. This share remains elevated at 63-65% from 2026 to 2028 before gradually declining. EMDEs other than China would also reach their debt-to-GDP limit of 75% by 2041, necessitating USD 1.6 trillion in additional development finance from AEs from 2041 to 2050 (USD 162 billion a year on average) to close their climate change mitigation investment gap.

Given the central role of the public sector in this scenario and their governments' higher capacity to issue debt securities due to relatively lower domestic interest rates, no specific debt-to-GDP limits were established for advanced economies and China. To finance their domestic investment needs and support

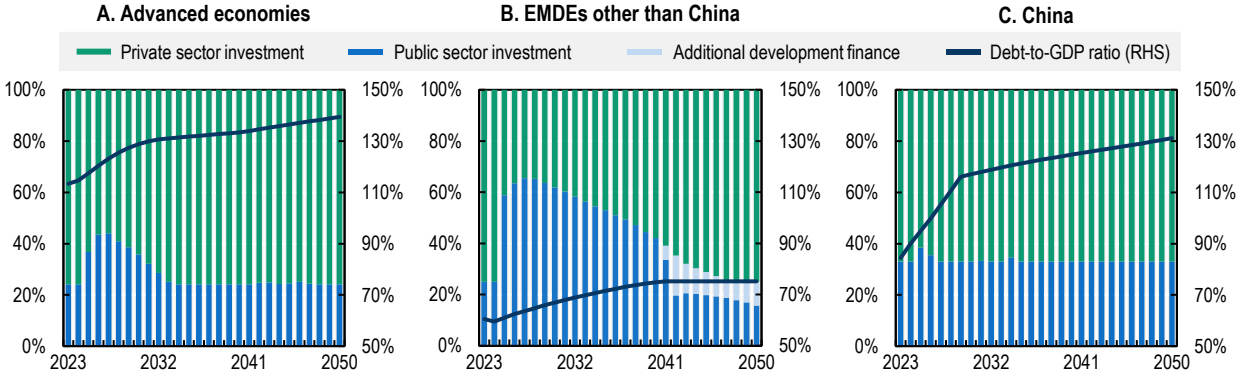
projected development financing for EMDEs other than China, advanced economies are projected to see an increase in their debt-to-GDP ratio by 25%, rising from 115% in 2024 to 139% by 2050. Similarly, for China to meet its domestic investment needs, its debt-to-GDP ratio is projected to rise by 41%, from 90% to 131% over the same period.

The PSS – as well as the CMS – build on baseline debt-to-GDP estimates from the OECD (for advanced economies) and the IMF (for EMDEs). These baseline figures do not account for public-sector climate transition expenditure in the IEA NZE. Therefore, future public-sector financing for climate transition investments in line with the IEA NZE represent an additional government debt-burden in the scenario analysis in this chapter. It is also important to note that this analysis does not account for other pressures on the public sector, such as that arising from ageing populations, which by itself represents a significant impending burden on public finances (Guillemette and Turner, 2021[30]). Additional spending pressures, including increased defence expenditures, may further contribute to fiscal challenges. The debt ratios presented in this chapter, which include general government gross debt, are not directly comparable with those in chapter one, which covers only central government marketable debt.

As this analysis aims to identify broad, aggregate insights, it does not provide country-level conclusions. As noted by the IMF (2024[31]), developing countries with the weakest credit ratings and relatively high debt-to-GDP ratios face distinct challenges related to debt financing and, consequently, in mobilising the necessary climate transition investments.

Figure 4.11. Public sector solution: Climate change mitigation investment contributions and debt-to-GDP limit

While all regions require increased public sector investment initially, this effect is most pronounced in EMDEs other than China



Note: Public sector investment includes the new COP29 development finance goals agreed on in November 2024. The scenario assumes a linear increase from USD 115.7bn in 2022 to USD 300bn in 2035 while subtracting the private sector contribution and development finance for climate change adaptation based on their average relative shares over the period 2019–22 (OECD, 2024[27]).
Source: OECD, IEA proprietary database.

Capital markets scenario

The CMS assumes that projected investments meet the annual requirements set out by the IEA NZE scenario. Unlike the BLS and PSS, the CMS imposes sovereign debt-to-GDP limits of 90% for advanced economies and 80% for China. Compared to the PSS, the CMS has a lower limit for EMDEs other than China (60%). These numbers stem from the two triggers of debt reduction mechanisms in the new EU fiscal rules, which are 60% and 90% debt-to-GDP ratios (European Parliament, 2024[29]).

Once debt-to-GDP limits are reached, the residual investment gap is closed through capital market-financed private sector investment. Therefore, the split between public and private sector contributions remains constant until the debt-to-GDP limit is reached, after which they become output metrics, reflecting the investment contributions needed to meet climate mitigation targets. To meet the required investment levels, EMDEs other than China would need a private sector investment CAGR of approximately 61% from 2023 to 2025. The debt-to-GDP limits of advanced economies and China bind their public-sector investment in 2025 at the start of the projection period, requiring private sector investment CAGRs of 36% and 46%, respectively, over the same period. China's higher growth rate reflects the historically greater contribution from the public sector there to climate change mitigation (33% in 2023 compared to 24% in advanced economies).

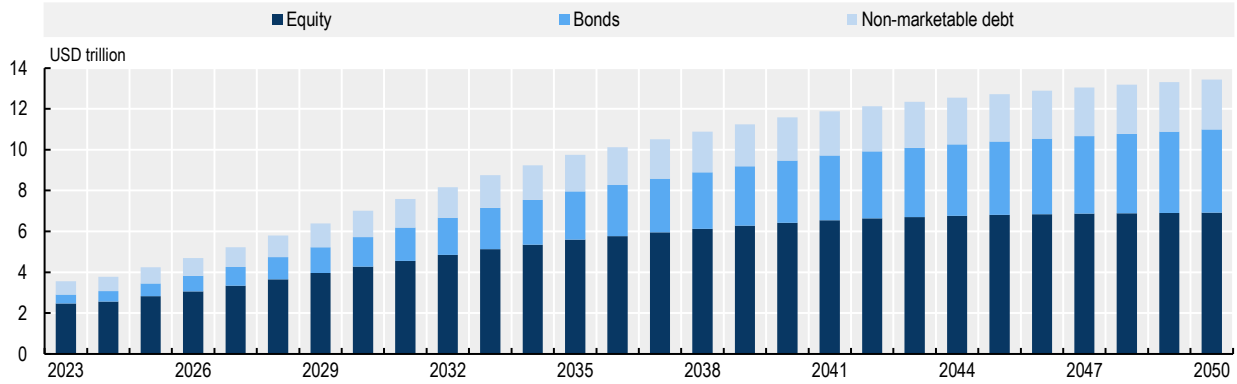
Greenfield FDI as a proportion of private sector investment is assumed to triple by 2035, benefiting from an assumed greater ease with which financial and non-financial companies can make cross-border investments in the CMS. Development finance presents the same values as in the BLS, increasing linearly to USD 300 billion by 2035.

In the CMS, the proportions of equity, bond and non-marketable debt financing for EMDEs other than China are assumed to converge toward those of advanced economies by 2050. This implicitly assumes that the regulatory framework for capital markets in EMDEs other than China will reach a level of quality similar to the one of advanced economies. As of December 2023, the financing structure for advanced economies in the energy sector comprises 52% equity, 30% bonds and 18% non-marketable debt. In contrast, EMDEs other than China rely more heavily on equity (70%) and have lower shares of bonds (12%) and non-marketable debt (18%).

Figure 4.12 illustrates the evolution of financing sources of listed companies in the energy sector in EMDEs other than China from 2023. While their total long-term financing sources would need to grow by a factor of 3.8 by 2050 or at a CAGR of 5.0%, bond markets would expand 9.7 times, or grow at a CAGR of 8.8%, in the same period. This compares to a projected GDP CAGR of 2.5%.

Figure 4.12. Capital markets solution: Evolution of financing sources in the energy sector of EMDEs other than China

While the long-term financing instruments in EMDEs other than China would need to grow 3.8 times from 2023 to 2050 (CAGR of 5.0%), bond markets would need an increase by a factor of 9.7 (CAGR of 8.8%) in the same period



Note: Figure excludes liabilities other than debt. Equity represents book equity.
Source: OECD, IEA proprietary database, LSEG.

The analysis in Figure 4.12 above begins with the book value of bonds and non-bond debt of listed energy companies as of December 2023, as well as the book value of their shares (see more about their capital

structure in the “Capital structure in the energy corporate sector” section). It incorporates new equity and debt financing necessary to meet the investment requirements for clean energy and high-emitting energy assets based on the IEA NZE. The analysis assumes that companies will be profitable in all years (i.e. revenues will be higher than costs), allowing them to reinvest revenues equivalent to depreciation, which is kept constant as a proportion of non-current assets throughout the period. The source of equity financing in the analysis can be either the reinvestment of profits or the issuance of new shares, so there is no assumption in relation to how profitable companies in the energy sector will be.

Analysing the energy sector as a whole effectively means that as the combined energy asset base (both low- and high-emitting) depreciates, the existing, relatively higher-emitting assets are gradually replaced by an increasing share of low-emitting ones, resulting from the IEA NZE investment shares in low- and high-emitting assets. Additionally, the CMS assumes that listed companies finance 90% of all future private sector investments (as referred to below, private equity assets and capital committed represent approximately 10% of public equity and bond markets).

Cross-border investments and climate finance from international providers

All scenarios account for cross-border investments in EMDEs other than China by reducing their domestic investment needs (as defined by the IEA NZE) based on net greenfield FDI inflows from advanced economies and China. Net FDI flows between advanced economies and China were excluded from the three scenarios due to their historically low levels, with average annual renewable energy investment net flows being less than USD 400 million between 2020 and 2023. FDI flows between advanced economies are not considered because the scenarios aggregate advanced economies in one group, as for EMDEs.

In the BLS and PSS, greenfield FDI is assumed to remain constant as a proportion of private sector investment in advanced economies and China. In 2022-24, FDI in renewable energy directed towards EMDEs other than China represented on average 12.7% of domestic clean energy investments from advanced economies and 3% from China. These percentages were applied to actual investments in the energy sector in 2023 and to projected investments in the BLS and PSS in subsequent years. This approach allows for estimations of FDI not only in renewable energy but also across all other technologies to be included in the analysis.

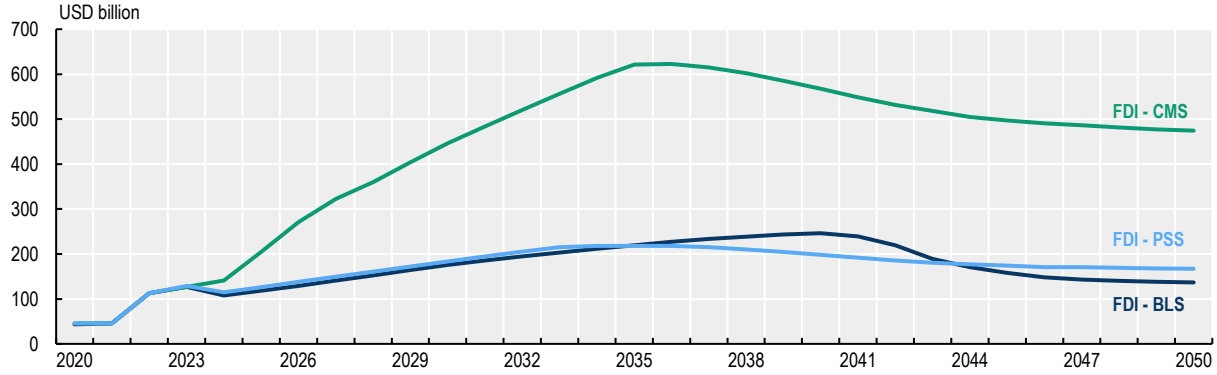
In the CMS, the share of greenfield FDI will triple by 2035, reaching approximately 38% in advanced economies and 9% in China. Total greenfield FDI to EMDEs other than China in 2023 was estimated to amount to approximately USD 127 billion, of which USD 110 billion (87%) originated from advanced economies and USD 17 billion (13%) from China (Figure 4.7).

Figure 4.13 illustrates greenfield FDI to EMDEs other than China across all three scenarios. In the CMS, greenfield FDI rises to a peak of USD 622 billion in 2035 (an increase of 4.9-times compared to 2023) before stabilising at around USD 475 (an increase of 3.7-times) billion in the long term. In contrast, in the BLS and PSS, greenfield FDI does not exceed USD 250 billion and eventually stabilises at around USD 150 billion. This compares to an increase of approximately five times over the last decade (OECD, forthcoming[26]).

Development finance for climate is assumed to grow linearly in all three scenarios, reaching the New Collective Quantified Goal on Climate Finance (NCQG) agreed at COP29 by 2035. Only in the PSS is additional development finance for climate provided by advanced economies to EMDEs other than China, when these countries reach their assumed 75% debt-to-GDP limit. The analysis focuses on climate finance provided by the public sector (bilaterally or through multilateral institutions) for climate change mitigation. It therefore excludes from the total NCQG the private sector investments mobilised by public climate finance (these investments would be captured as FDI) and any investments in climate adaptation, which are outside the scope of the scenarios.

Figure 4.13. All scenarios: Greenfield FDI to EMDEs other than China

Greenfield FDI stabilises at around USD 475bn in the CMS (an increase of 3.7-times compared to 2023), while it remains flat at around USD 150bn in the BLS and PSS towards 2050



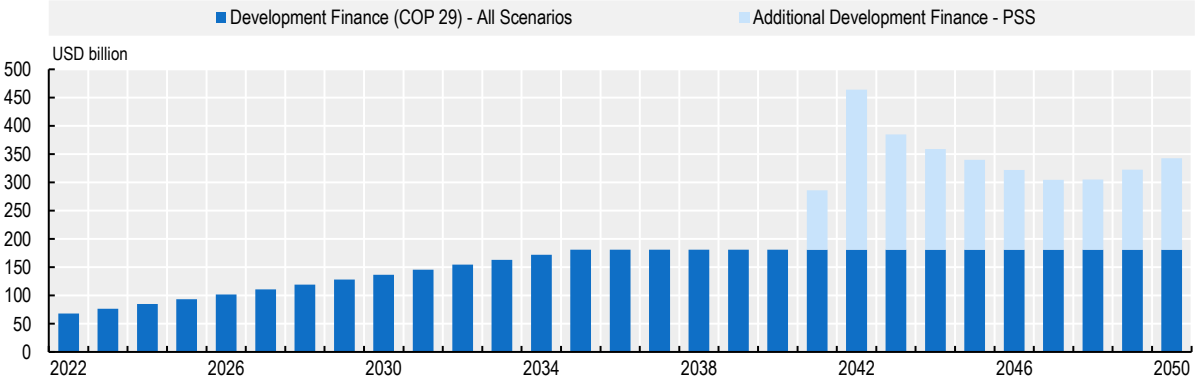
Source: OECD, IEA proprietary database.

Development finance for climate reduces the burden on the public sector in EMDEs other than China in the scenarios, while increasing the debt-to-GDP ratio of advanced economies from which it originates. The debt issuance related to development finance is allocated to advanced economies in the scenarios for four main reasons: (i) some of the development finance is in the form of grants or concessional agreements, which would not create any debt burden or would give rise to debt that is easier to service; (ii) part of the development finance loans are provided directly to projects, and do not create public debt in EMDEs; (iii) allocating the debt issuance related to development finance to both AEs and EMDEs would be to count twice the same investment; (iv) the main focus of this chapter is the development of public bond markets, which would not include loans received by EMDE governments. As a result, the debt-to-GDP ratio of advanced economies is projected to reach 139% by 2050 in the PSS, compared to 136% in the BLS.

Figure 4.14 illustrates the baseline development finance (aligned with COP29 goals) across all scenarios, as well as the additional development finance required in the PSS.

Figure 4.14. Climate mitigation development finance for EMDEs other than China

The PSS projects an average of USD 162 billion annually in additional required public-sector-funded development finance for EMDEs other than China in 2041-50, after their public debt-to-GDP reaches 75% in 2040



Source: OECD, IEA proprietary database.

Evolution of bond and equity markets in energy

The investments in each scenario are accompanied by a distinct evolution of equity and bond markets across the three regions analysed in this chapter. The share of each financing source—equity, bonds and non-bond-debt and other liabilities—in the energy sector was determined by analysing the capital structure of a sample of 1 000 randomly chosen companies in the energy sector (see in the above section "Capital structure in the energy corporate sector").

The share of bond debt relative to total assets in the energy sector is 21% in advanced economies, 9% in EMDEs other than China, and 3% in China. In EMDEs other than China, these shares remain constant in the BLS and PSS but converge toward the capital structure of companies in advanced economies in the CMS, reaching parity by 2050.

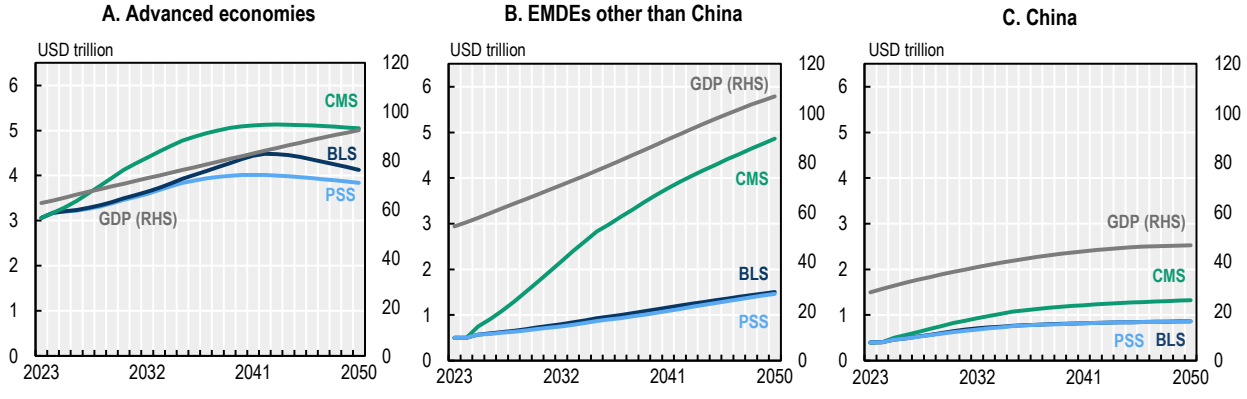
This section's projection of public markets begins with market value equity and total outstanding bonds as of December 2024. Subsequently, the analysis incorporates investments for clean energy and high-emitting energy assets based on the IEA NZE and assumes constant depreciation as a proportion of non-current assets. Similar to Figure 4.12, this implies that depreciation is effectively "reinvested," and the projected reduction in investments in high-emitting assets partially offsets higher investment needs in clean energy. Such reinvestment can occur either directly, through an energy company engaged in both fossil fuels and clean energy, or indirectly, through an investor who channels financial returns from fossil fuel companies into clean energy enterprises.

Evolution of bond markets in energy

The following graphs depict the evolution of bond and equity markets in the three scenarios and regions. In Figure 4.15, the analysis includes 2024 data on bonds issued by listed and unlisted companies in the energy sector, assuming that the outstanding amounts of bonds issued by unlisted companies grow in line with those issued by listed companies to illustrate the overall bond market development. All scenarios assume that 10% of equity and non-market-based debt funding is raised by unlisted companies (as referred to below, private equity assets and capital committed represent approximately 10% of public equity and bond markets).

Figure 4.15. All scenarios: Energy bond market development

The total energy bond markets in EMDEs other than China would need to grow 9.6-times (at a CAGR of 9.1%) in the CMS and rise to a market size of approximately USD 4.9 trillion from USD 0.5 trillion in 2024



Note: GDP in Volume Terms at 2015 Purchasing Power Parities. BLS and PSS bond outstanding trends overlap in panels B and C.
Source: OECD, IEA proprietary database, LSEG.

In December 2024, energy bond markets in advanced economies stood at USD 3.2 trillion and are projected to reach USD 4.1 trillion, 3.8 trillion, and 5.0 trillion in the BLS, PSS, and CMS, respectively, by 2050. This represents increases of 1.3-times, 1.2-times, and 1.6-times, corresponding to CAGRs of 1.0%, 0.7%, and 1.8%, respectively. This growth is below the projected GDP CAGR of 1.4% over the same period. It reflects the long-term trend in advanced economies, where GDP growth does not require a proportional increase in energy consumption due to efficiency gains, a structural shift toward less energy-intensive sectors, and changes in energy sources that support sustained economic expansion while moderating energy demand (IEA, 2023[32]; IEA, 2023[33]).

In EMDEs other than China, bond markets were valued at USD 0.5 trillion in 2024 and must expand to USD 1.5 trillion in the PSS, an increase of 2.9-times with a CAGR of 4.2%, and to USD 4.9 trillion in the CMS, reflecting a 9.6-times increase and a 9.1% CAGR. This compares to a projected GDP CAGR of 2.5%.

In China, energy bond markets amounted to USD 0.4 trillion in 2024 and are projected to reach USD 0.9 trillion in the BLS and PSS and USD 1.3 trillion in the CMS by 2050. This represents increases of 2.1-times and 3.2-times, corresponding to CAGRs of 2.9% and 4.6%, respectively. This compares to a projected GDP CAGR of 1.8%.

For context, total outstanding corporate bonds totalled USD 35 trillion as of December 2024 (see Chapter 2) and global equity markets reached a combined value of USD 113 trillion as of December 2023. Additionally, private equity assets and capital committed stood at USD 13.1 trillion as of mid-2023 (McKinsey, 2024[34]).

Evolution of sustainable bond markets in energy

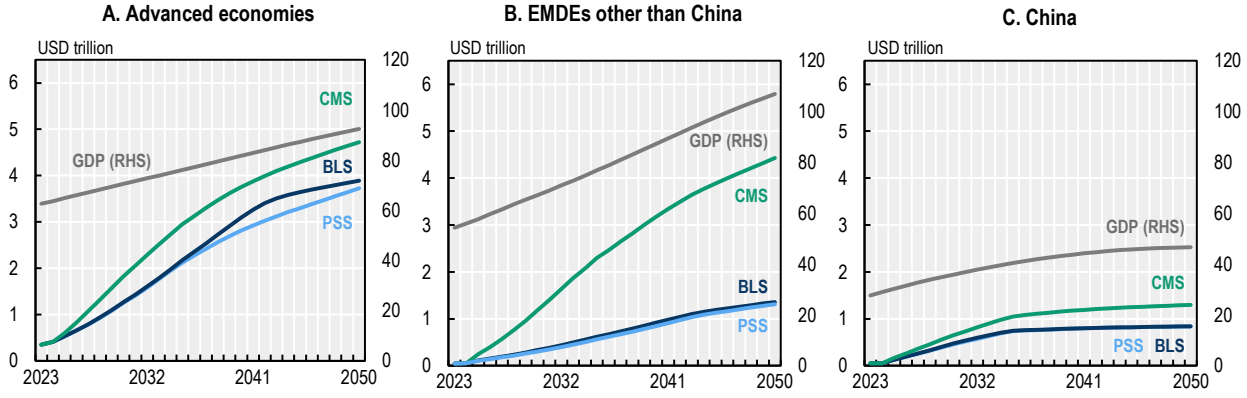
In December 2024, sustainable bonds in the energy sector were valued at USD 408 billion in advanced economies (13% of total energy bonds), USD 52 billion in EMDEs other than China (10%) and USD 50 billion in China (12%). The following figures estimate the sustainable bond market size per region by assuming that sustainable bonds entirely finance new clean energy investments. Investments in high-emitting assets in the IEA NZE scenario are assumed to be financed by conventional energy bonds. Lastly, the analysis in this chapter assumes that existing conventional bonds retire linearly based on twice their value-weighted average maturity, which is 13.7 years in advanced economies, 9.6 years in EMDEs other than China, and 5.4 years in China. Figure 4.16 illustrates the sustainable bond market size per region under each scenario.

In advanced economies, sustainable bond markets in the energy sector are projected to rise by a factor of 9.5 in BLS, 9.2 in PSS and 11.6 in CMS corresponding to CAGRs of 9.1%, 8.9% and 9.9%, respectively. In EMDEs other than China, sustainable bond markets would grow by a factor of 25.1 in the PSS and 84.6 in the CMS. This reflects the assumed convergence towards the capital structure of advanced economies, with a declining share of equity in total financing offset by a rising role for bond financing (as illustrated in Figure 4.15). The CAGRs for sustainable bonds growth are 13.2% in the PSS and 18.6% in the CMS. In China, energy sector sustainable bond markets are projected to grow by a factor of 16.8 in BLS, 16.7 in PSS, and 25.9 in CMS, corresponding to CAGRs of 11.4%, 11.5% and 13.3%, respectively.

Figure 4.17 illustrates the absolute and relative shares of the sustainable and conventional bond markets in the CMS. In advanced economies, the share of sustainable energy bond markets within total energy bond markets needs to increase from 13% in 2024 to 94% by 2050. Over the same period, conventional energy bond markets are projected to contract from USD 2.7 trillion to USD 0.3 trillion, reflecting a CAGR of -7.9%.

Figure 4.16. All scenarios: Sustainable bond market development

The total sustainable bond market in EMDEs other than China would grow by a factor of 84.6 (at a CAGR of 17%) in the CMS



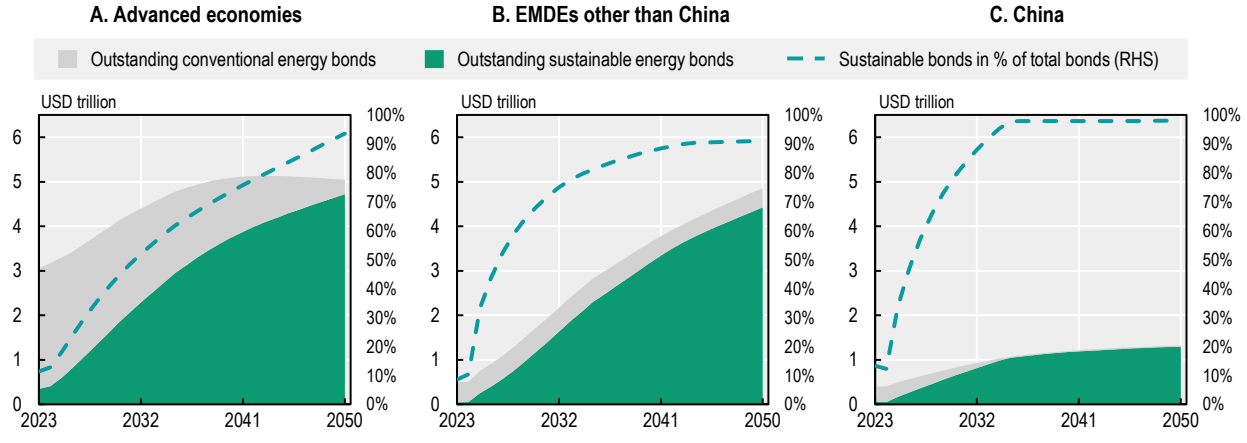
Note: GDP in Volume Terms at 2015 Purchasing Power Parities. BLS and PSS sustainable bond outstanding trends overlap in panel B.
Source: OECD, IEA proprietary database, LSEG.

In EMDEs other than China, sustainable energy bonds would need to rise from 10% in 2024 to 91% of total energy bond markets by 2050, while conventional energy bonds are projected to contract by 4% in size from USD 452 billion to USD 434 billion, representing a CAGR of -0.2%.

In China, the share of sustainable energy bond markets would grow from 12% in 2024 to 98% by 2050. Meanwhile, conventional energy bond markets gradually phase out, driven by the short average maturity of outstanding conventional bonds and the declining role of traditional energy in the NZE scenario by 2050 in China.

Figure 4.17. Sustainable and conventional bond market development in the CMS

The sustainable energy bond market share in EMDEs other than China would need to increase from 10% in 2024 to 91% of its total energy bond market in 2050



Note: GDP in Volume Terms at 2015 Purchasing Power Parities.
Source: OECD, IEA proprietary database, LSEG.

The relatively lower penetration of sustainable energy bonds in EMDEs other than China reflects a higher reliance on high-emitting energy assets until 2050 in the IEA NZE scenario. Between 2036 and 2050, the average share of investments in high-emitting energy assets as a percentage of total energy investments remains at 4.2% in EMDEs other than China, compared to 2.8% in advanced economies and 2.0% in China over the same period.

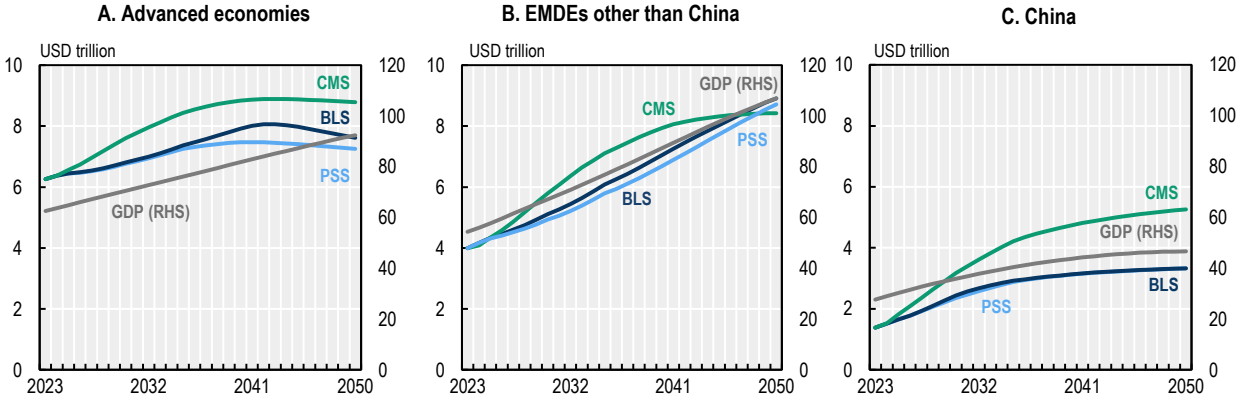
Evolution of equity markets in energy

In advanced economies, equity markets for the energy sector totalled USD 6.3 trillion in 2023 and are projected to increase by factors of 1.2 (0.7% CAGR) in the BLS, 1.2 (0.5% CAGR) in the PSS, and 1.4 (1.2% CAGR) in the CMS. In China, energy sector equity markets would grow by a factor of 2.4 in the BLS and PSS (3.1% CAGR) and by a factor of 3.8 in the CMS (4.9% CAGR).

In EMDEs other than China, energy equity markets stood at USD 4.0 trillion in 2023 and would increase by factors of 2.1 and 2.2 in the PSS and CMS, respectively. This reflects the convergence towards the capital structure of advanced economies, with a declining share of equity in total financing offset by a rising role of bond financing. While the share of private sector investments in the entire energy sector is higher in the CMS, the share of equity in companies' capital structures is lower compared to the PSS. The CAGRs for equity growth are 2.9% in the PSS and 2.8% in the CMS, compared to a GDP CAGR of 2.5%.

Figure 4.18. All scenarios: Energy equity market development

Equity markets in EMDEs other than China would rise by a factor of 2.1 (2.8% CAGR) in the CMS



Note: Equity represents market value; GDP in Volume Terms at 2015 Purchasing Power Parities. BLS and PSS equity market trends overlap in panel C.
Source: OECD, IEA proprietary database.

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Annex 4.A. Methodologies for the scenario analysis

The chapter integrates analyses from the International Energy Agency (IEA) and various OECD policy areas, including macro-economic projections, foreign direct investment, climate finance and development co-operation. The chapter includes an examination of the funding structures of companies in the energy sector and financing scenarios that depart from a “business-as-usual” approach. While the scenarios are not predictions about what will effectively happen in the future, they can help policy makers and investors to assess reasonable alternatives depending on the policies that are prioritised.

Capital structure analysis methodology

OECD Corporate Sustainability dataset

The company financials and outstanding bonds data are sourced from LSEG. This dataset contains company- and deal-level information on companies and bonds issued across 103 jurisdictions since 2013. It provides detailed data on:

- general company information (e.g. name, country, industry)
- consolidated financials (e.g. assets, debt, shareholder’s equity, depreciation)
- bond issuance (e.g. bond type, issuance date, maturity date, amount obtained from the issue, classification of sustainable bonds).

For bonds, LSEG data contains both Regulation S and Rule 144A sustainable bonds. Rule 144A presents a safe harbour from the registration requirements of the Securities Act for resales of securities not fungible with securities listed on a US securities exchange to qualified institutional buyers. Regulation S provides a safe harbour from the registration requirements of the Securities Act for offerings made outside the United States (Bruckhaus, 2017[35]). The calculations presented take account of this factor, and an exercise was conducted to eliminate the duplication when a single bond was issued both under Regulation S and Rule 144A.

When calculating the outstanding amount of bonds in a given year, issues that have been redeemed were also deducted. Outstanding values refer to the “principal amount” or otherwise to the “original amount issued” (i.e. the face value of the bonds in their legal documentation) when the “principal amount” could not be retrieved. The early redemption data are obtained from LSEG and cover bonds that have been redeemed early due to being repaid via final default distribution, called, liquidated, put or repurchased. The early redemption data are merged with the primary bond market data via ISINs.

To analyse company capital structure, adjustments are made to align the dates of the outstanding bond data with the company's financial year-end to ensure consistency between the two datasets at company level. Manual checks are conducted to remove data outliers.

The capital structure analysis in Chapter 4 cannot be compared to that of the IEA (2024[3]) because, while the former covers only listed companies and corporate-level financial information, the latter prioritises financial information at the project-level and also covers non-listed companies.

Energy sector

The energy sector is defined to include both energy and energy-related utilities industries and is based on the Reference data Business Classification (TRBC) from LSEG. The following table includes more details on the sectors and industries covered.

Annex Table 4.A.1. Definition of energy sector

Economic Sector	Subsector	Industries
Energy	Fossil Fuels	Coal, Oil & Gas and Related Equipment & Services, Oil & Gas Drilling, Oil & Gas Transportation Services
	Renewable Energy	Renewable Energy Equipment & Services: Wind Systems & Equipment, Stationary Fuel Cells, Photovoltaic Solar Systems & Equipment, Thermal Solar Systems & Equipment, Biomass Power Energy Equipment, Waste to Energy Systems & Equipment, Hydropower Equipment, Wave Power Energy Equipment, Renewable Energy Equipment & Services, Geothermal Equipment Renewable Fuels: Biodiesel, Ethanol Fuels, Pyrolytic & Synthetic Fuels, Biomass & Biogas Fuels, Hydrogen Fuel, Other Renewable Fuels
	Uranium	Uranium, Uranium Mining, Uranium Processing
Energy-related utilities	Electric Utilities & Independent Power Producers (IPPs)	Fossil Fuel Electric Utilities, Nuclear Utilities, Power Charging Stations, Alternative Electric Utilities, Hydroelectric & Tidal Utilities, Solar Electric Utilities, Wind Electric Utilities, Biomass & Waste to Energy Electric Utilities, Geothermal Electric Utilities, Fossil Fuel IPPs, Renewable IPPs, Nuclear IPPs, Other IPPs
	Natural Gas Utilities	Natural Gas Distribution, Other Natural Gas Utilities
	Multiline Utilities	Multiline Utilities

Foreign direct investments

Figure 4.7 includes capital investment in greenfield projects that have been announced. They include projects announced by a company, although sometimes the first announcement occurs after the project is already completed. Projects include both new operations being established at new sites and expansions of an existing operations. They do not include investments to maintain already-developed projects and may differ from effective disbursements in new projects as the database primarily covers announced investments. Notably, with the growing trend of investments in the renewable energy sector, announced investments in a given year are expected to exceed effective disbursements for that year.

A review of publicly available reporting from the 20 largest listed companies in the energy sector, as well as the 20 largest unlisted companies (based on LSEG data), reveals that information contained in such reporting on investment flows by geographic region or country is insufficient to derive precise quantitative estimates on cross-border investments. Therefore, the analysis presented in this chapter draws on FDI data from the FT fDi Markets database to assess investment trends in the sector.

Scenario analysis methodology

Macro-economic data and corresponding assumptions

The analysis in the “Financing scenarios for future investments in the climate transition” section draws on the baseline long-run scenario from the OECD, including GDP growth trends for advanced economies and EMDEs, as well as debt-to-GDP ratios for advanced economies up to 2050 (Guillemette and Château, 2023[36]). All GDP figures are expressed in volume terms at Purchasing Power Parities (PPPs) using 2015 as the base year.

The OECD does not provide a debt-to-GDP ratio scenario for non-OECD countries. Therefore, the analysis relies on IMF debt-to-GDP data for EMDEs, available up to 2029. From 2029 until 2050, the analysis assumes that any growth-driven debt issuance that keeps the ratio stable at 61% is climate-unrelated and that countries do not run ratio-increasing deficits unrelated to climate change mitigation investments. The OECD's debt-to-GDP ratio baseline does not include fiscal costs associated with meeting climate goals. Similarly, the IMF's data do not explicitly account for additional public spending required to meet future climate goals (IMF, 2018[37]). Future public sector investments for climate change mitigation, as outlined in the Financing scenarios for future investments in the climate transition section scenario analysis, represent an additional government debt burden. Furthermore, the methodology in Chapter 4 does not account for potential GDP growth effects stemming from increased climate transition investments.

The debt-to-GDP figures employed in Chapter 4 are obtained from the OECD Economic Outlook and IMF and encompass a broader spectrum of general government debt, as opposed to the other debt-to-GDP figures in Chapter 1, where the primary focus lies in central government marketable debt.

Advanced economies and EMDEs in the analysis generally follow the categorisation of the IMF's 2024 World Economic Outlook Database (IMF, 2024[38]), except that non-OECD advanced economies are not included. These are Andorra, Croatia, Cyprus, Hong Kong (China), Macau (China), Malta, Puerto Rico, San Marino, Singapore and Chinese Taipei.

Public sector debt limits and debt issuance

The analysis distinguishes between government debt issuance unrelated to climate goals (implicit in OECD and IMF debt-to-GDP scenario baselines) and additional public sector investment needed for climate change mitigation as per IEA NZE investment requirements.

The CMS caps debt-to-GDP for each region, restricting debt issuance for climate change mitigation. Countries are allowed to issue debt tied to GDP growth (i.e. growth-driven debt issuance) to keep the ratio stable. In the absence of such issuance, the debt-to-GDP ratio would decrease over time. However, countries cannot issue debt that increases the ratio beyond the established cap (i.e. ratio-increasing debt).

The PSS caps debt-to-GDP at 75% for EMDEs other than China. The analysis assumes that countries issue growth-driven debt and ratio-increasing debt for purposes unrelated to the climate transition in line with the IMF estimates, where debt-to-GDP of 60.2% in 2023 increases to 61.0% in 2029. From 2029, the analysis assumes that any growth-driven debt issuance that keeps the ratio stable at 61% is climate-unrelated and that countries do not run ratio-increasing deficits unrelated to climate change mitigation investments, as explained in the preceding section.

Conversely, investments in climate change mitigation are driven by ratio-increasing debt issuance (from 61% to 75% over time) and partly by growth-driven debt issuance that keeps the ratio stable at 75% (from 2038 when EMDEs other than China hit their limit) minus the growth-driven debt issuance that would keep the ratio stable at 61% absent any climate mitigation-related investments.

EMDEs other than China in the CMS

The CMS (visualised in Figure 4.12) begins with private and public sector investment contributions at 2023 levels—for example, in advanced economies, the private sector accounted for 76% of climate change mitigation investments, while the public sector contributed 24%. Greenfield FDI is modelled to triple as a share of the baseline private sector investment contribution. In advanced economies, this means greenfield FDI represents 38.1% of the private sector's baseline share, which constitutes 76% of the total annual investment requirements of advanced economies under the IEA NZE scenario. However, when the private sector steps in to compensate for the public sector's 24% share of annual investment requirements after debt-to-GDP limits are reached, this does not trigger a proportional increase in greenfield FDI.

The CMS models a gradual alignment of the capital structure in EMDEs other than China with that of advanced economies by the end of 2050. The convergence is modelled using a logarithmic trajectory. By 2035, 70% of the adjustment is achieved, reflecting an accelerated initial shift that slows as it approaches equilibrium.

Estimation of future bond and equity markets

The projection of energy bond and equity markets takes advantage of the basic accounting identity of equating total assets with total liabilities plus equity and uses the capital structure data presented in "Financing sources of recent investments in the energy sector" section.

Furthermore, the analysis uses the total asset and non-current asset base, and depreciation in the energy sector as of December 2023. These figures result from aggregating firm-level data of all listed companies in the energy sector as defined above.

The analysis then incorporates total future private sector energy investments based on the IEA NZE pathway in the different scenario projections, increasing the asset base while assuming a constant depreciation rate relative to non-current assets. The resulting increase in the total asset base is then translated into financing instruments based on the shares presented in "Financing sources of recent investments in the energy sector" section (following the methodology in panel B of Figure 4.5).

The starting points for bonds and listed equity are the total outstanding bonds in the energy sector and the total market capitalisation as of December 2023. As future investments exceed depreciation, total energy assets increase and require a corresponding increase in their financing instruments. The analysis of capital market data is sourced from LSEG.

IEA data

The analysis draws on proprietary data from the IEA, reflecting its most recent updates and adjustments. As a result, the data may differ slightly from figures presented in earlier IEA publications.

The IEA reports average annual investment requirements for achieving the NZE across distinct periods (2026–30 and 2031–35 as in prior publications, and 2036–50 based on its proprietary data) and for the regions included in this analysis.

The analysis in the section "Financing scenarios for future investments in the climate transition" draws on this data, disaggregating the period averages into annual investment requirements. For advanced economies and China, the annual investment requirements gradually increase, peaking in the 2031–35 period before declining thereafter. In contrast, EMDEs other than China reach their peak aggregate annual investment requirement in the 2036–50 period, reflecting their existing larger investment gap, as well as the IEA NZE average requirements.

Country classification

The analysis in Chapter 4, draws on a range of data points from multiple sources. It incorporates climate transition investment requirements in different regions (i.e. advanced economies, EMDEs other than China, and China), cross-border investments in the form of greenfield FDI, international development finance, as well as capital structure data of the corporate energy sector. Additionally, it integrates macro-economic indicators such as GDP, GDP growth, and public-sector debt-to-GDP. These data come from diverse data sources, notably the OECD and, IMF, IEA, FT fDi Markets, and LSEG. While data sources may vary in definitions and classifications, selections and adjustments are made where possible to enhance comparability and ensure consistency in the analysis. This section clarifies the alignment and reconciliation of country classifications across data sources.

The section “Past and future investments in the climate transition” follows the country classification set out in the World Energy Outlook 2024 when presenting IEA data. This classification includes all OECD countries as advanced economies, diverging from the IMF's methodology, which categorises seven OECD member countries as EMDEs—namely, Chile, Colombia, Costa Rica and Mexico in Latin America, and Hungary, Poland and Türkiye in Europe.

The section “Financing sources of recent investments in the energy sector” follows the IMF’s 2024 World Economic Outlook Database (IMF, 2024[38]) country groupings when presenting analysis on capital structure, development finance, and greenfield FDI data .

The scenario analysis in section “Financing scenarios for future investments in the climate transition” aims to quantify the scale of any investment gaps, potential funding sources for investments, and assesses the necessary bond market development while considering also cross-border investments from advanced economies to EMDEs other than China. Accordingly, the analysis reconciles the IEA’s classification—the only one meaningfully diverging from the IMF’s country grouping—to the extent possible with the classifications used for greenfield FDI, development finance, capital structure, and macro-economic data. Notably, the investment requirements for Chile, Colombia, Costa Rica and Mexico are aggregated to the investment requirements of the grouping “EMDEs other than China”. The IEA dataset does not allow for a disaggregation of investment requirements for Hungary, Poland, and Türkiye, leading to a slight overestimation of advanced economy investment requirements, and a corresponding underestimation of the investment burden for EMDEs other than China.

The macro-economic data for advanced economies and EMDEs in the analysis follow the categorisation of the IMF, except that non-OECD advanced economies are not included. These are Andorra, Croatia, Cyprus, Hong Kong (China), Macau (China), Malta, Puerto Rico, San Marino, Singapore and Chinese Taipei. Like the IMF, the OECD develops baseline GDP growth and debt-to-GDP ratio scenarios for advanced economies, and includes Chile, Colombia, Costa Rica, Hungary, Mexico, Poland, and Türkiye as EMDEs.

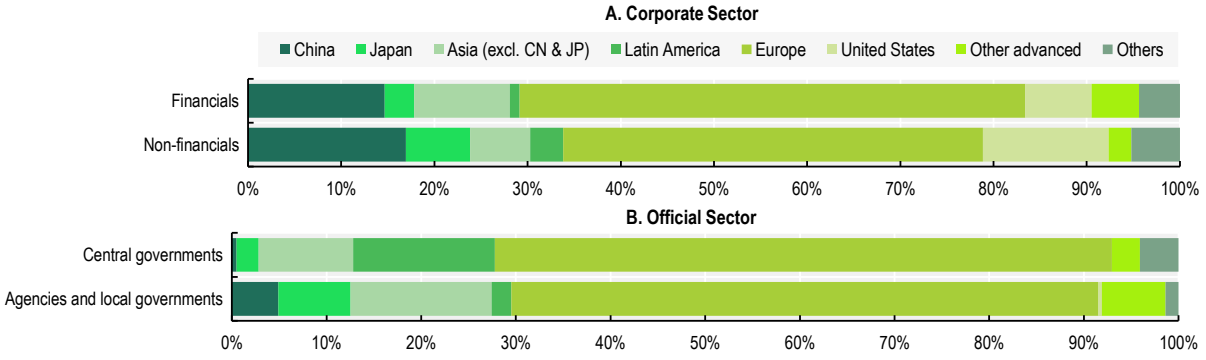
Annex 4.B. Sustainable bonds

Over the past five years, sustainable bonds have become a more important source of capital market financing. Globally, companies issued USD 522 billion in sustainable bonds in 2024, while the official sector issued USD 473 billion in the same year. Green bonds have been the most important type of sustainable bonds issued in 2024 with, respectively, USD 381 billion and USD 257 billion (Annex Figure 4.B.2).

In both the corporate and official sectors, Europe has been the most active region. From 2015 to 2024, 45% of the global amount issued through corporate non-financial sustainable bonds was raised by European companies. China and the United States follow with 17% and 13%, respectively. Europe also dominates the issuance of sustainable bonds by financial corporates with 54%, followed by China (15%), Asia excl. China and Japan (10%) and the United States (7%) (Annex Figure 4.B.1, Panel A).

In the official sector, sustainable bonds issued by central governments have been mainly issued by European countries (65% of global issuance by central governments in 2015-24), followed by Latin American governments (15%). Issuance by agencies and local governments is also dominated by European issuers (62% of the global amount), followed by issuers in Asia excl. China and Japan (15%) (Annex Figure 4.B.1, Panel B).

Annex Figure 4.B.1. Global sustainable bond issuance by region, 2015-24

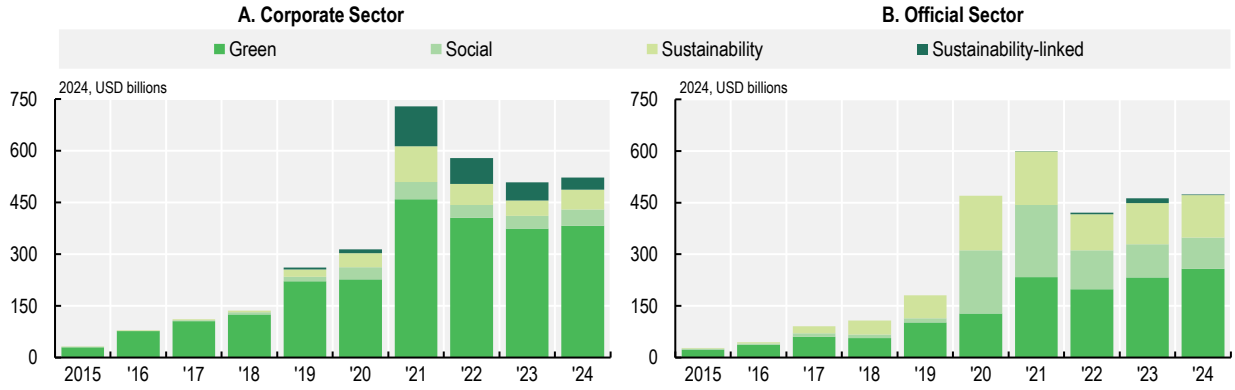


Source: OECD Corporate Sustainability dataset, LSEG

Before 2020, most corporate sustainable bonds issued were green bonds, averaging 92% annually of all the amount issued via sustainable bonds (Annex Figure 4.B.2, Panel A). In 2020, sustainability bonds and social corporate bonds represented more than 10% each of the amount issued. In 2023 and 2024, Sustainability-Linked Bonds (SLB), sustainability bonds and social bonds averaged 9%, 10% and 8% respectively of the total amount of corporate sustainable bonds issued.

The issuance of green bonds is less prevalent in the official sector than in the corporate sector, representing 51% of the amount issued on average in the last three years. Governments and multilateral institutions have used social (22%) and sustainability (26%) bonds more frequently over the last three years (Annex Figure 4.B.2, Panel B). SLBs were issued for the first time by central governments and multilateral institutions in 2022, making up only 2% of sustainable bonds issued in the last two years in the official sector.

Annex Figure 4.B.2. Global sustainable bond issuance by type, 2015-24



Source: OECD Corporate Sustainability dataset, LSEG

Sovereign sustainable bonds

Sovereign sustainable bond (SSB) gross issuance reached a record USD 170 billion in 2024, against an average of USD 132 billion in 2021-23. Outstanding SSBs increased by 26% to USD 600 billion. Large SSB issuers remain advanced economies, with EMDEs accounting for around one-quarter of SSB gross borrowings and stock since 2020 (Annex Figure 4.B.3, Panels A and B).

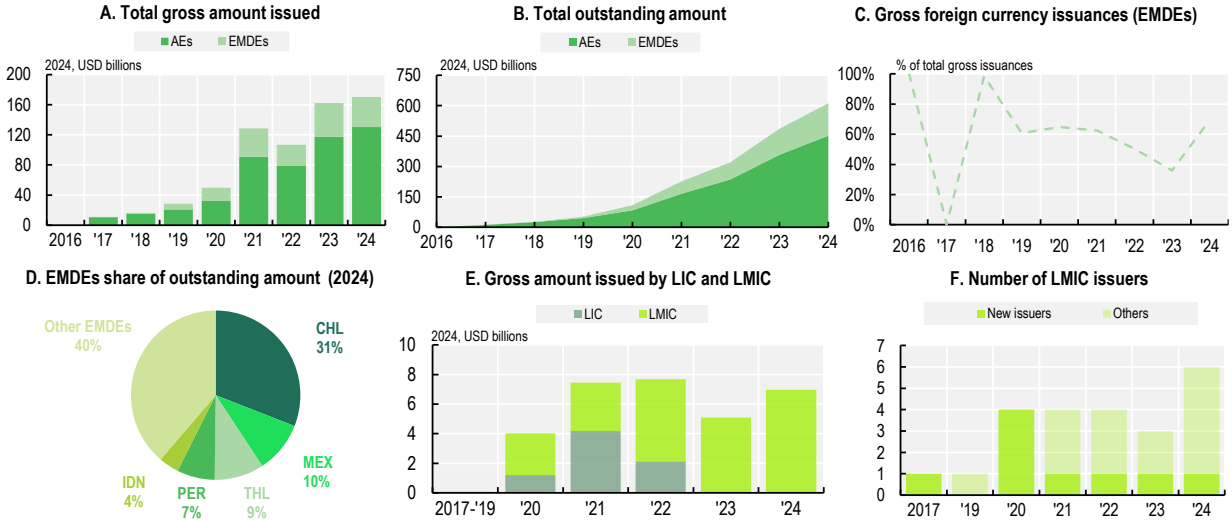
SSB issuers increased from 56 in 2023 to 64 in 2024, with four EMDEs debuts. Romania's first SSB (HIC) was the largest EUR-denominated green bond issued by an EMDE (EUR 2 billion). Qatar (HIC) issued the first sovereign green bond from the Gulf Cooperation Council region. The debut issuance of the Dominican Republic (UMIC) achieved a 15 basis points price advantage. Honduras' (LMIC) debut issuance was also its first on foreign markets since 2020.

The monetary tightening cycle may have impacted SSB issuance denominated in foreign currency across EMDEs. The share of SSB gross issuances denominated in foreign currency decreased 10 percentage points from 2021 to 2023, reaching 50%, before rebounding to around 70% in 2024 (Annex Figure 4.B.3, Panel C). This share is now at an all-time high for LMICs (around 63%), and close to it for HICs and UMICs, both at around 70%. LMICs have never issued foreign currency SSBs.

Chile (HIC), Mexico (UMIC) and Thailand (UMIC) have been the largest issuers in the EMDE SSB market, making up half of its stock (Annex Figure 4.B.3, Panel D). In Chile, SSBs funded half of the gross borrowings and represented 40% of debt stock in 2024. Mexico first issued SSBs in 2020 and aims to have a higher share of its debt in sustainable bonds, currently around 3%. Thailand issued the first Asian sovereign sustainability-linked bond in November 2024, and is expected to issue a new one in 2025.

SSB markets are expanding for LMICs while contracting for LICs. Nigeria was the first LMIC issuer in 2017, joined by four others in 2020 and a new one yearly until 2024, when gross issuance was a record USD 7 billion (Annex Figure 4.B.3, Panel E and F). LICs joined the market in 2020, with debut issuances by Burkina Faso, Guinea Bissau, Mali, Niger and Togo. No other countries have joined this group since then, and despite a significant increase in 2021, gross issuances were negligible in 2023-24 (Annex Figure 4.B.3, Panel E).

Annex Figure 4.B.3. Sovereign sustainable bond issuance trends



Source: OECD Survey on Primary Market Developments 2024, LSEG and OECD calculations.

Global Debt Report 2025

Financing Growth in a Challenging Debt Market Environment

Global debt markets have played a key role in supporting the recoveries from the 2008 financial crisis and COVID-19 pandemic, continuously providing capital to governments and companies. But their role needs to shift from supporting recovery to financing investment and growth. This will be a challenge. Debt levels are already high and increasingly costly, economic growth is slowing, and geopolitical risks are rising. The report analyses the latest trends in global sovereign and corporate bond markets up to end 2024. It also looks at sovereign borrowing in emerging markets and developing economies and assesses how debt markets could help finance the climate transition.

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