The OECD Business and Finance Outlook 2018 is an annual publication that presents unique data and analysis on the trends, both positive and negative, that are shaping tomorrow’s world of business, finance, and investment. Using analysis from a wide range of perspectives, this year’s edition addresses connectivity, both among institutions within the global financial system and among countries. Almost a decade on from the 2008 financial crisis, the Outlook examines new risks to financial stability that will put financial reforms to the test, focusing in particular on the normalisation of monetary policy, debt problems and off-balance sheet activity in China. With respect to connectivity among countries, the Outlook examines the new phase of globalisation centred on Asia/Eurasia, using China’s Belt and Road Initiative as a case study. It argues that this ambitious development plan has a number of economic issues to look out for, and that it would be best carried through with transparent “rules of the game” that will help ensure a level playing field for all.
Introduction

The OECD Sovereign Borrowing Outlook provides data, information and background on sovereign borrowing needs and discusses funding strategies and debt management policies for OECD countries and the OECD area.

Based on data collected through the annual survey on OECD Central Government Marketable Debt and Borrowing of OECD governments, this report provides an overview of, and outlook for, sovereign borrowing needs, redemptions and outstanding debt in the OECD area for the period 2007-2020. The cut-off date for data collected through the survey and other data considered in this report is December 2019. This report was published in February 2020 prior to the outbreak of the COVID-19 pandemic. A revised report is available at www.oecd.org/finance/oecdsovereignborrowingoutlook.htm.

Comments and questions should be addressed to publicdebt@oecd.org.

More information about OECD work on bond markets and public debt management can be found online at www.oecd.org/finance/public-debt/.
Executive summary

In recent years, sovereign bond markets in the OECD area have been characterised by an increased supply of government bonds and continued benign funding conditions, which have in turn helped to generate favourable interest rate-growth differentials and stabilise debt-GDP ratios.

Gross borrowing needs of the governments have risen over the last two years, after a relatively steady period between 2014 and 2017. The combined gross borrowings of OECD governments from the markets, which peaked at USD 10.9 trillion in 2010 in the wake of the global financial crisis, are set to reach USD 11.4 trillion in 2019. This year’s report forecasts a continuation of this upward movement in 2020, albeit at a slower pace. The bulk of gross borrowings, projected to reach USD 11.8 trillion in 2020, are to refinance existing debt. As a percentage of GDP, the gross borrowing needs of G7 countries are expected to continue increasing in 2020, while those of the other country groupings are expected to continue a slow decline.

The accumulation of debt continues, albeit at a slower pace in recent years in comparison to the period during the global financial crisis and its aftermath. Outstanding central government debt for the OECD area as a whole, which grew by an average of 10% per year between 2008 and 2013, has grown by 4% per year since 2014. At the end of 2019, central government gross marketable debt is estimated to account for 72.6% of GDP. It is projected to be broadly unchanged in 2020, largely due to favourable interest rate-growth differentials in most OECD countries.

Prolonged low market interest rates have restrained interest expenses on outstanding debt, depending on the amount of new debt issuance and the duration of outstanding debt of countries.

Government debt comes with a cost in the form of interest payments. Low interest rates reduce the fiscal cost of debt accumulation and make it more attractive for governments to pursue new programmes, particularly investments. The cost of sovereign funding has been a declining trend in major economies. For example, 10-year bond yields dropped by 220 basis points on average in the OECD area between 2012 and 2019. The resulting issuance of debt at low rates means interest payments in relation to GDP have decreased, despite high and even upward-trending sovereign debt levels in some OECD countries. Interest expenses on outstanding debt stock as a percentage of GDP fell by an average of 100 basis points between 2012 and 2019, but this varies widely across OECD countries depending on the amount of new debt issuance in relation to outstanding debt as well as the duration of outstanding government debt.

The weighted average term-to-maturity of outstanding marketable debt in the OECD area reached a peak level in 2019, reflecting relatively lesser refinancing risk exposure.

Typically, longer-term borrowings mitigate the volatility of financing costs, but have a higher expected cost because term premiums tend to be higher as maturity lengthens. From a debt management perspective, the shape of the yield curve is an important factor in determining the maturity composition of borrowing. Flattened yield curves in most countries have presented an opportunity for low-cost mitigation of roll-over
risk in recent years. The majority of OECD countries have experienced a sizeable elongation of debt maturity since the global financial crisis. This manifests itself in the record level of average term-to-maturity (ATM) ratios. The weighted ATM has increased by around 2 years since 2007, and reached 8 years in 2019, implying slower pass-through of changes in market interest rates to government interest costs. Notwithstanding the record high level of ATM, OECD governments will need to refinance around 40% of their outstanding marketable debt in the following three years. Sovereign issuers, particularly in countries where heavy debt repayments coincide with high new borrowing needs, should remain vigilant to global risks and maintain flexibility in funding programmes as well as transparency and predictability.

**Negative-yielding debt issuance, trending down since a high in 2016, surged again to a peak in 2019 albeit with a lukewarm response from yield-sensitive investors**

During 2019, sovereign bond yields in several jurisdictions declined further, and more government bonds in the euro area and in Japan fell deeper into negative territory. Around 35% of the total government bonds have been sold with interest rates below 1% of which 60% have below zero interest rate at auctions in OECD countries in 2019. France, Germany and Japan account for more than three quarters of the total issuance in this category. The maturity of negative-yielding debt issuance has also lengthened to over 10-year segment in several countries including Denmark, France, Germany and Switzerland. An examination of negative yielding fixed-rate sovereign bond issuance in 17 OECD countries between 2014 and 2019 indicates that the volume of negative-yielding fixed-rate bond issues reached USD 3.6 trillion and issuers received more than USD 28 billion from these issues. Different investor groups react in different ways to negative-yielding debt. It is an unattractive proposition for most bond investors, such as banks and affects their investment decision. Nevertheless, yield-insensitive investors such as central banks have displayed continued demand for sovereign bonds regardless of their interest rates. As a result, yield-insensitive investors who are often buy-and-hold type of investors, have become more visible in negative-yielding debt markets.

**Despite rapid growth, the sovereign green bond market remains small compared to the traditional bond market, with its long-term prospects largely dependent on public green expenditures**

Sovereign issuance of green bonds supports the development of sustainable financial markets, primarily by providing institutional investors with risk-free benchmark green securities. In 2019, sovereign green bond issuance gained significant momentum in the OECD area. Supported by a few large inaugural issuances, outstanding sovereign green bonds increased from in EUR 24 billion in 2018 to over EUR 43 billion in 2019. This market is expected to grow further as some countries, including Germany and Sweden, have expressed their readiness to issue green bonds in 2020. Despite its rapid growth, the sovereign green bond market amounts to only 0.1% of all government marketable debt in the OECD area. Different to conventional bonds, proceeds from green bonds are dedicated to financing public green expenditures. Since the size of public green expenditures put a natural barrier to green bond issuances, the potential size of this market will to a large extent depend on the size of government investments in green projects such as renewable energy, clean transportation and climate change adaptation. Issuing a green bond is not the only way to promote the environmental, social and governance (ESG) initiatives of governments so sovereign debt management offices may benefit from adapting their communication and investor relations strategies according to rising interest in the ESG-related activities of governments.
In recent years, sovereign bond markets in the OECD area have been characterised by an increased supply of government bonds and continued benign funding conditions on the back of accommodative monetary policies. Gross borrowings of OECD governments from the markets are projected to increase by 4% annually to USD 11.8 trillion in 2020. While heavy debt repayments account for the bulk of gross issuance in 2020, the net supply of government debt to the markets is projected to remain at around USD 2 trillion. As a result, outstanding central government marketable debt for the OECD area is expected to reach almost USD 50 trillion.
1.1. Introduction

This chapter reviews recent developments concerning government borrowing needs, funding strategies and marketable debt within the OECD area. The key source of information is an annual survey of debt management offices of OECD countries (Box 1.1). In addition to an overview of sovereign debt developments in the OECD area, this chapter also discusses near and medium-term policy considerations for sovereign debt management, with a particular focus on sovereign green bond markets, negative-yielding debt and preparedness for transition from interbank offered rates.

Key findings

- The total gross borrowing of OECD governments from the markets is estimated to have risen from USD 10.6 trillion in 2018 to USD 11.4 trillion in 2019, and is projected to increase slightly to USD 11.8 trillion in 2020. While heavy debt repayments account for the bulk of gross issuance in 2020, the new debt issuance of OECD governments to the markets is projected to amount USD 2 trillion.

- The accumulation of debt continues, albeit at a slower pace in recent years in comparison to the period during the global financial crisis and its aftermath. Outstanding central government debt for the OECD area as a whole grew by around 10% per year on average between 2008 and 2013, and has increased by 4% per year since 2014. The central government marketable debt-to-GDP ratio for the OECD area is projected to be 72.8% in 2020, broadly unchanged from 2019, largely due to favourable interest rate-growth differentials in most OECD countries.

- Interest rates on government bonds declined to new record lows, and yield curves in many countries have flattened over the past year. This reflects a confluence of factors including stronger demand for safe assets and more accommodative monetary policy in most major advanced and emerging market economies. These conditions facilitate the servicing of debt and lengthening of the average maturities, hence encouraging debt-financed public investments.

- The maturity composition of issuance across OECD countries remained tilted towards long-term fixed-rate securities, though with a slight increase in the use of T-Bills. The weighted average term-to-maturity of outstanding marketable debt has increased by almost two years since 2007, reaching eight years in 2019. The lengthened maturities reduce the near-term exposure to refinancing risk and the sensitivity of total debt servicing costs to changes in market interest rates.

- In recent years, several sovereign debt management offices in the euro area and Japan have issued negative-yielding debt and received premiums from these issues. As of end 2019, the pool of total negative bond issuance reached USD 3.6 trillion with maturities up to 20-years. This affected investor base due to lower demand from yield-sensitive investors such as banks.

- Total sovereign issuance of green bonds in the OECD area has exceeded EUR 40 billion, and amounts to 0.1% of total government marketable debt in the OECD area in 2019. The green bond market is expected to grow further as some countries, including Germany and Sweden, have expressed their readiness to issue green bonds in 2020. However, this market is still quite small compared to traditional bond market, and its long-term prospect will depend to a large extent on the size of green eligible projects in government budgets.

- OECD governments will need to refinance around 20% of their outstanding marketable debt in 2020. Sovereign issuers, in particular in the countries where heavy debt repayments coincide with high new borrowing needs, should remain vigilant against the global risks and maintain flexibility in funding programmes as well as transparency and predictability.
1.2. Supply of government marketable debt: Growth in gross terms, signs of stabilisation in net terms

The annual Survey on OECD Central Government Marketable Debt and Borrowing has collected information on central government borrowing requirements, funding strategies and marketable debt figures of OECD governments from 2007 to 2020. A detailed description of definitions and concepts, as well as a background information associated with the Sovereign Borrowing Outlook survey is provided in Box 1.1.

Gross borrowing needs of the governments have continued to rise over the last two years, after a relatively steady period between 2014 and 2017. The combined gross borrowings of OECD governments from the markets, which peaked at USD 10.9 trillion in 2010 in the wake of the global financial crisis, is set to reach USD 11.4 trillion in 2019 (Figure 1.1 Panel A). This was mainly due to rising budget deficits in a few countries, particularly the United States. This year’s survey forecasts a continuation of this upward movement in 2020, albeit at a slower pace. Gross borrowings of OECD governments from the market are projected to increase slightly to USD 11.8 trillion in 2020. As a percentage of GDP, the gross borrowing needs of the G7 countries where ratios are relatively high will continue to increase in 2020, while those of the other country groupings are expected to decline slightly (Figure 1.1. Panel B).

Figure 1.1. Sovereign borrowing outlook in OECD countries

Panel A: Central government marketable borrowing in OECD countries
Panel B: Central government marketable gross borrowing requirement, as a percentage of GDP

Notes: GBR = standardised gross borrowing requirement, NBR = net borrowing requirement.
Source: 2019 Survey on Central Government Marketable Debt and Borrowing; OECD (2019b), OECD Economic Outlook, https://doi.org/10.1787/9b89401b-en; IMF World Economic Outlook (October 2019); Refinitiv, national authorities’ websites and OECD calculations.

It should be highlighted that debt repayments play an important role in gross borrowing needs. Between 2014 and 2017, around 85% of gross marketable debt issuance was used to repay existing debt. During this period, the average net supply of government marketable debt in the OECD area was USD 1.4 trillion which was a decline from the average of 2.4 trillion for the previous four years. As a consequence, governments’ additional exposure in the market was relatively limited. In recent years, however, the net supply of government securities has risen again, largely driven by the G7 countries. Net financing of
governments from the market increased by almost 40% to USD 1.8 trillion in 2018 from USD 1.3 trillion in 2017. After reaching to USD 2.1 trillion in 2019, it is projected to stabilise at around USD 2 trillion in 2020. Most notably, net supply of sovereign marketable debt is expected to decline in the euro area and emerging OECD, where the survey results indicate USD 263 billion and USD 146 billion worth of new debt supply in 2020 respectively (Figure 1.2).

**Figure 1.2. Net borrowing requirements between 2010 and 2020**


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**Box 1.1. Definitions and concepts used in the Sovereign Borrowing Outlook Survey**

This box provides background information, definitions and concepts associated with the Sovereign Borrowing Outlook which is the main source of this chapter.

**Background information:**

At the outset of the global financial crisis, many OECD governments faced unprecedented challenges due to explosive growth of their borrowing needs. At the same time, these challenges have brought sovereign debt operations to the forefront and enhanced the intrinsic need for greater transparency associated with a granular data on relevant metrics such as outstanding debt, redemptions and funding plans (OECD SBO 2009 and 2012). Investors and other stake-holders having a great interest in understanding the current risk exposure of central government debt, future funding needs and debt strategies require a breakdown of these metrics by instruments, maturity and currency types. Existing data on public debt focuses on outstanding debt with limited granularity, providing useful but insufficient cross-country information for comprehensive assessments of debt vulnerabilities. In an effort to address this information/data gap, the OECD Working Party on Debt Management launched the first Borrowing Outlook survey in 2009 after significant consideration was given to possible
advantages and disadvantages of different coverage of entities and instruments and the different ways to value them.

The Borrowing Outlook survey collects gross borrowing requirements, redemption and outstanding debt amounts with breakdown of these items by maturity, currency and interest rate types. It uses core definition of sovereign debt, so-called 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 stands as broadest institutional coverage, as it includes local governments, state funds financial and non-financial public corporations as well as central government debt. General government definition, which is used by for example by 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 instrument of the central authority of a country, except 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 central government is raised, managed and retired by the national DMOs on behalf of the central government. Hence, advantage of this relatively narrow definition of debt is that it enables countries to provide comparable figures, in particular for the 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 for trade in the secondary market and which are not. Another reason is for 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.
1.3. Sovereign debt accumulation and interest expenses

The outstanding level of central government marketable debt changes by the amount of net borrowing requirements each year. As the net borrowing figure for the whole the OECD area remains positive, this results in continued growth of central government marketable debt. It doubled from USD 22.5 trillion in 2007 to around USD 45 trillion in 2018, with year-to-year growth of 6.5% during this period. In 2019, USD 2.1 trillion worth of the net borrowings by OECD countries is estimated to push the nominal debt up to USD 47.1 trillion. Looking forward, fiscal policy is expected to remain somewhat expansionary to tackle a subdued economic outlook in some OECD countries including Japan, the United Kingdom and the United States, and to contract slightly in a few countries. In this context, the outstanding central government marketable debt for the OECD area as a whole is projected to rise by 4% per year to USD 49.1 trillion in 2020 (Figure 1.3).

Figure 1.3. Accumulation of nominal debt continues

Panel A: Outstanding central government marketable debt in OECD countries, 2007-2020
Panel B: Primary balance in 2019 and 2020 (as a percentage of GDP)

Notes: Panel A uses 2007 as base year for cumulative net borrowing requirement (NBR) calculations.

While primary balance drives the nominal central government debt, debt-to-GDP ratio is affected by interest payments and economic growth in addition to primary balances. In recent years, interest rates on government debt have remained lower than GDP growth in most OECD countries and this favourable condition has helped to stabilise the debt-GDP ratio in the OECD area (OECD, 2019a). While this trend is expected to continue, the debt-to-GDP ratio for the OECD area is projected to increase only marginally from 72.6% in 2019 to 72.8% in 2020 (Figure 1.4).
Figure 1.4. Favourable interest rate-growth differential stabilises debt-to-GDP ratios

Panel A: Central government marketable gross debt¹ in OECD countries, 2007-2020, as a percentage of GDP
Panel B: Interest rate-nominal GDP growth differential ²

1. Debt stock without cash.
2. The average difference between the effective interest rate paid on net debt (r) and nominal GDP growth (g) for 2016-21 (the so-called r-g). r is the weighted difference between the implied interest rate paid on government financial liabilities and the implied interest rate earned on government financial assets, where the weights are the share of financial liabilities and assets in net debt, respectively.


In the view of low or slowing growth projections along with prolonged low interest rates, the OECD highlighted the importance of using fiscal and structural policies alongside monetary policy (OECD, 2019b). The idea is that governments should take advantage of the current favourable interest rate-growth differential levels to address serious infrastructure shortages and strengthen longer-term growth (Blanchard, 2019). It should be noted that when assessing the scope and the need for additional easing of fiscal policy, a set of factors including trends in potential output growth, expected differentials between effective interest rates paid on debt and nominal GDP growth as well as the current stance of public debt burdens in countries need to be considered together. The OECD Economic Outlook of November 2019 assessed a few countries with relatively low debt and with stable output gaps, including Germany, the Netherlands and Sweden as having leeway for a stronger discretionary stimulus. It was also highlighted that some countries with sizeable budget deficits and high debt-to-GDP ratios such as Italy, Spain, the United Kingdom and the United States have limited scope for discretionary fiscal easing.

1.3.1. Prolonged low market interest rates restrains the cost of servicing the debt

Government debt comes with a cost in the form of interest payments, which is determined by the stock of government debt and the interest rates that the government has to pay on it. Over the past decade, the cost of sovereign funding has been on a declining trend in major economies. 10-year bond yields dropped
by 220 basis points on average in the OECD area between 2012 and 2019. During this period, sovereign debt levels remained high and even on an upward trend in some OECD countries with substantial new borrowing needs. Even so, interest payments in relation to GDP have decreased due to issuance of debt at low interest rates during this period. On average interest expenses on general government debt as a percentage of GDP fell from 2.5% in 2012 to 1.8% in 2017 and further to 1.5% in 2019 (Figure 1.5 Panel B). Moreover, several governments including France, Germany and Japan where central banks purchased large amounts of government bonds to provide monetary policy stimulus, which contributes to compress yields in recent years (see discussion in Section 1.4).

**Figure 1.5. Prolonged low interest rates and evolution of interest expenses**

Panel A: Change in 10 year yields between 2012 and 2019
Panel B: Change in general government interest expenses in relation to GDP between 2012 and 2019

Changes in debt interest payments in relation to GDP varied significantly amongst countries during the period under review. It is worth noting that interest payments are based on effective interest rates on government debt portfolio and encompasses the interest on debt incurred in the past. Therefore, exposure to interest rate changes depends in large part on how quickly a change in the rate on new borrowing feeds through to the effective interest rate on the outstanding stock. This pass-through of market interest rates to interest payments depends on the amount of new debt issuance in relation to outstanding debt, which partly reflects the duration of outstanding government debt. When new debt issuance at the market interest rates are sizeable, the pass-through impact is large. In this context, the impact of falling interest rates on...
government interest expenses have remained relatively limited in countries such as Denmark, Sweden and the Netherlands where fiscal policy stayed close to budget balance in recent years (Figure 1.5).

With respect to the duration factor, the reflection of market interest rates changes in government interest expenses is faster when the duration of outstanding debt is relatively short. In addition to the duration, key measures of interest rate risk include the average re-fixing period and the average term-to-maturity. For the majority of OECD countries, there has been a sizeable elongation of debt maturity since the global financial crisis. This manifests itself in a significant increase in the average term-to-maturity (ATM) ratio. The weighted ATM has been increased from 6.2 years in 2007 to 7.9 years in 2019, which implies slower pass-through of changes in market interest rates to government interest costs (Figure 1.6). For a quarter of countries (including Austria, Chile, Japan and the United Kingdom), it takes more than nine years to roll-over the whole debt portfolio, which implies that any change in issuance takes a long time to affect the composition of the debt portfolio. On the other hand, some countries with relatively shorter ATM (e.g. Hungary, Poland, and the United States) have relatively higher exposure to changes in market interest rates. While a low ATM would, in principle, entail a higher refinancing risk in general, for issuers with better than average fiscal fundamentals, ample market liquidity and sustained appetite from a diversified investor base refinancing risk is considered relatively low.

**Figure 1.6. Average term-to-maturity of outstanding marketable debt in selected OECD countries**

1.4. A more accommodative monetary policy stance has been supporting favourable financing conditions

Financial conditions, with the exception of temporary deteriorations in May and August, have been improving since the beginning of 2019 on the back of a more accommodative monetary policy stance. Confronted with persistently low inflation and weakening economic activity, major central banks have eased monetary policy further in 2019. Specifically, the US Federal Reserve had implemented gradual rate increases since December 2016 and a measured roll-off of the Treasury portfolio since 2017. In March 2019, however, the Federal Reserve signalled that it would reduce the cap on monthly Treasury
redemptions and conclude the reduction of its aggregate securities holdings at the end of September. In July, the Federal Reserve decided to end the unwind in August. It also lowered the federal fund rate to between 1.5% and 1.75% following three 25-basis point rate cuts in July, September and October. The Federal Reserve pledged to provide ample liquidity through purchasing T-bills from the markets in order to tackle repo market stress (Box 1.2).

**Box 1.2. US repo market spike and addressing liquidity concerns**

Repo markets, which allow dealers to act as market makers, redistribute liquidity between financial institutions and support secondary market liquidity for the cash markets. From a debt management perspective, a healthy repo market is important, as it is a factor ultimately affecting primary markets of government securities. In mid-September, US money markets experienced unusual turmoil, with repo rates peaking at 10% and the fed funds rate settling 5 basis points above its target range for one day. This sharp swing happened during a period of sizeable tax payments and debt settlement, which translated into a large drop in reserve balances. More structural causes including the gradual drain of reserves caused by the shrinking of the Federal Reserve’s balance sheet and likely intermediation bottlenecks related to regulatory capital requirements were also noted by the Treasury Borrowing Authority Committee (US Treasury, 2019a). In particular, liquid assets holdings of a few large banks, which became more skewed toward US Treasuries and diminished their ability to supply funding at short notice in repo markets recently, might have compounded the pressures of the temporary factors (BIS, 2019b).

In response to the liquidity squeeze in money markets, the Federal Reserve Bank of New York conducted a series of both temporary and permanent open market operations to supply more reserves, reduce volatility and ensure stability of short-term borrowing rates. The Federal Reserve anticipates to purchase T-bills at least into the second quarter of 2020, at an initial pace of approximately USD 60 billion per month. By doing so, it addressed these events and appears to have prevented potential year-end funding stress periods by intervening in the market with both temporary and permanent open market operations. This prepositioning helped attenuate the year-end funding pressures. Also, market participants were very aware of the potential for year-end funding pressures and began to secure funding well in advance of the year-end. In light of these developments, the US Treasury which is well-financed in the near-term, carefully foresees a possible scarcity in the T-Bill market if it maintains its current coupon issuance sizes (US Treasury, 2019b).

This incident highlighted the importance of repo markets for the financial system and of maintaining authorities' operational flexibility to address unexpected changes in market functioning. While repo markets are adapting to a number of drivers such as accommodative monetary policy and tightening of balance sheet constraints, markets can come under pressure due to temporary shortage of funding or security supply. In the context of the latter, a security lending facility (SLF) is a valuable policy tool typically used by central banks for monetary policy and financial stability purposes. Recognising the key role of repo markets, several debt management offices in the OECD area also offer SLFs, and act as the lenders of last resort for government securities (e.g. Finland, Germany and Sweden). SLFs support market participants to continuously quote prices and reduces the risk of shortages, avoids settlement problems and enhance liquidity in government debt markets (OECD, 2019a).
In the euro area and Japan, where both inflation and economic growth are expected to remain subdued, central banks are set to maintain highly accommodative monetary conditions. In its September meeting, the ECB cut the deposit rate to minus 0.5% and restarted its asset purchase programme (EUR 20 billion per month). Also, in order to contain the impact of more negative interest rates on bank profitability, the ECB introduced a new system of tiered remuneration of bank reserves. Meanwhile, the Bank of Japan (BoJ) has maintained very stimulative monetary policy measures including the negative interest rate and yield curve control. With regard to the amount of government bonds to be purchased, the BoJ will continue to conduct purchases in a flexible manner so that their amount outstanding will increase at an annual pace of about JPY 80 trillion. In addition, it modified its forward guidance to clarify that there would be a downward bias in the policy rates.

Accommodative monetary policies adopted by major central banks have facilitated the financing of budget deficits and the re-financing of existing debt in recent years. It also makes economic growth, supported by expansionary fiscal policies, less costly and more attractive, without complicating fiscal indicators. In effect, the decline in market interest rates somewhat compensated the negative impact on debt dynamics in several countries. Large-scale asset purchases by central banks affect government securities markets in terms of investor base and market liquidity. As a result, today, central banks are among the major investors in sovereign debt in several OECD countries. For instance, the central bank holds more than 45% of national government debt in Japan and Sweden, above 20% in Germany and the United Kingdom (as of December 2019). Asset purchases affect the volume and the maturity of bonds the market can hold and reduce the quantity of bonds in private hands – the “free float” –, that can generate scarcity effects. This impact can be significant in markets where net supply of sovereign debt is limited.

The OECD Working Party on Public Debt Management (WPDM) regularly discusses implications of central banks bond-buying operations (both stock effect and flow effect), among other factors such as financial regulatory changes, for liquidity of government securities markets. Based on their observation of market developments and feedback from primary dealers, debt management offices (DMOs) assess that overall market liquidity conditions, which are still worse than the pre-crisis environment, have relatively improved recently in most OECD countries (Annex B. OECD 2019 Survey on Liquidity in Government Bond Secondary Markets). It appears challenging to isolate the effects of unconventional monetary policies from those of other factors including post-crisis regulatory reforms, and advances in financial technology. They view that major central banks carefully considered potential adverse implications of their unconventional policies on functioning of government securities markets and have adopted a range of strategies to mitigate to such effects. These strategies include (i) carefully designing programme parameters such as method, size and timing of purchases; (ii) adopting clear and transparent communication to limit asymmetric information and support predictability; (iii) establishing mitigation measures, such as securities lending programmes; and (iv) maintaining flexibility in programme implementation, particularly in purchases, to adjust market conditions (BIS, 2019a).

Looking forward, this remains as a key issue that requires careful considerations of the size of new bond issuances. Particularly when central banks’ purchases exceed new supply of bonds, this might cause scarcity in the market (IMF 2015). Recently, major central banks are set to switch back to net purchases, despite new transactions are expected to be small (Figure 1.7). In the euro area, the ECB, holds over EUR 2.1 trillion worth of public sector securities as of December 2019, considerably paced down net monthly purchases in 2019. Meanwhile, net supply of government debt by the euro area governments is expected to be slightly lower in 2020, compared to that of 2019. This implies that a sizeable increase in net purchases of the euro area government bonds, assuming size of issuance remain constant, might put pressure on free-float bonds in the market.
Figure 1.7. Net purchases of government securities by major central banks (monthly)

Note: Calculated from securities holdings data for Federal Reserve and BoJ. For BoE this data are calculated from holdings of gilts by the Bank of England's asset purchase facility holdings of purchases. Data for ECB are net purchases for the PSPP.
Source: Central banks.

1.5. Interest rates moved down to new record lows

Over the past year, long-term interest rates on government bonds have further declined across the OECD, reflecting several factors including the absence of growth momentum, more accommodative monetary policy in most major advanced and emerging market economies and stronger demand for safe assets driven by heightened uncertainty. Average 10-year government bond yields in large advanced economies have fallen by about 0.8 percentage points since December 2018, despite the bounce back from August lows (Figure 1.8 Panel A). Yields declined significantly in several countries including Italy, Portugal, Greece, Iceland and Turkey. Moreover, more government bonds in the euro area and in Japan fell deeper into negative territory. Since October, sovereign yields, which moved down to record low levels in August, have recovered and yield curves somewhat have somewhat steepened, as the heightened demand for safe assets retreated in the view of de-escalation of trade tension.

In 2019, around 35% of the total government bonds have been sold with interest rates below 1% of which 60% below zero interest rate at auctions in OECD countries (Figure 1.8 Panel B). France, Germany and Japan account for more than three quarters of the total issuances yielding less than 1%. 30% of the total bonds issued with interest rates between 1% and 2%, and 33% of them issued with more than 2% interest rates. The United States is the largest contributor to these two categories, followed by Italy, Korea, Canada and Mexico.
1.5.1. Yield curves have flattened in some jurisdictions, despite a recent rebound

While yields on long-term bonds have declined to low levels, yield curves in several countries have flattened substantially, and in some cases they have inverted. Compared to 2018, the difference between 10-year and 2-year yields has narrowed significantly in 2019, as long-term interest rates fell more than short-term interest rates. For example, the difference between 10-year and 2-year yields decreased by half or more in several countries including Germany, Japan, Italy and the United Kingdom, despite a recent rebound as market sentiment improved in recent months (Figure 1.9). Several factors may have contributed to this development, including persistent low inflation and low inflation volatility, weak global growth leading to low term-premium, and increased demand for bonds on the long-end of the yield curve.5

From an investor perspective, government bonds play a key role in asset portfolios due to the following features: i) low credit and liquidity risk; ii) income and capital gains; iii) portfolio stabilizer; and iv) regulatory and capital requirements. The dramatic drop in government bond yields over the past year has raised questions about their role in strategic asset allocations. Falling yields mean that the compensation for holding duration in the euro area and Japan has become more challenging (BlackRock, 2019). At the same time, portfolio resilience is crucial at a time of elevated global uncertainty, and government bonds play an important role in building portfolio resilience — even at low yields. Overall, higher yielding safe assets such as U.S. Treasuries have become more attractive as they offer greater balance than the euro area or Japanese bonds with negative yields. Furthermore, in the euro area and Japan, investor demand has somewhat shifted towards longer maturity debt that still offers positive yields (e.g. bonds with more than 20-year maturity).
In this context, it has also been argued that portfolio adjustments by long-term investors may have acted as an amplification mechanism in the fall in long-dated yields. Institutional investors such as pension funds and insurance companies invest in long-term securities as their investment strategy is driven by maturity of their liabilities. Aging population demographics and positive trends in life expectancy in most developed countries, elongated average maturity of their liabilities, and these have increased their demand for long-dated bond in order to contain duration mismatches. Domanski et al. (2017) highlights that this factor could have amplified downward pressures on long-term government bond yields.

From a debt management perspective, the expected cost of a given debt strategy is closely related to estimates of the so-called term premium that compensates investors for the interest rate risk associated with holding a long-term bond. Therefore, DMOs take into account, among other things, the shape of the yield curves in order to determine maturity composition of borrowing. A flattened yield curve implies a low expected cost of long maturities, which in turn, presents an opportunity for low-cost mitigation of roll-over risk. In response, the share of long-term fixed interest rate marketable debt in central governments of several OECD countries increased significantly. For example, in the United Kingdom, where the average maturity of debt is 18 years, strong demand from pension funds for long-term bonds, in particular index-linked bonds makes it cheaper to insure against roll-over risk. Similarly, in Japan average maturity of government debt elongated from 7.6 Years in 2013 to over 9 years in 2019, in consideration of, for example reducing roll-over risk and sustained demand for super long-term bonds with positive yields.

1.5.2. Negative-yielding debt has expanded in Europe and Japan

The unprecedented situation of negative yields overturned the conventional wisdom that investors should be compensated for lending their money. This is not only a reflection of the greater demand for safe assets amid heightened geopolitical and economic risks, but also of an expectation that bond prices will keep rising as
long as investors can still earn a return. If an investor buys a bond with a negative yield and holds it until its redemption, a combination of the interest income and redemption amount will be below the purchase amount, bringing about a loss. However, even with negative yields, investors can gain if they sell a bond at a premium (i.e. a higher price than the purchase price) before its maturity or by taking advantage of favourable currency dynamics that effectively inflate returns.

Interest rates of government bonds have dipped into negative territory for most maturities in Europe and Japan in recent years, where central banks have been following a negative interest rate policy since 2014 and 2016 respectively. In many countries including Japan, Germany, France, Sweden and Switzerland, the amount of government bonds trading at negative yields has increased significantly. In some countries, government bonds with negative yields stretched out 20-year maturities during the past year. As investors are willing to pay a premium for holding government bonds in some jurisdictions, this situation calls for a better understanding of their potential implications for both issuers and investors of government securities markets.

1.5.3. Some governments are in effect being paid to borrow

Figure 1.10 shows the result of an empirical study that examines negative-yielding fixed-rate sovereign bond issuance in 17 OECD countries between 2014 and 2019 in terms of the issuance amounts and premium received. The methodological approach and sources of this study are provided in Annex 1.A. Total issuance amounts, trending down since a high in 2016, surged again to a peak in 2019. The maturity of negative-yielding debt issuance has also lengthened to over 10-year segment in several countries including Denmark, France, Germany and Switzerland. In August 2019, Germany’s 30-year Bund was issued at a small negative yield for the first time.

Figure 1.10. Negative-yielding sovereign bond issues, 2014-2019

Notes: USD conversion carried out at each year end.
Source: Refinitiv, national authorities’ websites; and author calculations.

Over the review period, negative-yielding bond issues amounted more than USD 3.5 trillion and issuers received more than USD 28 billion from these issues. In 2019, more than 200 government bonds were issued with negative yields, exceeding 2016 issues. In terms of country composition, Japan, Germany and France account for more than 90% of the total negative-yielding bonds. It should be noted that more countries such as Latvia, Lithuania and Ireland joined the negative-yielding bond issuers and a few countries such as Italy, Belgium and Spain issued more negative-yielding debt during the summer.
In terms of accrual accounting (e.g. Maastrichtian accounting rules), premiums at issuance, which are explained by a yield that is lower than the coupon of bonds issued, are amortised annually over the residual life maturity of the bonds. These amortisations have the effect of reducing the budget cost of the interest payments. Thus, they can be used to reduce the deficit or, for a same level of deficit, to offset increase in other expenditures. In most OECD countries, sovereign cash management falls under the responsibility of debt management offices. From a cash management perspective, premiums at issuance can be used for building up cash reserves or by issuing less debt. The French Treasury, for example, took the decision to recycle this special inflow to issue less in T-Bills in recent years. T-Bill issuance by the French Treasury, which accounted for 18.7% of outstanding debt in 2009, came down to 6.3% in 2019.

A majority of sovereign debt management offices in the OECD area (i.e. 28 countries) maintain a liquidity buffer as a precautionary measure for extraordinary periods. Current negative-yielding environment in some countries complicates keeping large cash balances. In the euro area, DMOs can have deposit accounts at the central bank with certain restrictions in terms of maximum size (e.g. 1% of GDP, it is EUR 8.2bn for the Netherlands), remuneration and the use of accounts (i.e. withdrawal needs to be reported five in advance). The ECB decisions and guidelines of June 5 (ECB/2014/22-3), introduced the possible application of negative interest rates and common European rules for the maximum remunerated cash balances. DMOs in the euro area are, therefore, incentivised to minimize the liquidity amount held on their cash account at central banks and to invest it in the money market.

1.5.4. Yield-insensitive investors become more visible in negative-yielding debt market

From an investor perspective, negative-yielding bonds represent an unattractive proposition for all bond investors. Yet, different investor groups react in different ways: Some investors such as central banks are less sensitive to yields, and continue buying these bonds; while ‘yield-sensitive investors’ such as banks, pension funds and insurance companies shy away from the negative-yielding government securities markets or shift their demand to longer-term bonds.7

The OECD Working Party on Public Debt Management (WPDM) discussed the impact of negative yields on the investor base. Discussions reveal that the issuers of negative-yielding bonds observe somewhat lesser demand from “yield-sensitive issuers” such as banks, pension funds and insurance companies. They highlighted the following factors: i) ability of different types of investors to manage duration risk, depending in particular on the negative duration gap, ii) investment restrictions on buying negative-yielding assets and, iii) potential negative impact on bank profitability and banks’ incentives to lend and adjust their assets and liabilities. For example in Japan, the share of bank holdings of Japanese government bonds (JGBs) decreased from 42.7% in 2012 to 16.4% in 2018, while holdings of Bank of Japan increased from 11.5% to 46%, as falling interest rates have made it difficult for banks to gain profit on JGB holdings. Over the same period, demand from life insurance companies has shifted from medium and long-term JGBs to super long-term JGBs (i.e. 20-year and longer maturities), mainly due to extending asset duration and matching asset and liability duration. Indeed, the prolonged low interest-rate environment in several OECD countries poses a significant challenge for pension funds and insurance companies, which promise a minimum return to policyholders.8 A similar development was observed in the Bunds market. The share of ‘yield-sensitive investors’ (e.g. pension funds and insurance companies) came down from around 50% in 2014 to below 20% in 2019. Life insurance companies selling many insurance contracts with guaranteed yields of 3% to 4%, have gradually reduced their purchases of new issuances of German government securities to diversify into other issuers or asset classes since the 2010s.

While government bond markets are predominantly wholesale, with a little retail participation in several countries, retail investors play an important role by providing stable demand for government securities, which, in times of volatility, can cushion the impact of sales from institutional and foreign investors. In some OECD countries where government bonds have been yielding low or negative rates for a long time, the demand
from retail investors has been also negatively affected. For example, household holdings of JGBs decreased from 4.4% in 2008 to 2.9% in 2012 and further to 1.1% in 2016. In response to declining sales to retail investors, Japan’s Ministry of Finance has continuously promoted public relations activities to improve individuals’ understanding of JGBs and implemented various measures. An important element of these efforts, a minimum interest rate of 0.05% is guaranteed on retail investor bonds, relatively higher yields than bank deposit rates.

Central banks as investors giving priority to safety, liquidity and stable long-term holdings, are less sensitive to interest rate developments. In this context, demand from both national and foreign central banks for risk-free sovereign bonds has not been affected by negative yields. Global holdings of foreign currency reserves by central banks are mainly invested in highly rated liquid foreign government securities. In view of significant accumulation of foreign currency reserves in recent years (worth of over USD 11 trillion as of September 2019, IMF COFER data), foreign central banks’ demand for safe liquid assets has increased as well. In addition, central banks in the euro area and Japan already have bought a sizeable share of domestic government bonds as a result of their quantitative easing policy. A recent survey of primary market developments also indicated that a majority of countries observed no change or higher demand from national and foreign central banks to government securities in recent years (Annex A. OECD 2019 Survey on Primary Markets Developments).

In a negative yield environment, investors can make profit if they sell a bond at a premium (i.e. a higher price than the purchase price) before its maturity or by taking advantage of favourable currency dynamics that effectively inflate returns. Asset managers and hedge funds have been increasingly active in some government securities markets in recent years. In addition, foreign investors, in particular the ones active in derivative markets, currently hold about 70% of outstanding T-Bills in Japan. This is largely due to low yen fund-raising costs on the back of the tightening dollar supply-demand balance which generates an advantage in dollar-yen basis swap spread (Ministry of Finance of Japan, 2019a).

From the perspective of issuers, a diversified investor base for government bonds is important for ensuring stable demand in the market. A diversified investor base with different time horizons, risk preferences, and trading motives ensures active trading, enhanced liquidity and allows borrowing at reasonable cost (OECD, 2019a). If the investor base is diverse and includes different types of investors from different geographic regions, the behaviour of any subset will have a diminished effect. In this context, the changing profile of the investor base is having a major impact on both primary and secondary markets of government securities. While, the investor base of a government debt portfolio is predominantly a result of market forces, using a variety of measures (e.g. use of different instruments, tax treatment and investor relation programmes) can be used for building a broad investor base as well as reaching out to new investor groups. Also, decisions on the composition of debt issuance methods are informed by an assessment of investor demand for debt instruments by maturity and type. For example, in cases where investor demand shifts from the short-end of the yield curve to the mid- and long-end of the yield curve where yields are still positive, this might create additional incentive for issuance of these securities. Against this background, it is important to better understand the factors driving investor demand and trading behaviour for different government bonds. This requires greater efforts to collect data and gather market information for a more comprehensive monitoring of the trends and risks in government securities markets.

1.6. Fixed-rate long-term bonds remain as the main source of financing, despite a slight increase in T-bills

Table 1.1 illustrates the composition of marketable gross borrowing in the OECD area between 2007 and 2020. In recent years, maturity composition of funding strategies across OECD countries remained tilted towards long-term fixed-rate securities, despite a slight increase in the use of T-Bills and foreign currency denominated bonds.
In optimizing the funding mix amongst long-term fixed-rate securities, variable rate securities and short-term securities, sovereign issuers consider expected cost and volatility of alternative funding strategies which largely depends on term premium and the level of yields. In a positive yield curve environment, short-term securities cost less than long-term securities. However, they must be rolled over in short periods, which increases sovereigns’ debt portfolio exposure to market developments (i.e. interest rate risk and rollover risk). While T-Bills involve both interest rate and roll-over risk, variables rates, depending on the maturity, add to interest rate risk without increasing roll-over risk of the portfolio. These considerations underpin the objective of sovereign debt management: “to minimise the costs of government’s financing, taking into account risk.” In practice, sovereign issuers set funding strategies in a way that strikes a balance between minimising interest expense and minimising refinancing risks, considering market conditions.

Table 1.1. Funding strategy based on marketable gross borrowing needs in OECD area, 2007-2020

(Percentage)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Short Term (T-bills)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fixed rate</td>
<td>50.0</td>
<td>55.5</td>
<td>45.3</td>
<td>44.3</td>
<td>44.6</td>
<td>45.4</td>
<td>43.8</td>
<td>40.4</td>
<td>39.9</td>
<td>40.7</td>
<td>40.6</td>
<td>41.1</td>
<td>41.6</td>
<td>42.6</td>
</tr>
<tr>
<td>Index linked</td>
<td>50.0</td>
<td>44.5</td>
<td>54.7</td>
<td>55.7</td>
<td>55.4</td>
<td>54.6</td>
<td>56.2</td>
<td>59.6</td>
<td>60.1</td>
<td>59.3</td>
<td>59.4</td>
<td>58.9</td>
<td>58.4</td>
<td>57.4</td>
</tr>
<tr>
<td>Variable rate</td>
<td>43.9</td>
<td>39.9</td>
<td>50.6</td>
<td>51.4</td>
<td>50.9</td>
<td>50.3</td>
<td>50.9</td>
<td>52.3</td>
<td>53.5</td>
<td>52.8</td>
<td>52.8</td>
<td>52.5</td>
<td>51.5</td>
<td>50.7</td>
</tr>
<tr>
<td>Other</td>
<td>3.3</td>
<td>2.5</td>
<td>1.9</td>
<td>2.4</td>
<td>2.9</td>
<td>3.3</td>
<td>3.7</td>
<td>4.0</td>
<td>3.7</td>
<td>3.5</td>
<td>3.5</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
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<tr>
<td><strong>Of which:</strong></td>
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<td></td>
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</tr>
<tr>
<td>Local currency</td>
<td>99.5</td>
<td>98.8</td>
<td>98.5</td>
<td>99.1</td>
<td>99.2</td>
<td>98.9</td>
<td>98.9</td>
<td>98.9</td>
<td>98.9</td>
<td>98.7</td>
<td>98.9</td>
<td>98.0</td>
<td>97.4</td>
<td>97.8</td>
</tr>
<tr>
<td>Foreign currency</td>
<td>0.5</td>
<td>1.2</td>
<td>1.5</td>
<td>0.9</td>
<td>0.8</td>
<td>1.1</td>
<td>1.1</td>
<td>1.2</td>
<td>1.1</td>
<td>1.3</td>
<td>1.3</td>
<td>2.0</td>
<td>2.6</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Notes: Standardised gross borrowing requirement.
Source: 2019 Survey on Central Government Marketable Debt and Borrowing; OECD (2019b), OECD Economic Outlook, https://doi.org/10.1787/9b89401b-en; Refinitiv, national authorities’ websites; and author calculations.

In addition, sovereign issuers view Treasury Bills as shock-absorbers for any unexpected financing needs. This means that issuers manage short-term or unexpected surges in financing needs through T-bill issuance. For example, during the GFC, several countries including France, Germany, the Netherlands and the United States, increased their T-Bill issuance temporarily. Hence, more than 55% of the total funding requirement of OECD governments was raised via Treasury bills in 2008 (Table 1.1). In the following years, while borrowing requirements remained elevated, maturity choices of most OECD countries have leaned towards long-dated securities in order to mitigate roll-over risk.

Looking forward, a key driving factor for funding strategies will be the change in investors’ demand for a range of instruments with different maturity and interest rate type characteristics. A few countries have already announced plans to introduce new maturity lines or new product(s) (Annex A. OECD 2019 Survey on Primary Markets Developments). For example, the US Treasury has consulted with a broad range of market participants regarding a set of instruments, including 20-year bonds, 50-year bonds and a SOFR-index floating rate note. Their outreach suggested that there was stronger appetite for a potential 20-year bond, than for an ultra-long bond, as evidenced by their decision in January to proceed with a new 20-year offering. In addition, the Treasury continues to consider the possibility of issuing a SOFR-linked FRN. Such a product might support the transition away from LIBOR to SOFR.

1.6.1. Increase in T-Bill issuance is confined to a few issuers

Overall, the share of long-term securities, predominantly in the form of fixed-rate bonds, increased at the expense of T-Bills since 2009, and reached its highest level in 2015 (60.1% across OECD countries). In recent years, however, the use of T-Bills in financing marketable funding needs rose slightly from 39.9%
in 2015 to 41.6% in 2019. The survey results indicate continuation of this trend in 2020. The United States is the main driver of this increase and also the largest issuer of T-Bills amongst OECD countries, while Japan, the second largest issuer, has been allocating relatively less in T-bills since 2016 (Figure 1.11). In 2020, a few countries including Australia, Germany and the United States are planning to expand their T-Bill issuance.10

Figure 1.11. Share of Treasury Bill issuance in the OECD area, 2007 to 2019

<table>
<thead>
<tr>
<th>Year</th>
<th>United States</th>
<th>Japan</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>16</td>
<td>48</td>
<td>36</td>
</tr>
<tr>
<td>2008</td>
<td>17</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>2009</td>
<td>22</td>
<td>37</td>
<td>41</td>
</tr>
<tr>
<td>2010</td>
<td>20</td>
<td>38</td>
<td>42</td>
</tr>
<tr>
<td>2011</td>
<td>18</td>
<td>47</td>
<td>35</td>
</tr>
<tr>
<td>2012</td>
<td>18</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td>2013</td>
<td>16</td>
<td>48</td>
<td>36</td>
</tr>
<tr>
<td>2014</td>
<td>15</td>
<td>53</td>
<td>32</td>
</tr>
<tr>
<td>2015</td>
<td>15</td>
<td>53</td>
<td>32</td>
</tr>
<tr>
<td>2016</td>
<td>16</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>2017</td>
<td>16</td>
<td>28</td>
<td>14</td>
</tr>
<tr>
<td>2018</td>
<td>14</td>
<td>25</td>
<td>13</td>
</tr>
<tr>
<td>2019</td>
<td>13</td>
<td>21</td>
<td>65</td>
</tr>
</tbody>
</table>

Source: 2019 Survey on Central Government Marketable Debt and Borrowing; OECD (2019b), OECD Economic Outlook, https://doi.org/10.1787/9b89401b-en; Refinitiv, national authorities' websites; and author calculations.

Over the years, the US Treasury have altered relative size of T-Bill supply in response to various supply side and demand side reasons. T-bill supply as a percentage of the total US Treasury debt outstanding, which was stable around 23% between 1996 and 2006, increased significantly to 32% in 2008 in response to rapidly soared financing needs during the GFC. In the following years, T-Bill issuance was cut down and its share came down to 11.5% in 2015. In 2015, the Treasury took a strategic decision to expand net annual issuance supplies of T-Bills, and since then the share of T-Bills gradually increased to 14.5 % of total US Treasury debt outstanding in 2019. This outcome is in line with the recommendations of the Treasury Borrowing Advisory Committee (TBAC), suggesting T-Bills issuance to account for between 25% to 33% of new issuance in the medium term. The aim is to retain flexibility in Treasury's issuance path and accommodate historically large auction sizes in light of the uncertainty inherent to fiscal projections and potential changes in size and composition of the SOMA (System Open Market Account).11 From the demand side, an important factor supporting this strategy is the regulatory changes including money market reforms and bank capital rules to hold high-quality liquid assets, which led to greater demand for T-Bills. Recently, the Federal Reserve started to buy T-Bills from the market (i.e. USD 60 billion of bills every month at least until the second quarter of 2020) to soothe funding problems in money markets, created extra, but perhaps a temporary, market demand for the T-Bills (Box 1.2). It should be noted, the US Treasury, being a "regular and predictable" issuer, has not changed its funding programme in this regard (US Treasury, 2019b).
1.6.2. Relatively higher foreign currency borrowing in a few OECD countries

Currency risk is the most important market risk for emerging economies where local currency bond markets tend to be less developed and foreign currency denominated debt is a significant source of both public and private sector financing. Chapter 2 discusses the rise of foreign currency denominated debt in emerging markets in detail. Based on a global bond dataset, it demonstrates that currency exposure of both public and private sector has been increasing in emerging markets in recent years. High levels of foreign debt raise concerns about exposures to currency risk – without active management – of these countries’ balance sheets (e.g. high sensitivity of these economies to global financial conditions and to waves of capital flows).

OECD governments predominantly finance their budget deficits via local currency denominated debt. This means that sensitivity of debt repayments to changes in the exchange rate (i.e. exchange-rate risk) is quite negligible in most OECD countries. Only a few countries, including Chile, Mexico, Sweden and Turkey use foreign currency denominated bonds for government deficit financing purposes.\textsuperscript{12} While still at a very low rate, the proportion of the foreign currency denominated debt issuance in total marketable funding rose from 0.5% in 2007 to 2.6% in 2019, largely driven by Turkey (Figure 1.12).

Figure 1.12. Evolution of foreign currency denominated debt by selected OECD countries 2010-2019

Panel A: Share of FX denominated securities in total issuance
Panel B: Share of FX denominated securities in total debt

Notes: Panel A based on bond issuances. Panel B are bonds in foreign currency as a proportion of total debt stock (without cash).
Source: 2019 Survey on Central Government Marketable Debt and Borrowing; OECD (2019b), OECD Economic Outlook, https://doi.org/10.1787/9b89401b-en; Refinitiv, national authorities’ websites; and author calculations.

The Turkish Treasury has resorted to USD-denominated bond issuance in global bond markets in recent years against the background of risk-on environment with low yields across developed markets. In addition, the Treasury re-introduced euro- and USD-denominated bonds in the domestic market in 2018, eight years after the issuance was discontinued in 2010. In 2019, net foreign currency denominated debt issuance accounted for more than half of the net borrowing. Consequently, the foreign currency proportion of government marketable debt more than doubled since 2010 to almost 40% in 2019.\textsuperscript{13}
The most common currency of choice for a foreign currency denominated bond issuance by governments is USD, followed by EUR and JPY-denominated issuances. In recent years, a few OECD countries including Poland, Hungary and Portugal have issued renminbi-denominated debt in China, commonly called Panda bonds, mainly for investor diversification purposes. It should be noted that in terms of size of issuance, these bonds were fairly small compared to overall financing needs and did not cause a material change in currency composition of debt stock.

1.6.3. More governments are issuing green bonds

Green bonds are fixed income securities whose proceeds are used to finance new or existing eligible green projects that deliver environmental benefits (OECD, 2017). For an instrument launched in the market three years ago, issuance of sovereign green bonds in the OECD area is growing rapidly with new issuers. 14

Issuance of sovereign green bonds by OECD governments exceeded EUR 19 billion in 2019, a 42% increase compared to 2018. Debut issuances by Chile, Korea and the Netherlands accounts for 44% of the total issuance amount in 2019 (Figure 1.13). Apart from two exceptions, all sovereign green bonds issued so far are denominated in euro. In terms of maturity structure and volume size, they vary significantly: Maturity of bonds varies from 5- to 30-year, with 19-year weighted average maturity, and size of bonds ranges from EUR 20 million to above EUR 20 billion.

**Figure 1.13. Sovereign green bond issuance by OECD countries**

![Graph showing sovereign green bond issuance by OECD countries]

* Korea issued a green and sustainability bond for Foreign Exchange Stabilization Fund, the proceedings of which will be used for green eligible projects.
Source: National authorities’ websites and author calculations.

Germany and Sweden have also announced their plans to issue green bonds in 2020, and a few other countries including Denmark, Mexico, Spain and Slovenia are considering issuing one. From a debt management perspective, the main motivation for issuing a green bond is often to align with government's sustainability policy, as green bond issuance is assessed as a tool for governments to display moral leadership on climate change and sustainability (OECD, 2018). In addition, the sovereign issuance of green bonds aims at supporting the development of sustainable financial markets and in particular the green market segment by providing institutional investors with risk-free benchmark green securities. Germany, for example, intends to establish a liquid green interest benchmark curve by providing market participants with investing opportunities in green securities along the entire German yield curve in the future.
The OECD Working Party on Public Debt Management (WPDM) has discussed existing practices of sovereign green bonds during its meetings in recent years. When making a decision on a new instrument, sovereign issuers give careful consideration to investor demand and investor diversification aspects, in addition to other factors such as additional costs due to novelty and liquidity premium, and the impact on existing instruments. With regard to green bonds, the issuers including France, Ireland and the Netherlands reported green bonds attract a wide range of investors irrespective of a green mandate. They also observe sustained demand from an increasing number of institutional investors that committed to responsible investment and integration of ESG (environmental, social and governance) factors into their investment procedures. In this regard, they emphasised the importance of reaching 'green investors' to achieve a diversified investor profile. In its inaugural green bond issuance, the Dutch State Treasury Agency (DSTA) formally supported “green investors” by offering priority allocation to ‘real money’ bidders willing to declare their green credentials in their first green bond issuance. Regarding the pricing, issuers reported that they have not observed a consistent, material difference (e.g. a premium or discount in terms of spreads at issuance) between green and conventional bonds, as the financial risk as well as the credit risk are the same for investors.

In terms of secondary market liquidity, however, slightly poorer conditions have been observed for green bonds, except in a few rare cases. This reflects the relatively small size of green bonds and the strong presence of buy-and-hold investors in green bond markets. Secondary market liquidity is an important contributing factor in supporting primary market access and minimising sovereign borrowing costs (OECD, 2018). One way to support secondary market liquidity, hence to avoid illiquidity premium, is to build up a significant issue size of a bond. For example, the French debt management office (AFT) tapped the Green OAT after the initial issuance and reached a EUR 20 billion value – similar to a benchmark size of conventional bonds. Similarly, the Dutch DMO (DSTA) has committed to issue its green bond to a benchmark size similar to conventional bonds (i.e. around EUR 10 billion for the DSTA).

Potential involvement of central banks in promoting the move towards a sustainable global economy is an important factor for supporting green finance. Recently, several central banks have expressed interest in incorporating sustainability factors into their reserve management frameworks (NGFS, 2019). However, it is unknown yet if sustainability will be integrated into the reserve management process, either explicitly by articulating sustainability as a defined purpose for holding reserves, or implicitly as a supporting aspect of existing policy purposes (Fender et al., 2019). If sustainability can be added to policy purposes of holding reserves, this might further vitalise the green bond market. Sovereign green bonds, with high credit quality and liquidity, can particularly benefit from such a policy move that might further encourage governments to issue green bonds to finance the large-scale public sector investment required to reach the goals of the Paris Agreement on climate change.

1.6.4. Size of sovereign green bond market will depend on public green investments

For any new instrument, outstanding volume is often essential for a market to develop. Despite its rapid growth, the size of the sovereign green bond market is quite small compared to traditional bonds. Outstanding green bond issuance, reaching EUR 43.5 billion in 2019, amounts to only 0.1% of all government marketable debt in the OECD area. Government debt, with conventional instruments, is issued to finance government deficits that cover a wide range of purposes, such as providing health care, education, infrastructure and justice services to the population, and maintaining public order and safety, whereas proceeds of green bonds can only be used for green purposes. Green eligible public investment in a government budget is often quite small relative to overall government borrowing needs. In this respect, public investments, which green bonds proceeds are meant to be dedicated, put a natural barrier to green bond issuance. Sovereign issuers, especially the ones with limited or decreasing funding requirements, have concerns about issuing a green bond may create a fragmentation in sovereign issuance structures and increase funding costs due to illiquidity premium. In order to address this concern, a few sovereign...
DMOs including Denmark and Germany have been looking into a new model of green issuance where a conventional bond and a green add-on can be traded separately.

Climate change is a growing concern in OECD countries, as evidenced by their adherence to international agreements (e.g. the Paris Climate Agreement). Nevertheless, few resources are dedicated to fight against climate change. Across OECD countries, overall government investments amounted to 7.7% of government expenditures (i.e. on average 3.1% of GDP), and investment in environmental protection represented only 4% of total investment in 2017 (OECD, 2019c). It should be noted that in addition to green investments, green eligible operating expenditures and tax expenditures can also be financed through the proceeds of sovereign green bonds (e.g. sovereign green bond frameworks of Belgium and the Netherlands). Against this backdrop, potential size of the sovereign green bond market will to a large extent depend on the size of government expenditures in green projects such as renewable energy, clean transportation and climate change adaptation.

Nevertheless, issuing a green bond is not the only way to promote the environmental, social and governance (ESG) initiatives of governments. DMOs, maintaining regular communication with both domestic and international investors as well as rating agencies, might benefit from adapting their communication and investor relations strategy according to rising interest in the ESG-related activities of governments. The 2019 OECD survey on primary market developments, which aims to capture sovereign issuers’ experiences and observations in primary markets, revealed that the majority of OECD countries observe an interest in governments ESG related activities from market participants such as investors and rating agencies. Furthermore, the issuers observe that investors attach more importance to the factors related to ‘governance’ in determining sovereign credit risk, relative to ‘environment’ and ‘social’ components, which seems to have indirect and more diffuse effects. Of the 19 responding DMOs, 11 considered ESG factors and adapted a somewhat a broader approach to ESG highlighting sustainability strategies in their communication and investor relations strategy (Annex A. OECD 2019 Survey on Primary Markets Developments). Many DMOs provide information on policies and reforms to strengthen institutional arrangements and governance, as well as government initiatives to promote sustainable development. It should be noted that although few resources are devoted to green projects, several OECD countries integrate environmental considerations across all policy domains of the budget, and they take various actions including reducing carbon emissions.18 Fourteen respondents including Israel, Portugal and Mexico consider ESG factors when making an instrument choice. Lastly, a few DMOs including Austria perform the function of an auctioneer of greenhouse gas emission allowances, in addition to their core functions.19

1.7. Global uncertainties call for continued vigilance in debt management

1.7.1. Managing roll-over risk is of paramount importance

Across global financial markets, in any direction that one chooses to look, there are significant uncertainties related to a number of factors including global growth, trade deal negotiations, Brexit process, the US elections and monetary policies. In addition to finance current budget deficits, sovereign debt management offices are tasked to refinance redemptions in the financial markets. In the OECD area, the medium and long-term debt redemption profile increased dramatically in the post-crisis period, but has stabilised around 7.5% of GDP in recent years (Figure 1.14 Panel A). In the next three years, governments will need to refinance around 40% of their outstanding marketable debt (Figure 1.14 Panel B). Among the G7 countries, the large volumes of scheduled redemptions in Italy following that of the United States and Japan are the most challenging. Emerging OECD countries have also substantial refinancing needs in the next three years, mainly due to shorter borrowing maturities. Against this backdrop, sovereign issuers, in particular the countries with heavy repayments alongside high new borrowing requirements, should remain vigilant against the global risks in the coming periods.

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Figure 1.14. Redemptions of central government marketable debt in OECD country groupings, 2007-2020

Panel A: As a percentage of GDP. Panel B: As a percentage of debt stock


As observed during the market turbulences that occurred in 2019, funding conditions may become vulnerable to sudden shifts in investor risk-on and -off sentiment. Investors seek safe assets in exchange for lower returns in times of heightened uncertainty in the markets. When market sentiment turns in such a risk-off mode, investors switch from perceived higher-risk bonds to safer bonds such as the US Treasuries. In such cases, managing refinancing risk for countries with heavy debt services becomes more challenging, as sudden deterioration in perceived market risks for sovereigns could lead repricing of sovereign risk and tightening of credit (OECD, 2019a). The following section discusses the relevance of building contingency funding tools for flexibility, being a transparent and predictable issuer, a solid relationship with the investor base, as well as two-way communication with wider market participants in stressed conditions.

1.7.2. Dealing with expected and unexpected event risks in debt management

Sovereign debt management offices (DMOs) can be characterised as regular and frequent issuers in securities markets all around the world. DMOs design and implement debt management programmes based on principles of transparency and predictability for the long-term benefits. Event risk, especially when it occurs prior to an auction, poses a challenge for transparency and predictability and could cause reputational damage if not well managed. Debt management preparedness for an event risk is crucial for ensuring not only continuity of government activities, but also smooth functioning of financial markets in critical times. In this respect, DMOs should remain vigilant in monitoring market developments and market participants carefully and closely in case of an event risk. Furthermore, they should regularly conduct business impact analysis to keep pace with the evolving risks and have an effective business continuity plan in case of event risks.

During its 2019 annual meeting, the OECD Working Party on Public Debt Management (WPDM) discussed the potential impact of events occurring during any fiscal year on auctions calendars and cash management as well as experience with pre- and post- response risk management strategies. Country experiences
revealed valuable information regarding the use of issuance programmes, contingency funding tools, and internal risk control and communication strategy, in addressing various event risks. In terms of addressing the event risk, they make a distinction between ‘known events’ and ‘unexpected events’.

First, expected events such as national and major CBs’ interest rate announcements, elections, referendums, major economic data releases as well as holidays can be considered when designing an issuance operations calendar. DMOs should try to avoid potentially market moving data releases and other scheduled external events as far as known and practicable. At the same time, it’s important to maintain flexibility to be able to make minor adjustments to account for dates of major events announced after the issuance calendar. For example, the US Treasury releases a tentative auction calendar for the next six months every quarter. This provides an opportunity to communicate shifts in the auction calendar well in advance. In this process, Treasury may also consult with Primary Dealers before releasing the auction calendar each quarter, in cases where there are short weeks with many auctions and several options to consider.

Second, risk management of debt operations, especially debt auctions, becomes more complicated when it comes to unexpected events (e.g. political developments, terror attacks, IT fails and natural disasters). It is important to allow, through in-year adjustments to the calendar, the ability to respond appropriately to unforeseen or changing circumstances. In this regard, adjusting auction calendars, having a contingency cash reserve, ability to issue T-Bills, clear decision process and business continuity plans in place are paramount. For example, a few DMOs including Canada and the US Treasury had to cancel and reschedule auctions due to the 9/11 attack in 2001. Similarly, several DMOs tweaked auction times due to occasional changes in central banks’ announcement dates. In addition to adjustments in auction calendars, keeping a liquidity buffer has proven useful for providing room for manoeuvre in case of an urgent and unexpected need for cash. A cash buffer allows the issuer to skip and manage auctions more comfortably when confronted with unexpected events. For example, the US Treasury, a frequent issuer, maintains a cash balance to cover five days of expected outflows, subject to a floor of USD 150 billion.

Third, communication with primary dealers and other market participants is a crucial element of an efficient risk management strategy during and after a stress event. DMOs use various documents (e.g. annual debt management strategy, quarterly and monthly issuance (auction) calendars, call for tenders, auction announcements) as regular tools for communicating their short and long range issuance planning. In times of stress, clear and timely communication of any adjustment to issuance program including by explaining the rationale of their actions plays an important role for limiting the reputational effect. Also, as soon as market conditions return to a normal situation, DMOs should return to the previously announced issuance guidance.

Lastly, building nationwide resiliency at a broader level and employing a strong internal risk control environment at a granular level to deal with these risks are important features of event risk management. The majority of event risks require a close co-ordination with other government bodies, especially with central banks and ministry of finances. Several countries (e.g. Canada, Germany and the US) adopt a multi-layered management approach to certain event risks such as disaster and cybersecurity risk. For example, in Canada, management of the risks associated with increased cyber threats is supported nationwide by an information-sharing and coordination programme, which is a public-private partnership involving the Bank of Canada, the six largest Canadian banks, and managers of designated payment systems and financial market infrastructures such as Payments Canada. Similarly, in the US, Office of Critical Infrastructure within the Treasury makes sure that systemically important banks are following best practices around resiliency and cyber security. Also, primary dealers are required maintain and test a geographically-dispersed disaster response site. In terms of internal risk management, operational capabilities of DMOs should be strengthened through business continuity plans and back-up contingency systems. Majority of DMOs in the OECD area regularly conducts business impact analysis in terms of economical, reputational and governance breach consequences of potential disruptions in business processes, and have enhanced back-up systems in place to handle critical functions such as funding operations and debt repayments.

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1.7.3. The transition away from IBORs

One of the important shifts expected in financial markets is the transition from interbank offered rates (IBORs) to a new set of risk-free rates (RFRs). For decades, interbank offered rates (IBORs) have provided a reference rate for the pricing of a wide range of financial contracts, including contracts for derivatives, loans and securities. Due to lack of underlying transaction data to support it, the UK Financial Conduct Authority announced in 2017 that they have reached an agreement with banks to keep submitting rates until the end of 2021, but beyond that date the existence of LIBOR is not guaranteed. In several countries, authorities have already started publishing rates intended to eventually replace the IBOR benchmarks (e.g. CORRA in Canada, SOFR in the United States, €STR in Europe, and SONIA in the United Kingdom). The authorities aim at introducing credible, transaction-based RFRs anchored in sufficiently liquid money markets.

The benchmark reform has significant implications for issuers of government bonds as IBORs have been used as a reference rate for various contracts and financing instruments. The transition, therefore, entails legal and operational risk for the issuers. In order to facilitate smooth and orderly transitions, sovereign DMOs need to scrutinise their financial contracts (e.g. ISDA protocols, loan and lending contracts), evaluate their operational readiness and adjust their IT systems for legacy transactions and new products. A survey of IBOR transition amongst the sovereign DMOs indicates that most DMOs that currently use IBOR-linked products have identified a transition path from IBOR to other reference rates for legacy contracts (Box 1.3). With regard to new RFRs, they consider new RFRs are well-suited or closely matched as the foundation for interest rate markets, but have concerns about near-term liquidity. In order to accelerate the adoption of RFRs in financial markets, a few sovereigns including the United States are currently considering issuing RFR-linked products in coming years.
Box 1.3. Are sovereign issuers ready for IBOR transition?

The UK Financial Conduct Authority announced that the interest rate benchmark LIBOR is expected to cease after end of 2021 and encouraged market participants to move away from LIBORs to alternative rates before this date. While the deadline for IBOR transition is approaching fast, sovereign issuers that currently use IBOR products or are planning to use new risk-free rates (RFRs) need to adapt their operations to this change in order to avoid potential operational and legal complications. Key work areas include documentation, legal considerations, system configuration and valuation impacts and settlement implications. In particular, legal arrangements such as ISDA protocols and loan/lending documents require amendments (e.g. fallback language, contract conversions) for legacy and new transactions. Also, back office systems (i.e. IT systems) should be prepared to maintain market access. The 2019 survey of IBOR transition amongst the DMOs revealed important insights regarding the relevance of benchmark reform for DMOs, state of market development for new RFRs, as well as their preparedness level to deal with this significant shift in the financial markets. Specifically,

I. Of the total 26 DMOs that responded to the survey, more than half (i.e. 62%) indicated that they currently issue or use IBOR-linked products. Derivatives were the most common IBOR-linked product type, followed by loans and debt securities.

II. Most DMOs are still in the early stages of assessing the RFR market, and only four out of the 26 responding DMOs are currently considering issuing RFR-linked products. Specifically, of the 16 DMOs currently issuing or using IBOR-linked products, two offices had plans to support RFR market development and another two DMOs were considering issuing RFR-linked products.

III. Regarding evaluation of RFRs as a benchmark, most DMOs consider that RFRs are well-suited or closely matched as the foundation for interest rate markets. However, debt managers are concerned about the near-term liquidity and robustness of the RFR market, and are less enthusiastic about issuing RFR-linked products.

IV. Most respondents stressed that no clear standards have yet emerged in the cash RFR markets, while more respondents appeared willing to say that some standards have evolved in the derivative RFR markets.

V. Ten out of the 16 DMOs who currently issue or use IBOR-linked products have identified a transition path from IBOR to other reference rates for legacy contracts. Most DMOs indicated that they need IT system modifications to accommodate RFR-linked trading, and examine legal challenges arising from the IBOR transition.

Source: The information provided in this box is mainly based on a survey of sovereign issuers’ preparedness about the “IBOR” transition coordinated by the US Treasury in 2019, and on general discussions held at the annual meeting of the OECD Working Party on Debt Management on 6-7 November, 2019.
References


Annex 1.A. Methods and sources

Definitions

- **Gross borrowing requirement** (GBR) for a year is equal to net borrowing requirement during that year plus the redemptions on the capital market at the beginning of the same year. Also, the (estimated) cash balance may affect the funding needs. In other words, the size of GBR in calendar year amounts to how much the DMO needs to issue in nominal terms so as to fully pay back maturing debt plus the net cash borrowing requirement through any issuance mechanism.

- **Net borrowing requirement** (NBR) is the amount to be raised for current budget deficit. While refinancing of redemptions is a matter of rolling over the same exposure as before, NBR refers to new exposure in the market.

- The funding strategy involves the choice of i) money market instruments for financing short-term GBR and ii) capital market instruments for funding long-term GBR. The strategy entails information on how borrowing needs are going to be financed using different instruments such as long-term, short-term, nominal, variable-rate, indexed bonds and FX-denominated debt.

- **Gross debt** 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 paid back to the holders of the debt. Redemptions refers 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 36 countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

- The G7 includes seven countries: Canada, France, Germany, Italy, Japan, United Kingdom and the United States.

- The OECD euro area includes 17 members: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain.

- In this publication, the Emerging OECD group is defined as including five countries: Chile, Hungary, Mexico, Poland and Turkey.

- The euro (€) is the official currency of 19 out of 28 EU member countries. These countries are collectively known as the Eurozone. The Eurozone countries are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain.

Calculations and data sources

- Standardised gross borrowing requirements (GBR) as a percentage of GDP are calculated using nominal GDP data from the *OECD Economic Outlook, Volume 2019 Issue 2*, November 2019.
• Debt is measured as the face value of current outstanding central government debt. Face 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.

• To facilitate comparisons with previous versions of the Outlook, figures are converted into US dollars using exchange rates from 1 December 2009, unless indicated otherwise. Where figures are converted into US dollars using flexible exchange rates, the main text refers explicitly to that approach. Source: Refinitiv. The effects of using alternative exchange rate assumptions (in particular, fixing the exchange rate versus using flexible exchange rates) are illustrated in Figures 1.3 and 1.4 of Chapter 1 of the Sovereign Borrowing Outlook, 2016.

• All figures refer to calendar years unless specified otherwise.

• 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 2019 and/or 2020, using publicly available official information on redemptions and central government budget balances.

• Negative-yielding debt calculations in Figure 1.8 (Panel B) are based on all issuances and re-openings of fixed-rate bonds (i.e. data excludes: short-term instruments, indexed linked, floating rate instruments and strips). Data covers the period January to November 2019 and is sourced from Refinitiv.

• The empirical study of negative-yielding debt between 2014 and 2019 (figure 1.10) was an update to the analysis that can be found in Chapter 2 of the Sovereign Borrowing Outlook, 2017 where its detailed methodology can be seen in its Annex 2. A1. Having followed this methodology, broadly speaking summarised as, excluding short-term issues and STRIPS and using Refinitiv data shortlist countries to investigate further on a more detailed an auction result basis. The countries included were: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Latvia, Lithuania, Netherlands, Poland, Spain, Sweden and Switzerland.

• The average term-to-maturity data in Figure 1.6 is not strictly comparable across countries. Some countries may exclude some securities (like short-term debt) whilst others may include them. The following notes were received from each country:

<table>
<thead>
<tr>
<th>Country</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Weighted average term to maturity calculation includes Treasury Bonds, Treasury Indexed Bonds and Treasury Notes. Security weightings are based on the face value of each instrument. All marketable debt in Chile corresponds to Bonds. All calculation as of December 31st of each year. Some of them consider amortization with maturity January, 1st of the following year.</td>
</tr>
<tr>
<td>Chile</td>
<td>Includes central government marketable debt only, excludes other levels of government.</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Marketable central government debt excludes savings government bonds (retail bonds).</td>
</tr>
<tr>
<td>Estonia</td>
<td>Includes central government marketable debt only, excludes other levels of government.</td>
</tr>
<tr>
<td>Finland</td>
<td>This is the ATM for the central government debt, excluding no securities at the end of 2019 and 2020.</td>
</tr>
<tr>
<td>Germany</td>
<td>Excludes swap effects, maturities of inflation-linked securities are weighted by 0.75 %</td>
</tr>
<tr>
<td>Greece</td>
<td>The above-mentioned data refer to Long Term marketable debt securities (more than 1 year original maturity) and excludes Treasury Bills.</td>
</tr>
<tr>
<td>Hungary</td>
<td>Data excludes retail securities, locally issued FX bonds, loans, and from 2018 a bond series held by the National Bank of Hungary (only negligable amount). Data includes cross-currency swaps.</td>
</tr>
<tr>
<td>Iceland</td>
<td>Excludes swap effects.</td>
</tr>
<tr>
<td>Ireland</td>
<td>The estimated ATM for Ireland reflects bonds, Euro Commercial paper and Irish Treasury Bills. Inflation linked bonds and some ultra-long maturity notes issued since 2016 are excluded on the basis that they were issued as private placements. The total o/s for these products at end-2019 stood at just above €1.5bn, c. 1.2% of the total marketable debt o/s.</td>
</tr>
</tbody>
</table>
Italy | No security has been excluded; swap effects are included.
Japan | (Note) MOF announces ATM based on Fiscal Year, not Calendar Year. Figures from 2007 to 2018 exclude saving bonds. Figures of 2019 and 2020 are estimated and include saving bonds.
Netherlands | The information in the table is based on the data of T-bill and Bonds.
New Zealand | The calculation is based on all NZ government marketable securities including Nominal Bonds, Inflation-Indexed Bonds, and Treasury Bills. The Calculation excludes the securities held by NZ Reserve Bank and Earthquake Commission.
Norway | Includes all outstanding Treasury bills and government bonds
Portugal | Excludes securities issued for collateral purposes.
Sweden | Marketable debt securities include:
- Government bonds
- Inflation-linked bonds
- Treasury bills
- Public bonds in foreign currency
- Commercial paper in foreign currency
Switzerland | Outstanding marketable debt, excluding:
- own tranches not yet issued
- securities for cash management purposes
- swap effects
Turkey | Weighted average term to maturity (ATM) figures reflects central government marketable debt.
United Kingdom | Treasury bills for cash management purposes, DMO's gilt holdings and undated gilts are excluded from the calculation of the weighted average term to maturity.

Notes

1 The cut-off date for data collected through the Survey on Central Government Marketable Debt and Borrowing conducted by the OECD Working Party on Debt Management and other data considered in this chapter was December 2019.
2 Average term-to-maturity (ATM) is useful for measuring and identifying refinancing risk. However, it does not provide any information on details of redemption profiles (e.g. concentration of repayments). Generally, ATM is not considered as strategic target indicator, rather it is a result of funding strategies.
3 Sovereigns with strong fiscal fundamentals and market liquidity might benefit from shortening borrowing maturities in order to take advantage of very low short-term rates (Maravalle and Rawdanowicz, 2018).
4 Operations related to raising, managing and retiring government debt are carried out by a debt management office, treasury, ministry of finance and central bank. For example, the UK Debt Management Office; Deutsche Finanzagentur; debt office within the US Treasury, Agence France Trésor, Dipartimento del Tesoro in Italy or Ministry of Finance in Japan. In this publication, they are referred as debt management offices (DMOs).
5 Term-premium can be defined as extra returns demanded by investors to compensate for risks (e.g. greater exposure to interest rate and inflation volatility relative to investing in short-maturity bills) associated with long-term bonds.
6 This study excludes Treasury-Bills considering that the purpose of short-term debt issuance varies from country to country (e.g. liquidity management and debt management).
7 BIS (2018) suggests that compared to banks, insurance companies and defined benefit pension funds are relatively more vulnerable to falling interest rates because of their negative duration gaps. As declining
interest rates would push up the present value of their liabilities more than that of their assets, this leads these investors to experience more pronounced reductions in profitability and balance sheet positions.

8 Low yields influence insurance companies through two channels: i) income channel indicate that net cash flow from paid premiums and maturing investments needs to be gradually re-invested at lower rates ii) balance sheet effect is a valuation effect occurs as low rates induce increases in the values of both assets and liabilities.

9 For example, in Japan, the share of bonds with 20-year and more in total debt portfolio has increased substantially from 2.7% in 2008 to around 12% in 2019, largely in response to increased demand for super-long JGBs.

10 Compared to the previous year, the DMO of Germany is expected increase money market issuances of EUR 19 billion in 2020 and intends to issue new Bubills every month in 2020. (Source: https://www.deutsche-finanzagentur.de).

11 Also, the US Treasury introduced a new benchmark 2-month bill in October 2018.

12 In the case of Sweden, on-lending to the Riksbank is included in the reporting of marketable debt. Since 2009, the debt office has borrowed on behalf of the Riksbank to strengthen the foreign exchange reserve. SEK 243 billion of the SEK 262 billion in foreign currency marketable debt in December 2018 was on-lending to the Riksbank.

13 This includes gold bonds and gold lease certificates issued by Turkish government since October 2018.

14 The introduction by the International Capital Market Association (ICMA) of the Green Bond Principles in 2014, encompass the use of proceeds; the process for project evaluation and selection; the management of proceeds; and reporting, paved the way for government green bond issuance.

15 For example, a survey of investor interest in the Green OAT by the French Treasury revealed that the investors bought the bond because of its green credentials accounted for total investors 65% in 2018, and 52% in 2019. This finding confirms that green bonds attract not only ESG investors, but also conventional fixed income investors. (Source: https://www.aft.gouv.fr)

16 The DTSA sold 33% of 20-year green bond to pension funds and insurance companies in May 2019.

17 Reduced liquidity of government securities impairs the price discovery process in the secondary market and translates into higher yields through a liquidity premium in primary markets which, in turn, increases borrowing costs for sovereigns (OECD, 2018).

18 In most OECD countries, climate change is reflected in the budget programmes of the ministry with the lead responsibility. For example, some countries, such as Canada, Finland and Ireland reflect on climate change systematically across budgetary programmes (OECD, 2019c).

19 In an effort to fight climate change, emissions trading is emerging as a key instrument in the drive to reduce greenhouse gas and carbon dioxide emissions. The EU established emissions trading system (EU ETS) in 2005.