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.

This booklet reproduces the executive summary and chapter one of the forthcoming 2018 edition of the *Outlook*. Based on data collected through a survey on the borrowing needs of OECD governments, it provides an overview of, and outlook for, sovereign borrowing, deficits and debt in the OECD area for the period 2008-2018. It examines net and gross borrowing needs of OECD governments in the context of fiscal policy challenges and developments. The cut-off date for data collected through the survey was mid-November 2017 and the cut-off date for other data considered in this report was December 2017.

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Executive summary

Nearly a decade after the outbreak of the financial crisis, sovereign debt figures remain at historically high levels while elevated debt service ratios pose a significant challenge against a backdrop of continued fiscal expansion in most OECD countries.

Sovereign debt across the OECD area has been rising significantly since the global financial crisis (GFC), albeit at a slower pace in recent years compared to the period 2008-2012. Looking ahead, OECD governments are expected to borrow approximately USD 10.5 trillion from the markets in 2018, similar to 2017. In line with the borrowing figures, central government marketable debt is expected to increase slightly from USD 43.6 trillion in 2017, to around USD 45.0 trillion in 2018. This pattern reflects the continued expansionary stance of fiscal policy in major OECD countries in recent years.

While total borrowing requirements for the OECD area have been stable, sovereign debt burdens remain at elevated levels of over 70%. The 2018 outlook for debt-to-GDP ratio is projected to be 73%, slightly lower than 2017, mainly owing to robust economic growth expectations. The November 2017 edition of the Economic Outlook projects 2.4% economic growth, supported by fiscal policy stimulus, for the OECD area in 2017 and 2018.

Overall, risk-based debt management strategies implemented in most of the OECD area helped governments to achieve relatively well-structured debt portfolios. Nevertheless, the high level of debt redemption profiles observed following the GFC is expected to persist, primarily due to the increasing refinancing burden from maturing debt combined with continued budget deficits in most OECD countries. Total debt service of OECD governments for the next three years is around 40% of the outstanding marketable debt, one fifth of which is due in the next 12 months. That said, high debt service ratios pose significant challenges in terms of re-financing risks for sovereign debt management.

The funding environment has been relatively favourable in major OECD countries, enabling governments to finance borrowing requirements at low cost.

The long era of low interest rates, along with stable market conditions, have created a buoyant funding environment for sovereign issuers in major OECD countries. This, in turn, has enabled governments to finance borrowing requirements at low cost. For example, 10-year bond yields in the United States and Japan, the two largest issuers in the OECD area, were below 2.5% and 0.1% respectively during the past two years, as of December 2017. Furthermore, interest rate-growth differential has been favourable in recent years and has facilitated sustained historically-high debt burdens in most OECD countries. Nevertheless, the current favourable funding conditions may not be a permanent feature of financial markets.

In terms of funding strategies, OECD governments have leaned steadily towards long-term financing instruments in recent years. The share of long-term borrowing in central government marketable debt is estimated to reach around 90% in 2017 and to continue to rise gradually in 2018.
Moreover, the average term-to-maturity ratio for the OECD area rose to about eight years in 2017, and reached unprecedented levels in several countries, including Austria, Belgium, Chile, Japan, Mexico and the United Kingdom. This trend is mainly driven by three factors: Firstly, sovereign debt managers facing significant borrowing requirements aim to lengthen borrowing maturities to mitigate rollover risk. Second, ultra-low interest rates accompanied by low term-premiums which have changed the cost-risk trade-off between short-term and long-term borrowing. Lastly, from an investor perspective, beside the natural investor base consisting of insurance companies and pension funds, a broader spectrum of investors searching for positive yields has created additional demand for long-term bonds in recent years.

**Sovereign debt managers take a long-term perspective and carefully consider various parameters including investor demand, additional costs, and impact on existing instruments when making a decision on a new instrument.**

The set of sovereign borrowing instruments has expanded over time. Floating-rate and inflation-linked securities have become part of the regular issuance choices of sovereign issuers during the past few decades, in addition to traditional instruments such as zero coupon and fixed-rate bonds. In recent years, alternative approaches to sovereign borrowing, such as green bonds, sukuk, ultra-long bonds and GDP-linked bonds, have been increasingly in the spotlight. This edition of the Outlook describes experiences and views on alternative approaches, following a survey of sovereign debt managers undertaken in 2017.

The well-defined objective of sovereign debt management is to minimise the cost of financing, subject to a prudent level of risk. Accordingly, sovereign debt managers take various cost and risk factors into consideration when issuing a new instrument (e.g. investor demand, additional costs due to novelty and liquidity premium, impact on existing instruments, investor diversification), while striving to support development and maintenance of efficient local bond markets. Against this backdrop, debt management offices (DMOs) of some OECD countries have issued new borrowing instruments, such as green bonds, sukuk and ultra-long bonds, although these instruments were adopted in only a few cases as part of regular issuance programmes. Proposals have also been made by academics and some policy-makers to consider issuing GDP-linked bonds, although no DMO reported having considered issuing such bonds.

**Sovereign debt managers have many reasons to desire liquid bond markets and have many ways to support them.**

Sovereign debt managers have a vital interest and a great responsibility in continuous, well-functioning government debt markets, since liquidity of government bonds is an important contributing factor in minimising sovereign borrowing costs. In fact, government bond markets have continued to evolve in a number of different ways since the GFC. The combined effects of new regulations, advances in financial technology, as well as macro-economic factors in the post-crisis environment, have reshaped market liquidity in several jurisdictions. Against this backdrop, debt managers take action and implement policies in order to promote efficiency in the government securities market. Sovereign issuers’ concerns over secondary market liquidity of government bonds were discussed in previous editions of the Outlook. This edition provides a deeper insight into the key driving forces behind market liquidity conditions in general, and the measures taken by DMOs to enhance liquidity of bonds, in particular.
Chapter 1

Sovereign borrowing outlook for OECD countries

Chapter 1 examines sovereign borrowing, deficits and debt developments in the OECD area from 2007-2018. It presents current levels and the outlook for gross and net borrowing needs as well as redemption and debt stock profiles. The unprecedented changes in country debt-to-GDP ratios over the past decade are examined and the implications of financing conditions for sovereign debt management, within the context of monetary and fiscal developments and prospects, are discussed.

The chapter also looks at recent trends in sovereign debt credit quality in OECD countries. Deeper insight is provided by a discussion of a measure to quantify and assess credit quality of sovereign bond issuance. The last section provides a brief description of the challenges facing sovereign funding under stressed conditions, as well as the policy tools available including liquidity buffer practices, to mitigate short-term refinancing and liquidity risks.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.
1.1 Introduction

This chapter provides an outlook and overview of sovereign borrowing, deficits and debt in the OECD area for the period 2008-2018. It looks at net and gross borrowing needs of OECD governments in the context of fiscal developments, and considers recent trends in government debt-to-GDP ratios in the current funding environment, as well as implications for funding strategies. Finally, the chapter examines recent changes in sovereign debt credit quality in OECD countries and provides a brief discussion of potential challenges facing sovereign funding under stressed conditions.

Key findings

- In gross terms, OECD governments are expected to borrow approximately USD 10.5 trillion from markets in both 2017 and 2018, to finance budget deficits, as well as debt redemptions. In net terms, the amount of new financing is expected to reach USD 1.7 trillion in 2017 and USD 1.4 trillion in 2018.

- As a percentage of GDP, projections signal a slight decline in gross borrowings from 17.8% in 2017 to 16.9% in 2018, while the fiscal policy stance continues to support and broaden the recent economic recovery in major OECD countries.

- Outstanding central government debt-to-GDP for the OECD area which soared in the wake of the global financial crisis (GFC), has recently been rising moderately. The debt burden, which has remained between 73.5-74.0% of GDP in the OECD area over the past five years, is projected to slightly decline from 73.7% in 2017 to 72.9% in 2018, mainly owing to robust economic growth expectations.

- The elevated level of debt redemption profiles observed in the aftermath of the GFC is expected to persist, primarily due to the increasing refinancing burden from maturing debt combined with continued budget deficits in most OECD countries.

- Market conditions have been favourable over much of the period, generally with low interest rates, and low volatility, which have helped facilitate funding of elevated gross borrowing needs. While downside risks in the short-term are limited, given extended debt maturity profiles and strong growth outlooks, refinancing risks in sovereign debt may pose significant challenges in the long term if market conditions deteriorate.

- The risk-based debt management framework followed by most Debt Management Offices (DMOs) has helped to achieve strategic debt targets and has thus resulted in relatively well-structured debt portfolios in OECD countries over the past decade.

- Credit quality of sovereign bond issuance in the OECD area, notably in G7 countries, has been declining over the past decade due to deteriorated sovereign credit ratings. However, this development has not been reflected in the cost of borrowing.

- In the event of stressed market conditions, DMOs develop contingency funding plans, including maintaining a liquidity buffer, funding from money markets (e.g. T-Bills) and drawing on credit line facilities at central banks and commercial banks to mitigate short-term refinancing risk and liquidity risk.
1.2 Government borrowing needs and outstanding debt are rising slightly

The 2017 OECD Survey on Central Government Marketable Debt and Borrowing shows stabilisation of government borrowing requirements and outstanding debt figures in recent years, as compared to 2008-2012. Starting with flows, central government marketable government borrowing requirements in the OECD area have increased slightly since 2016, following a decline observed from 2013-2015 (Figure 1.1). OECD governments are projected to borrow approximately USD 10.5 trillion from the markets both in 2017 and 2018. This pattern reflects the stance of fiscal policy, which is set to be eased further to support and broaden economic recovery in major OECD countries.

While gross financing requirement figures contain financing needs for annual debt redemptions, as well as for budget deficits, net borrowing requirements represent additional exposures in the market. Net borrowing requirements for the OECD as a whole registered a slight increase in 2017, but are estimated to decrease to USD 1.4 trillion in 2018.

As for outstanding stocks of debt, positive net borrowing requirements reflect the continued growth of central government marketable debt. However, outstanding central government debt, which soared in the wake of the GFC, has recently been rising more moderately. Specifically, nominal central government marketable debt expanded 22% between 2012 and 2017, compared to 44% between 2008 and 2012. It is further expected to rise by just over 3% from USD 43.6 trillion in 2017, to around USD 45.0 trillion in 2018 (Figure 1.1).

Figure 1.1. Fiscal and borrowing outlook in OECD countries, 2008-2018

Notes: GBR = gross borrowing requirement, NBR = net borrowing requirement. General government deficit is derived from general government net lending as published in the OECD Economic Outlook No. 102 for all OECD countries, except for Chile, Mexico and Turkey for which the source is the IMF World Economic Outlook (October 2017). Figures are calculated based on data in national currencies using exchange rates as of 1st December 2009.

Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and OECD calculations.
Figure 1.2 illustrates gross borrowing requirements as a percentage of GDP – rather than in absolute amounts – for the OECD area as a whole and for selected OECD groupings. Gross borrowing ratios, which jumped 6 points from 2008-2009 due to significant deterioration of fiscal balances in the wake of the GFC, have been decreasing since then. In 2017 the gross borrowing ratio is expected to remain just under 18%, similar to the previous two years. Amongst selected OECD groupings, “G7” countries’ – where ratios are already relatively high – gross borrowing requirements for 2017 slightly surpassed the 2016 level.

Figure 1.2. Central government marketable gross borrowing in OECD countries, 2008-2018
As a percentage of GDP

Notes: Central government marketable GBR without cash. Values of marketable GBR and GDP have been aggregated by using fixed exchange rates, as of 1st December 2009, for all years. See Annex 1.A1 for a list of countries in each country group.
Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and author calculations.

The 2018 outlook suggests a moderate decline in gross borrowing in all country groupings, totalling 16.9% of GDP and is projected to be more visible in the “Euro area”. Overall, the improved figures reflect robust economic growth combined with a stable level of nominal gross borrowing needs. The OECD Economic Outlook (published in November 2017) shows an upward revision in growth expectations for the OECD area to 2.4% for 2017. A similar strong and synchronized economic recovery is projected for 2018, against the background of fiscal easing underway in many OECD countries (OECD, 2017c). In addition to the fiscal easing, the Outlook also highlights the importance of stepping up the pace of implementing structural reforms in labour market and product markets to improve longer-term growth prospects and enhance the overall effectiveness of policies.
1.3 A closer look at the changes in debt-to-GDP ratios reveals significant differences among countries

The GFC took a heavy toll on public finances across the OECD area, pushing debt-to-GDP ratios from 50% in 2007 to 62.2% in 2009 (Figure 1.3). The ensuing European debt crisis further deteriorated gross debt-to-GDP ratios in the OECD to 71.8% in 2012, particularly in G7 and Euro area countries. This means that the average debt burden jumped more than 40% in less than five years in OECD economies (except emerging OECD). Thereafter, the debt burden remained between 73.5-74.0 % of GDP in the OECD area. Despite fiscal consolidation efforts in 2014-16, which helped to considerably reduce net financing needs, fiscal policies in many countries have remained expansionary to support weak economic growth – with persistent recessions in some economies.

The OECD Economic Outlook (November 2017 edition) expects a fiscal easing of around 0.6% of GDP to occur in the median OECD economy over 2017-19, along with strengthened growth prospects. While interest rates on government debt remain less than GDP growth in most OECD countries, this in turn limits a further rise of debt burden (e.g. Japan, the United Kingdom). In this regard, the debt-to-GDP ratio for the OECD area is projected to decline slightly from 73.7% in 2017 to 72.9% in 2018.

Figure 1.3. Central government marketable debt in OECD countries, 2007-2018
As a percentage of GDP

Notes: Central government marketable debt without cash. As of 1 December 2009, values of marketable debt and GDP have been aggregated by using fixed exchange rates for all years. See Annex 1.A1 for a list of countries in each country group.

Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and author calculations.

A closer look at changes in debt-to-GDP ratios reveals significant differences across countries. Figure 1.4 presents changes in debt ratios by country between 2007 and 2012, compared to the period 2012-2017. The results in the first period indicate that public debt burdens deteriorated for the most part in the OECD area, except for a few countries, including Sweden and Switzerland. In contrast, changes in debt-to-GDP ratios in the
subsequent span show a more diverse profile. While some countries successfully managed to put their debt trajectory back on a sustainable path, others were still on an expansionary fiscal path. In the former group, the Czech Republic, Denmark, Iceland and New Zealand successfully brought their respective debt-to-GDP ratios down to – or closer to – pre-crisis levels without blocking economic recovery. In contrast, debt burdens have continued to build up further during the past five years in some countries, including: Australia, Chile, France, Italy, Portugal, Slovenia, Spain, and the United States – in some cases even above 100% of GDP.

Figure 1.4. Debt stock to GDP, percentage point changes over the last 10 years

Notes: Based on marketable debt stock.
Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and author calculations.

The economic growth rate is one of the key determinants of long-term debt sustainability for countries with a high government debt-to-GDP ratio. This puts an even greater emphasis on structural policy efforts (e.g. productivity-enhancing reforms) to lessen dependence on expansionary fiscal policies to boost economic growth. The OECD
Economic Outlook (November 2017) emphasises that fiscal policy measures need to be undertaken to support potential long-term growth which underpins fiscal sustainability.

1.4 The favourable funding environment may not be permanent

Recently, financial markets have provided a favourable funding environment with exceptionally low interest rates and low volatility globally. This has several important implications for sovereign debt dynamics, particularly in terms of the cost of sovereign funding. Sovereign funding costs in most OECD countries have fallen to very low and even negative levels – up to the 10-year maturity segment – as demonstrated by low term-premia, as well as a downward shift in expected future rates (Figure 1.5). Some sovereign DMOs, including France, Germany and Japan, have issued negative-yielding debt and received premiums from these issues in recent years.³

In terms of interest expenses on debt, OECD governments have paid less in recent years, although sovereign debt levels are high, and even on an upward trend in some OECD countries (between 2011-17) (Figure 1.5). However, it should be noted that as the average-term-to-maturity (ATM) of outstanding marketable debt in OECD countries has been reaching eight years, the impact of falling interest rates on government interest expenses has been relatively limited in recent years.

Prolonged low interest rates have facilitated the financing of budget deficits and the re-financing of existing debt in recent years (Figure 1.6.). That said, it also makes economic growth, catalysed largely by expansionary fiscal policies, less costly and more attractive, without complicating fiscal indicators. As such, the decline in interest rates somewhat offsets the impact of the increase in the debt-to-GDP ratio (OECD, 2017c).

Figure 1.5. Central government marketable debt and long-term debt interest repayments as a percentage of GDP and long-term interest rates, 2008-2017

Notes: OECD area estimates. Long-term interest rates derived from long-term interest rate on government bonds calculated as a GDP weighted average.

Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and author calculations.
Figure 1.6. Government benchmark interest rates in OECD countries, 2006-2017

Notes: Interest rates in percentages. Charts show the evolution of several metrics (minimum, maximum, 25th percentile, 75th percentile, median) of 3-year, 5-year and 10-year benchmark government bond yields, calculated for the following group of countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Netherlands, New Zealand (5-year and 10-year yields only), Norway (5-year and 10-year yields only), Poland, Portugal, Spain, Sweden (5-year and 10-year yields only), Switzerland, United Kingdom and the United States. The grey area shows the range of minimum and maximum values among all the included countries. 

Source: Thomson Reuters and author calculations.
One of the key factors behind the favourable financing conditions is the strong monetary-easing stance that has been maintained by key central banks over the past decade. Specifically, three large central banks, plus the Swiss and Swedish central banks, have engaged in quantitative easing programmes and now hold substantial amounts of government bonds in their portfolios. Today, as large buyers in several government securities markets, these central banks hold more than USD 10 trillion in government debt. As of June 2017, the share of central banks’ holdings in marketable government debt reached 40% in Japan and 30% in the United Kingdom, Germany and Sweden (See Chapter 3 for details). These figures indicate the scale of the challenge that debt managers may face in terms of a demand shortfall that will need to be filled during the unwinding process.

Against the backdrop of accommodative monetary policy, set to remain in force in most major economies for the near-term, eventual normalisation of monetary policy measures would lead economic actors to adjust their expectations as central banks become net sellers of government bonds. From a debt management perspective, the drawdown of central banks’ sovereign bond portfolio will result in increased funding needs from other investors. Also, depending on central banks’ communication policies, this shift might create uncertainty for medium-term borrowing requirements. This process could put upward pressure on sovereign premia and adversely affect market conditions, especially if the unwinding action took place earlier or faster than expected. In fact, leading economists argue that the monetary policy normalisation process needs to be calibrated diligently against the financial market response and the need to support growth along with inflation expectations (OECD 2017c, BIS 2017).

While bond-buying programmes are still being pursued by the Bank of Japan (BoJ), and to a lesser extent by the European Central Bank (ECB), the US Federal Reserve (Fed) had already started raising its policy rate in December 2015 and announced the start of a balance sheet normalisation programme in September 2017. There are a number of potential scenarios that the Fed may pursue but the speed of normalisation and ultimate size of the balance sheet are as yet unclear (See figure 1.7).

Nevertheless, after experiencing dramatic market turbulence following Bernanke’s testimony in May 2013, central banks are expected to be more cautious when reacting to monetary policy changes (Bernanke, B.S. 2013). It is important to note that an earlier or faster than expected unwinding of accommodative monetary strategies could shake government securities markets by pushing up longer term interest rates more strongly than desired. Similarly, financial markets often react to delayed or postponed fiscal adjustments, as well as to sudden mood swings, in a non-linear fashion thereby creating the risk of a cliff effect where markets suddenly lose confidence in the government's ability to repay debts (OECD 2014).

In this regard, public finances need to be managed prudently during more favourable times to ensure that there is sufficient room for fiscal manoeuvre when needed, without putting public finances on an unsustainable path. This is particularly relevant given the rise in the stock of debt in recent years, as high levels of outstanding government debt raises the sensitivity of future debt interest costs to changes in interest rates. Generally, macroeconomic policies should aim to strengthen longer term growth potential and reduce vulnerability. This would also create an opportunity for rebuilding fiscal buffers which are critical for governments with high debt burdens.
Against this backdrop, and having discussed potential challenges and policy responses during the November 2017 annual meeting of the OECD Working Party on Debt Management, sovereign debt managers are well aware that current favourable funding conditions may not be a permanent feature of financial markets. For example, market participants were surprised by the results of some recent political events, such as the UK Brexit referendum in June 2016, presidential elections in the United States in November 2016 and in France in April 2017 and sovereign debt managers in several jurisdictions were confronted with market swings. Risk premia (spreads) widened during these periods, but returned to normal levels afterwards. In response to periods of political stress, some DMOs adjust their issuance calendar and instrument choices according to market conditions. The impact of political developments on sovereign yields is usually temporary and, overall, debt managers view yields as being more sensitive to monetary policy actions than to political events.

In cases of unexpected market stress (e.g. sudden upsurge in funding costs, increasing volatility) due to one or more risks occurring (e.g. an earlier or faster-than-expected exit from unconventional monetary policies, delayed or postponed fiscal adjustments), sovereign debt management becomes much more complicated, particularly funding operations, and requires a set of readily available contingency plans. The last section discusses policy tools for debt management, such as investor relations; contingency funding plans, such as liquidity buffers; and medium-term risk-based funding strategies to address funding/refinancing risk.

1.5 Funding strategies to achieve well-structured debt portfolios

The main objective of government debt management is typically defined as “to minimise costs of meeting the government’s financing needs, taking risks into account”.

Figure 1.7. Projections of the US Federal Reserve balance sheet, 2006-2025

Notes: Figures for 2006-2016 are historical settled holdings. Smaller and larger liabilities projections are based, respectively, on the 25th percentile and 75th percentile responses to a question about the size and composition of the Federal Reserve’s long-run balance sheet in the New York Fed’s June 2017 Survey of Primary Dealers and Market Participants. Source: OECD Economic Outlook No. 102.
When constructing a medium-term funding strategy, debt managers will base it largely on this well-defined objective and take a risk-based approach. This may include the following actions: i) identification of cost and risk features (e.g. interest rate, refinancing, liquidity and currency risks) of the existing debt portfolio; ii) potential medium- and long-term outcomes of a range of alternative funding strategies (e.g. constructing an efficient frontier by using scenario analysis or simulation models); iii) consideration of expert judgement on market constraints (e.g. investor demand, legal restrictions etc.) and potential market challenges and opportunities.

The use of the risk-based framework by DMOs in OECD countries has helped them to achieve strategic debt targets thereby generating relatively well-structured debt portfolios. Table 1.1 displays the evolving composition of gross marketable borrowings in the context of maturity, interest rate and currency choices between 2008 and 2017 and the outlook for 2018. Overall, funding choices have changed in favour of fixed-rate instruments with long-term maturities denominated in local currency. This means that sovereign debt portfolios as a whole have become more resilient to potential market risks.

Emerging market debt managers managing sovereign debt portfolios and executing funding strategies are typically facing greater and more complex risks than their counterparts in more advanced markets primarily due to a lack of deep and liquid local bond markets (OECD, 2005). Currency risk is the most important market risk for emerging economies where local currency bond markets tend to be less developed and foreign currency debt is a significant source of financing. Against this backdrop, the share of foreign currency borrowing has diminished by half over the past decade in the OECD area (Table 1.1), but is still an important part of borrowing strategies in several emerging economies. For example, in 2016 more than 20% of annual sovereign borrowing by Chile, Mexico and Turkey was issued in foreign currency. In recent years, the share of non-residents’ holdings in local currency government debt has increased significantly in several countries (e.g. over 30% in Latvia, Mexico, and Poland in 2017), implying a higher sensitivity to global market volatilities.

Table 1.1 Funding strategy based on marketable gross borrowing needs in OECD area, 2008-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Short Term (T-bills)</th>
<th>Long Term</th>
<th>Fixed rate</th>
<th>Index linked</th>
<th>Variable rate</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Term (T-bills)</td>
<td>55.5</td>
<td>45.9</td>
<td>44.3</td>
<td>45.0</td>
<td>45.0</td>
<td>43.4</td>
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<td>Long Term</td>
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<td>55.0</td>
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<tr>
<td>Fixed rate</td>
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<td>51.3</td>
<td>50.2</td>
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<tr>
<td>Index linked</td>
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<td>1.8</td>
<td>2.3</td>
<td>2.9</td>
<td>3.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Variable rate</td>
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<td>1.0</td>
<td>0.9</td>
<td>0.7</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Other</td>
<td>1.0</td>
<td>1.1</td>
<td>1.0</td>
<td>0.9</td>
<td>0.7</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Memo item: Percentage of long-term debt in:

- Local currency: 98.8, 98.6, 99.2, 99.2, 99.0, 98.9, 98.9, 98.9, 98.7, 99.2, 99.4
- Foreign currency: 1.2, 1.4, 0.8, 0.8, 1.0, 1.1, 1.1, 1.3, 0.8, 0.6

Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; Thomson Reuters, national authorities’ websites and author calculations.
The rise in shares of fixed-rate, long-term issuance in gross marketable borrowing indicates that the prolonged low-interest rate environment in several OECD countries has enabled debt managers to lengthen average maturity of issues. The trade-off between expected costs and risks of different funding choices has changed due to persistent flattened yield curves in most sovereign bond markets. Looking for ways to mitigate refinancing risks, DMOs of several countries, including Canada, France, Germany, Italy, Japan, Spain and the United States, and have been quite active in issuing securities with maturities of 30 years or more. Furthermore, Austria, Belgium, Ireland and Mexico have sold ultra-long bonds with 100-year maturity.7 As a result, not only the volume, but also the average maturity of long-term issuance has significantly increased. In turn, this development has lengthened the ATM of outstanding debt and alleviated concerns over refinancing risk, and is discussed in the following section.

In addition to traditional instruments, such as zero coupon and fixed-rate bonds over a range of maturity segments, inflation-linked and variable-rate securities are also part of regular issuance choices in the OECD area and reached 5.7% of long-term borrowing in 2017. Also, some DMOs have issued alternative instruments, such as green bonds (France and Poland) and sukuk (Luxembourg, Turkey, and the United Kingdom), but these instruments were adopted only in a few cases as part of regular issuance programmes. Chapter 2 looks at the driving forces behind alternative instruments; key considerations for sovereign issuers (e.g. liquidity, investor demand, legal and operational risks) in general; DMOs’ experience with green bonds and sukuk and their thoughts on GDP-linked bonds in particular.

1.6 A relatively high level of longer-term debt redemption profile

As discussed in previous sections, gross debt issuance in the OECD area has steadily increased during the past decade, mostly through long-term instruments. As a result of lengthening borrowing maturities, the maturity structure of central government debt, which declined sharply at the height of the GFC in 2008, has improved significantly since then.8 The share of long-term debt in central government marketable debt reached 90% in 2015 and is projected to rise gradually in 2018 (Figure 1.8).

One of the important implications of lengthened debt maturity profile is the increased ATM ratio which is one of the most common measures of rollover risk. Figure 1.9 displays the trend in ATM of outstanding marketable debt in selected OECD countries. The ATM is estimated to have reached almost 8 years in 2017, an increase of more than 1.5 years, compared to the pre-crisis period. Among OECD countries, Chile, Ireland and the United Kingdom have the highest ATM.

From a risk management perspective, higher ATM and duration figures imply a lower pass-through impact of interest rate changes on government interest costs and enhanced fiscal resilience. The November 2017 edition of the OECD Economic Outlook suggests that even a lasting increase in 10-year government bond yields of 1 percentage point, compared with current projections, might only worsen budget balances, on average, by between 0.1% and 0.3% of GDP annually in the next three years (OECD, 2017c).
Figure 1.8. Maturity structure of central government marketable debt for the OECD area, 2008-2018

Percentage

Source: 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; Thomson Reuters, national authorities’ websites and author calculations.

Figure 1.9. Average term-to-maturity of outstanding marketable debt in selected OECD countries

Notes: Data are collected from Debt Management Offices and national authorities’ websites. Data are not strictly comparable across countries, see Annex 1.A1 for further details. The weighted average was calculated using data from all countries for which ATM was available for 2007, 2013, and 2015. The values of central government marketable debt (without cash) in 2007, 2013 and 2017, expressed in USD values using December 2009 exchange rates, were used as weights in constructing the average. Figures for 2017 refer to the latest, publicly available, information.

Source: Surveys on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; Debt Management Offices and national authorities’ websites and author calculations.
Nevertheless, a higher ATM level may not always be the ultimate objective for public debt management for two reasons. First, long-term borrowing strategies are associated with higher borrowing costs in a positive yield curve environment (i.e. term premia). Therefore, some sovereigns, such as the United States and Germany, with better than average fiscal fundamentals, have stabilised maturities at certain levels in order to take advantage of very low short-term rates. Second, the future path of interest rates remains uncertain, so borrowing costs for a given maturity segment might decline further in the long term. For example, the weighted average maturity of Denmark’s government debt soared from 5.1 years in 2007 to 10.5 years in 2008, largely owing to issuance of a 30-year bond with a 4.5% annual coupon rate in November 2008. In the following period of high budget risk, high ATM and duration figures were estimated to contribute to a lower refinancing amount and more stable interest costs for the Danish government’s budget (Danmarks Nationalbank, 2015). In hindsight, the high level of ATM limited the pass-through impact of the ensuing decrease in interest rates, on the government’s interest expense.

For some countries (e.g. Belgium, Mexico and the United Kingdom) ultra-long bond issuance (defined here as maturities of 30 years or more), and discussed in the last edition of the SBO, has contributed significantly to this trend. It should be noted that, in 2016, the size of pension fund investments as a percentage of GDP reached 70.1% in Chile and 95.3% in the United Kingdom (OECD, 2017b). The strong demand for ultra-long bonds is driven by pension funds and insurance companies that are buying long-term government bonds to match their liabilities with long-term assets.

A DMO not only finances net borrowing needs, but also total redemptions. As described in the 2016 edition of the SBO, refinancing redemptions could be considered easier than funding net borrowing requirements, as refinancing redemptions are simply a matter of rolling-over existing debt. However, when redemptions are sizeable, alongside high new borrowing requirements, the DMO may face considerable refinancing risk in the market. In fact, financing elevated budget deficits through long-term debt instruments has generated a heavy redemption profile for the medium and long term in the OECD area. Figure 1.10 shows medium and long-term redemptions of central government marketable debt in OECD country groupings as a percentage of GDP from 2008-2017. Total redemptions of medium and long-term debt in the OECD area have soared since the 2012 sovereign debt crisis, and have remained high, hovering around 8% of GDP. Among the country groups, G7 countries have the highest ratios while emerging countries display an improved redemption profile, owing to fiscal consolidation efforts in recent years.

Looking ahead — unless a strong fiscal consolidation policy is implemented — already elevated debt redemption levels might increase even further and generate additional borrowing needs and gross funding requirements. This clearly indicates a greater refinancing risk in the long term, particularly for issuers with high redemption profiles who may face significant challenges if the current favourable funding conditions are reversed. It is useful to note that in times of market turbulence, sovereigns with weak fundamentals are more vulnerable to spikes in borrowing rates, while “safe havens”, such as Germany and the United States, experience the “flight to safety” phenomenon which can translate into lower borrowing costs.

For the OECD area as a whole, governments will need to refinance around 40% of their outstanding marketable debt in the next three years. Interestingly, G7 countries will have the highest long-term refinancing requirements over this period (Figure 1.11).
Figure 1.10. **Medium and long-term redemptions of central government marketable debt in OECD country groupings, 2008-2018**

As a percentage of GDP

![Graph showing medium and long-term redemptions of central government marketable debt in OECD country groupings, 2008-2018](image)

**Notes:** See Annex 1.A1 for a list of countries in each country group.

**Source:** 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and OECD calculations.

Figure 1.11. **Cumulative percentage of debt maturing in the next 12, 24 and 36 months**

As a percentage of total marketable debt in 2017

![Graph showing cumulative percentage of debt maturing in the next 12, 24 and 36 months](image)

**Notes:** Cumulative percentage of debt maturing in the next 12, 24 and 36 months (i.e. in 2018, 2019 and 2020), as a percentage of total marketable debt stock (without cash) in 2017. Values of principal payments and marketable debt have been aggregated into a single currency by using fixed exchange rates, as of 1st December 2009, for all years.

**Source:** 2017 Survey on Central Government Marketable Debt and Borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 102; IMF World Economic Outlook (October 2017); Thomson Reuters, national authorities’ websites and OECD calculations.
1. SOVEREIGN BORROWING OUTLOOK FOR OECD COUNTRIES

The high level of observed debt redemption profiles since 2012 is expected to persist, owing to the increasing refinancing burden from maturing debt, combined with continued budget deficits in most OECD countries. As discussed in the previous section, the current favourable financing conditions, together with extended debt maturity profiles and a strong growth outlook, have helped governments to manage aggravate refinancing risks in sovereign debt management. However, funding conditions may become less favourable in the long term. To reduce vulnerability to potential market turbulence, it is important for governments to continue their focus on reducing refinancing risks and rebuilding fiscal buffers.

1.7 The recent evolution of sovereign debt credit quality

Theory suggests that borrowing costs should be closely linked to improved credit quality, which depends on fiscal prospects, and macroeconomic and political risks. Assessment of these factors shapes the lender’s perception of the borrower’s ability and willingness to repay. If and when this link is weak, borrowing conditions may become vulnerable to sudden shifts in investor sentiment and perceptions of sovereign risk.

From an investor’s perspective, the main determinants of bond valuation are: the credibility of a government’s macroeconomic framework; the integrity of state institutions; the political environment and the country’s economic growth prospects. To assess a government’s ability to pay, these elements are allegedly captured in sovereign credit ratings. It could be assumed that a government’s borrowing costs should largely reflect its credit quality. Nevertheless, besides country specific risks, there are other factors affecting borrowing costs associated with aggregate and contagion risk (e.g. changes in monetary policy, global uncertainty and risk aversion) (De Santis Roberto A., 2012).

The perceived credit quality of sovereign bonds is influenced by credit ratings to such an extent that sovereign borrowing pricing largely depends on credit ratings. In general, lower credit ratings are usually associated with higher borrowing costs, in particular during times of market stress. For example, in 2011 during the European sovereign debt crisis, 10-year bond yield spreads between ‘AAA’ and ‘AA’ issuers increased about 200 basis points. In today’s relatively calm market conditions, the difference is closer to 20 basis points. Considering that governments borrow in large amounts, even small changes in funding rates can result in significant costs or savings to taxpayers.

Figure 1.12 presents the credit rating profile of OECD governments in 2006, 2013 and 2017. A number of countries have been downgraded by the three big credit agencies during the past decade – in effect shrinking the pool of government bonds in the prime category to 11, down from 19 a decade ago. Notably, Ireland lost its AAA rating status in 2009, Spain in 2010, the United States in 2011 (only by Standard and Poor’s), Austria and France in 2012, the United Kingdom in 2013, and Finland in 2014. More broadly, credit ratings of many countries have steadily shifted down since the GFC.
1. SOVEREIGN BORROWING OUTLOOK FOR OECD COUNTRIES

Figure 1.12. Sovereign credit ratings in the OECD area

Note: Group 1 to group 6 corresponds to the highest to lowest credit rating, following these credit rating descriptions respectively: Prime (AAA), High grade (AA), Upper-medium grade (A), Lower-medium grade (BBB), Non-investment grade (speculative) (BB), and Highly speculative (CCC). The max rank is based on the maximum issuance rating from three rating agencies: Fitch, Moody’s and Standard and Poor’s. Whereas the min rank uses the lowest of the 3 rating agencies.


It has been argued that the size of the pool of high-credit-quality sovereign debt has shrunk, particularly since the GFC. The 2014 edition of the SBO discussed the alleged structural shortages in the aggregate supply of safe public assets (i.e. shortage of risk-free assets). It highlighted the definitional and measurement issues around the “safe assets” category, which often refers to AAA-rated assets, and argued that AA and A-rated assets should also be considered as “safe”. Using this approach, it claimed that there was no shortage of safe assets, given that the outstanding stock of (longer-term) safe assets (i.e. AAA, AA and A-rated government debt) was expected to increase by more than USD 11 trillion between 2007 and 2014, and reach 86.7% of total OECD long-term marketable debt in 2014.

However, caution should be taken when interpreting the results today, given the substantial rise in new issuance of government bonds since the GFC, particularly among issuers rated A and higher, which may have changed outstanding debt quality. To better quantify and assess the credit quality of sovereign bond issuance, an index covering 10-year bond issuance by OECD governments over the period 2008-2017 was constructed. Following the methodology used in the “corporate bond quality index” (OECD, 2017), each issuance is assigned a value ranging from 1 for the lowest credit quality rating and 21 for the highest. This means that a fall in the index indicates declining quality.

The index illustrates evolution of sovereign debt credit quality by selected country groupings over the past decade (Figure 1.13). The results reveal a clear deterioration in sovereign bond credit quality in the OECD area for the designated time period. The trend is clearly driven by the G7 and Euro area country groupings which can be explained by the constant rise in government debt-to-GDP ratios in these countries.
Figure 1.13. Evolution of sovereign debt credit quality, credit ratings weighted by amounts issued, 2008-2017

Notes: Weighted average (by amounts issued) and based on the maximum issuance rating from three rating agencies: Fitch, Moody’s and Standard and Poor’s.


StatLink 2 http://dx.doi.org/10.1787/1416182008

Furthermore, the distribution of sovereign bond issuance among rating categories indicates two significant shifts during the past decade: the first move was from ‘Prime’ category to ‘High grade’ category during the initial years of the GFC, the second was from ‘High grade’ down to ‘Upper medium grade’ category (Figure 1.14). Overall, the share of A-rated bonds in total 10-year bond issuance in the OECD area has decreased gradually from above 95% in 2008 to 90% in 2017.

Figure 1.14. Distribution of sovereign bond issuance among rating categories, as a percentage of total, 2008-2017

Notes: Weighted by amounts issued and based on the maximum issuance rating from three rating agencies: Fitch, Moody’s and Standard and Poor’s.


StatLink 2 http://dx.doi.org/10.1787/1416182008
Given the direct impact of credit ratings on certain institutional investors’ portfolios, along with bank capital requirements and pension fund investment restrictions, a downgrade can generate a portfolio shift which can significantly affect bond yields. Although the OECD area has experienced a substantial deterioration in sovereign credit quality, it has had a limited impact on sovereign borrowing costs. Specifically, a downgrade of sovereign credits should have increased yields; however they are at historically low levels in major OECD countries (see also Figure 1.6). This raises the important question as to whether the link between idiosyncratic sovereign credit risk and market bond yields has weakened. These issues clearly deserve further examination.

1.8 Sovereign funding under stressed conditions

Unexpected increases in borrowing needs, short term loss of market access due to operational issues and temporary mismatches in fiscal cash flows pose significant challenges to sovereign funding. Fiscal shocks may occur for various reasons, such as the realisation of explicit and implicit contingent liabilities, a sudden contraction in tax revenues, or military expenses. During the GFC, OECD governments experienced a surge in financing needs and some countries (e.g. Greece, Iceland and Ireland) lost access to markets for more than a year. In addition to fiscal shocks, abrupt increases in sovereign borrowing needs can be generated by temporary mismatches between fiscal cash inflows and outflows, overly optimistic budget estimates or market disruptions (e.g. a natural disaster). The impact of cash flow mismatches is relatively short-term compared with those of fiscal shocks. That said, sovereign funding can be complicated as the associated liquidity, or funding risk, would be augmented under such stressed conditions regardless of the source.

Against this backdrop, sovereign issuers should be well-prepared for potential future events and should develop contingency funding plans in case of a significant increase in borrowing needs. In stressed conditions, the following actions can be taken, depending on availability of resources: i) immediate access to asset portfolio/liquidity buffer; ii) issuance of short-term instruments, such as T-Bills and commercial papers; iii) increase auction size and tap existing bonds; iv) hold large syndications; v) overdraft facility arrangements with CBs (e.g. Australia and Sweden), and vi) credit lines with banks.

Examples from countries with contingency funding plans suggest that maintaining a liquidity buffer (minimum level of cash balance) as a precautionary measure for extraordinary periods, is a valuable tool to mitigate funding risk. In this regard, an increasing number of countries have been setting minimum cash balances in recent years. In particular, the GFC, which put an extreme strain on government financing needs and credit ratings, led more sovereigns to revise their liquidity management policies. The experience of DMOs during the crisis proved the importance of effective liquidity and refinancing risk management to prevent possible threats to the government’s reputation and financing capacity. Keeping a liquidity buffer cushions events caused by market stress, which in turn enhances market confidence. A liquidity buffer is considered to increase financial flexibility from both the investors’ and issuers’ perspectives. In practice, while a liquidity buffer is a useful tool against liquidity strains, idle liquidity balances may be costly due to their opportunity cost. Therefore, setting the target level (i.e. strategic benchmark) and investment of the balance are important issues for sovereign debt managers. An overview of liquidity buffer practices in OECD DMOs, in terms of sources, target level, and transparency policy associated with its management, is provided in Box 1.1.
Box 1.1. Overview of liquidity buffer practices of DMOs in OECD countries

A liquidity buffer (LB) can be defined as the level of cash, or other highly liquid assets, readily available to cover financing needs and withstand severe liquidity strains for certain durations. Keeping a LB is a widespread practice amongst DMOs in OECD countries with the purpose of managing time differences between cash inflows and outflows, and addressing short term loss of market access due to operational issues (e.g. a natural disaster, a cyber attack or terror attack may hinder auctioning debt). A recent survey on LB practices amongst the member of the WPDM revealed that 28 DMOs (including Canada, Denmark, France, Italy, Portugal, Turkey and the United States) maintain a LB as a precautionary measure for extraordinary periods. For example, the US Treasury maintains a cash buffer to provide a cash cushion against a temporary loss of market access due to a cyber attack, a storm or a terror attack.

In terms of risk management, DMOs strive to answer the following questions before addressing a funding risk: i) what is the risk and how likely is it to materialize? ii) what impact would materialisation have on cash needs? and iii) what is the potential cost of the policy response? Various models and methodologies are applied to respond to the questions and set the target amount of the LB. As such, many countries define benchmarks for the level. Since LB is kept in line with cash and debt management objectives, several elements are considered in the diagnostic process to define the target level, including timing, the amount of government revenues and expenses – in particular the debt redemption profile – as well as explicit and implicit contingent liabilities. The most common indicator for deriving levels is the analysis of daily deviations between forecasted and actual cash flows. In general, countries adjust the level in order to cover financing obligations for a certain period of time (e.g. survival period) or for a certain percentage. DMOs keep cash buffer levels ranging from 5 days to one year of total outlays, including debt payments. Although levels are variable across countries, the most common buffer level is sufficient to meet one month of debt redemptions.

While a LB is a useful tool against liquidity strains, idle liquidity balances may be costly due to their opportunity cost so authorities aim to manage balances effectively by evaluating all the pros and cons.

Cost measures focus on the cost of issuance versus the implied rate of return on LBs. DMOs usually keep LBs in demand deposit and/or time deposit account at national central banks, a risk-free counterparty, and rarely at local private banks. In several countries, central banks do not pay explicit interest (remuneration) but provide a year-end remittance to the government; while some DMOs (including Sweden and Turkey) collect remuneration for their CB account. Country practices suggest investment of excess cash to decrease the opportunity cost. In this regard, the negative interest rate environment in several countries has complicated the management of liquidity buffers in recent years. The DMOs of these countries have reviewed the minimum level of the buffer and put greater focus on active liquidity management (e.g. optimising the level of cash holdings with respect to funding needs and/or to current market conditions).

In terms of content, a LB may be in cash, highly liquid assets, credit lines, allocations from International Financial Institutions (IFIs) or other similar forms. The LB can be accumulated in several ways, such as over-borrowing (pre-financing), privatisation revenues, budget surpluses or allocations from IFIs.

Since several entities are involved in different parts of operations, efficient management of LBs suggests an effective coordination mechanism among relevant parties (e.g. Central bank, treasury and MoF). Thus, DMOs attach great importance to coordination and communication issues and have developed various mechanisms, such as regular meetings and ad hoc interactions, to improve their effectiveness.

Source: The information provided in this box is mainly based on a survey of LB practices compiled by the Portuguese delegation in 2017, and on general discussions held at the annual meeting of the OECD Working Party on Debt Management on 2-3 November, 2017.
If immediate access to required cash is not available, issuance of short-term instruments, such as T-Bills and commercial paper, increasing auction size and tapping existing bonds and holding large syndications (especially when a flexible and developed money market does not exist) are among the alternative borrowing methods commonly used by DMOs in the event of stressed market conditions. T-Bill funding, in particular, is often considered as a shock-absorber for any unexpected financing needs. Also, this strategy is consistent with the DMO’s goal of funding government at the lowest cost over time. While the initial funding choice is the money market, DMOs gradually shift from money markets to capital markets (i.e. to longer-term bonds) to reduce rollover risk in the medium- and long term. It should be noted that some countries (Denmark and the Netherlands) that were inactive in the T-Bill market prior to the GFC, had to re-enter the market due to a rapid increase in borrowing needs resulting from the crisis. They faced a re-entry cost which could be described as the re-establishment cost of a bond/bill programme that had been suspended for some time. DMOs therefore attach special importance to being an active issuer in money markets.

When access to market funding is difficult (or only at prohibitively high interest rates), DMOs turn to emergency credit facilities, such as overdraft arrangements with Central Banks (CB) and/or emergency credit lines with commercial banks. The latter is the more common approach in countries where a CB overdraft facility is prohibited by law. Usually, credit lines can readily be tapped at the borrower's discretion after payment of an annual percentage fee; however, this option may not be a reliable source of funding in the event of a sudden downgrade of sovereign credit ratings. In this regard, sovereign DMOs of OECD countries discussed various aspects of contingency funding plans during the 2017 annual meeting of the OECD WPDM. The experience of various countries suggests that, during times of stress, a liquidity buffer is a reliable tool for addressing short-term funding needs and for avoiding a temporary increase in borrowing costs from the market. Additionally, timely and direct communication with market participants is vital to retain access to market funding. For example, DMOs may need to re-activate certain markets, such as T-Bills, at short notice or cancel/modify a pre-announced auction. Noted examples suggest that having an investor relations unit in place in advance of a stress period is quite valuable.

Notes

1. The cut-off date for data collected through the Survey on Central Government Marketable Debt and Borrowing (carried out by the OECD Working Party on Debt Management) was mid-November 2017, and the cut-off date for other data considered in this chapter was December 2017.

2. This assessment is based on estimates of OECD aggregates using the assumption of fixed exchange rates as of 1 December 2009 when converting national values to USD equivalents.

3. Between 2014 and 2016, the volume of negative-yielding fixed-rate bond issues in 14 OECD countries stood at USD 1.25 trillion, total premiums received reached a substantial level, and the maturity of negative-yielding issues went out to 10 years in Germany, Japan, and Switzerland. From an investor’s perspective, the demand for
negative yielding bonds is mainly driven by expectation of a further decline in yields which would push prices up (OECD, 2017a).

4. In September 2017, the Fed initiated a plan to gradually scale back reinvestments of maturing securities: Principal payments from maturing securities are planned to be reinvested only if they exceed gradually rising caps – for Treasuries, from USD 6 billion per month to USD 30 billion per month (Federal Reserve Board, 2017, New York Fed, 2017).

5. As noted in recent statements of the Fed, the future level of balance sheets will reflect “the banking system’s demand for reserve balances and the Committee’s decisions about how to implement monetary policy most efficiently and effectively in the future” (Federal Reserve Board, 2017, New York Fed, 2017). That said, both the long-run size of the securities portfolio, and the time it will take to reach that size, will depend on numerous variables, including the long-run level of the Fed liabilities.

6. There is a trade-off between cost and risk considerations. For example, lengthening the maturity of domestic securities entails higher cost but lower refinancing risk. The efficient frontier can be defined as the set of optimal portfolios that offers the lowest expected cost for a given level of risk.

7. The annual volume of ultra-long bond sales has almost tripled from 2006-2016, as the number of issues doubled in the same period (OECD, 2017a).

8. Although the long-term trend implies a surge in the share of long-term debt in gross issuance operations, Table 1.1 indicates a slight rise in short-term issues in recent years. As discussed in the 2017 edition of the SBO, the main driver of this development is the US Treasury's strategic policy decision to raise its liquidity buffer by increasing the supply of Treasury bills in May 2015 (US Department of the Treasury, 2015).

9. Credit ratings are often used as a proxy for credit risk and used by regulators to establish banks’ capital requirements. Likewise, institutional investors such as pension funds and insurance companies are obliged by regulations to invest bonds with a certain minimum credit rating.

10. Unsurprisingly, these results confirm the results of a similar analysis made for corporate bonds, which concludes deterioration in overall corporate bond rating quality (OECD, 2017).

11. The OECD’s annual survey of large pension funds revealed that funds held more than 50% of their portfolio in bills and bonds at the end of 2016 in over half of reporting countries, especially in Central and Eastern Europe and Latin America (e.g. Chile, Mexico); http://www.oecd.org/daf/OECD-Business-Finance-Scoreboard-2017.pdf

12. Empirical evidence suggests that a downgrade – particularly to non-investment grade status – has more significant implications (e.g. currency depreciation and interest rate hikes) for emerging economies (e.g. Brazil in 2016 and Latvia 2009) than for advanced economies (Hanusch, M., et. al. 2016).

13. Since 2006, Four OECD countries (i.e. Greece, Iceland, Ireland and Portugal) and have lost access to the longer-term funding market for different periods of times. Three of these countries (Iceland in June 2011, Ireland in August 2012 and Portugal in January 2013) have regained (partial) market access. However, even when these sovereigns lost access to longer-term markets, they kept (for most of the time at least) partial access to short-term funding markets (e.g. T- Bills) (OECD, SBO 2014).
References


Methods and sources

Regional aggregates

- Total OECD area denotes the following 35 countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, 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 16 members: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain.

- In this publication, the Emerging OECD group is defined as including ten countries: Chile, Czech Republic, Estonia, Hungary, Latvia, Mexico, Poland, Slovak Republic, Slovenia 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, definitions and data sources

- Gross borrowing requirements (GBR) as a percentage of GDP are calculated using nominal GDP data from the OECD Economic Outlook No. 102, November 2017.

- 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: Thomson Reuters. 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 2017 and/or 2018, using publicly available official information on redemptions and central government budget balances.

- The average term-to-maturity data in Figure 1.9 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>All commonwealth government securities are included.</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>State budget debt marketable securities only.</td>
</tr>
<tr>
<td>Denmark</td>
<td>Excluding effects from interest and currency swaps.</td>
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<td>Finland</td>
<td>Includes marketable public debt securities and thus excludes private placements, loans and retail bonds.</td>
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<td>Germany</td>
<td>Excludes swap effects.</td>
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<td>Greece</td>
<td>The 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. Data includes cross-currency swaps.</td>
</tr>
<tr>
<td>Japan</td>
<td>MOF announces ATM, based on fiscal year, not calendar year. For the years 2007 &amp; 2013 (excluding saving bonds). For the 2017, the data includes saving bonds.</td>
</tr>
<tr>
<td>Latvia</td>
<td>Calculations exclude saving bonds and interest-free bonds.</td>
</tr>
<tr>
<td>Mexico</td>
<td>Our calculation of the ATM considers all outstanding market debt (short-term and long-term).</td>
</tr>
<tr>
<td>Netherlands</td>
<td>The information is based on the data of T-bills and Bonds.</td>
</tr>
<tr>
<td>New Zealand</td>
<td>These calculations include all New Zealand Government Bonds and Inflation Indexed Bonds that are readily tradable in the market. It excludes any Bonds held by the Reserve Bank of New Zealand or the Earthquake Commission. It also includes Treasury Bills.</td>
</tr>
<tr>
<td>Norway</td>
<td>The figures represent outstanding central government marketable debt, excluding interest rate swaps.</td>
</tr>
<tr>
<td>Poland</td>
<td>Marketable Treasury securities issued on domestic and foreign market, and excludes loans.</td>
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<tr>
<td>Portugal</td>
<td>Excludes T-bills issued in favour of FRDP and used as collateral. Excludes swap transactions.</td>
</tr>
<tr>
<td>Slovak Republic</td>
<td>Includes both: bonds and T-bills.</td>
</tr>
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<td>Sweden</td>
<td>Marketable debt securities include: Government bonds, Inflation-linked bonds, Treasury bills, Public bonds in foreign currency, Commercial paper in foreign currency.</td>
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<tr>
<td>Switzerland</td>
<td>Outstanding marketable debt, excludes own tranches not issued yet and securities for cash management purposes, excludes swap effects.</td>
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<tr>
<td>United Kingdom</td>
<td>Treasury bills for cash management purposes, government holdings and undated gilts are excluded from the calculation of the weighted average term to maturity.</td>
</tr>
<tr>
<td>United States</td>
<td>ATM is calculated by staff in OECD staff based on all securities data downloadable from <a href="http://www.treasurydirect.gov">www.treasurydirect.gov</a></td>
</tr>
</tbody>
</table>
Credit ratings analysis methodology

- A dataset of bonds taken from Thomson Reuters (as of November 2017) with the following criteria: i) were still active, ii) having a tenor of ten or more years (or in the case of re-openings – the original issue had a tenor of at least ten years), iii) were issued or had a reopening from 2008 onwards and iv) excluded stripped bonds.

- Credit ratings were sourced from Thomson Reuters long-term foreign credit rating for each of Fitch, Moody’s and Standard and Poor’s.

- Credit ratings converted into a ranking score, where 19 is equivalent to the highest rating (AAA or Aaa) going down to a score of 1 for CCC- (Caa3 in the case of Moody’s), and bonds with ratings below this excluded.

- The analysis is carried out on a bond by bond basis, looking at the minimum and maximum ratings (given by the three credit rating agencies) of the issuer country on the date of issue/re-opening.

- The Thomson Reuters US dollar conversion rate on date of issue (or date of re-opening) was used to calculate issue amounts on a US dollar basis.

- To see sovereign ratings changes over time, an initial artificial dataset was created which gave every country exactly one issue in each quarter. Based on this artificial dataset, a table was constructed to count the number of bonds (i.e. countries) with each credit rating rank in each quarter, of which the mean ranking was then calculated for each quarter.

- For the analysis which is weighted by amount: A table was constructed to sum the total amount issued in US Dollars in each quarter within each credit rating rank of which the weighted mean for the ranking was then calculated for each quarter (see figure 1.13 for the presentation of this analysis).