



OECD Sovereign Borrowing Outlook 2017

# Sovereign borrowing outlook for OECD countries

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## 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 2017 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 2007-2017. 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 2016 and the cut-off date for other data considered in this report was December 2016.

Comments and questions should be addressed to [publicdebt@oecd.org](mailto: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/](http://www.oecd.org/finance/public-debt/).

## Executive summary

**Shaped primarily by fiscal policies, sovereign borrowing levels in the OECD area have stabilised in recent years, although sovereign debt burdens remain high by historical standards and redemption profiles still pose serious challenges.**

The pace of debt accumulation has stabilised compared to the first years of the global financial and economic crisis. Sovereign borrowing requirements (both in gross and net terms), which had risen rapidly as a result of the policy response to the crisis, have since declined due to fiscal consolidation efforts made mostly from 2011 to 2015. Net borrowing requirements have also declined but remain positive and are projected to stay level in 2017 in the OECD area, reflecting that underlying fiscal balances are slowly becoming more expansionary. As a result, outstanding debt has continued to increase, albeit at a slower pace. Survey results indicate that aggregate central government marketable debt across the OECD area will gradually increase from USD 41.3 trillion in 2016 to USD 42.2 trillion in 2017, while sovereign net borrowing requirements are expected to remain at USD 1.7 trillion in 2017, approximately the same level as 2016.

Against this backdrop, sovereign debt burdens remain high by historical standards. After surging from 49.8% to 74.6% between 2007 and 2015 in the OECD area, central government marketable debt-to-GDP ratio has started to decline and is estimated to be 73% in 2017. This decline is more significant for the G7 group than other country groups, despite sluggish economic growth in these economies. The November 2016 edition of the *OECD Economic Outlook* indicated that fiscal space was created by lower interest payments on rolled-over debt in several advanced economies. The recommended policy response is to use fiscal space to support growth in public investment which would require additional borrowing.

Since 2008, the high level of debt servicing, combined with large net borrowing requirements, has generated challenging rollover ratios and aggravated refinancing risk for sovereign debt management in the OECD area. In response to the drastic increase in government debt levels, most OECD countries have deployed a funding strategy geared towards issuance of long-dated instruments. The total debt service of OECD governments has decreased from 45% in 2015 to around 40% of the outstanding marketable debt in 2016. While this service burden has eased, it still poses a serious challenge to sovereign debt managers.

## **The persistent ultra-low interest rate environment has had a significant impact on both primary and secondary markets for government securities.**

Short- and long-term interest rates have continued to fall, reaching very low and – in many cases – negative levels in recent years. More than USD 10 trillion of outstanding high-credit-quality sovereign debt is currently trading at negative yields. This *Outlook* examines the implications of the ultra-low interest rate environment for debt dynamics, sovereign funding strategies, investor base, and government market liquidity. Lower interest rate yields – entering into negative territory in several countries – have improved debt dynamics and eased government debt funding. Since interest rates have declined by more than GDP growth which more than offsets the increase in the debt-to-GDP ratio, debt-servicing has been facilitated and debt sustainability concerns have been alleviated in a number of OECD countries. Also, historical evolution of the average term-to-maturity of outstanding central government debt, representing refinancing risk exposure, indicates a 1.5-year increase compared to the pre-crisis period. This figure reached historic highs in 2016 for several countries including Belgium, Mexico, the United Kingdom and the United States, partly driven by growing issuance of ultra-long bonds.

With volumes of sovereign debt trading at negative yields attaining record levels in 2016, some countries, including France, Germany, Japan, and the Netherlands, have received payments for issuing domestic government bonds. Specifically, an examination of sovereign bond auctions in 14 OECD countries indicates that the volume of negative-yielding fixed-rate bond issues reached USD 1.2 trillion between 2014 and 2016.

Survey results indicate that debt managers witness structural changes in the investor base for government securities. Large central banks and public funds have become dominant holders of sovereign debt in major OECD countries. While the share of buy-and-hold type investors increased in the sovereign debt investor base, secondary market liquidity remains an important source of concern for debt managers. Reduced liquidity impairs, to some extent, the price discovery process, increases the cost of borrowing via higher risk premia and limits the issuers' ability to tap a variety of investors. In response, debt managers in several countries have introduced policy measures such as tap sales, buy-backs and switch operations, frequent and smaller auctions, repurchase agreements and changes to the primary dealership system.

## **Inflation-linked sovereign bonds have become a global asset class, as their supply has grown significantly in recent years.**

This edition of the *Outlook* also reviews inflation-linked sovereign debt in OECD countries which has grown significantly in recent years, currently standing at around USD 3 trillion. Inflation-linked bonds were originally created in the 18<sup>th</sup> century to deal with the impact of high inflation rates on investors. Today they are a significant part of government financial markets and offer a number of benefits for investors and issuers, such as: Portfolio and investor base diversifications; smoothing of budget volatility; information concerning inflation expectations; and protection of savings against inflation. A significant portion of inflation-linked bonds are issued by countries characterised by both low inflation rates and price stability. While G7 countries are the dominant players in this asset category, regional aggregates also indicate increased popularity of linkers in emerging market economies where near-term inflationary pressures are arguably more of a concern.

In light of prolonged low interest rates and falling inflation in several jurisdictions, current policy discussions focus on the potential impact on supply and demand for these securities. Indeed, break-even inflation rates, simply defined as the difference between nominal yield on a nominal fixed-rate bond and real yield on an inflation-linked bond of similar maturity and credit quality, have been decreasing in several countries. This development, which can be attributed to market expectation for future inflation and poorer liquidity conditions of linkers relative to nominal bonds, has raised concerns over the potential impact on the linker market. In terms of demand, inflation-linked bonds stand as a unique asset class offering a perfect hedge against inflation for investors, particularly for pension funds and insurance companies. Looking ahead, underlying demand for linkers is likely to remain robust as the future level of prices is uncertain and liability-driven investments increase. In response to continuing strong demand, sovereign issuers remain committed to inflation-linker programmes and to maintaining a well-functioning market for inflation linkers.

## *Chapter 1*

# **Sovereign borrowing outlook for OECD countries**

*This chapter provides an overview of, and outlook for, sovereign borrowing, deficits and debt in the OECD area for the period 2007-2017. It examines net and gross borrowing needs of OECD governments in the context of fiscal policy challenges and developments. Fiscal policies are shaped by two imperatives: the need to reinvigorate economic growth, including through debt-financed public investment over the short to medium term; and continued pursuit of measured fiscal consolidation over the medium- to long-term. Debt management offices react to these challenges by making redemption profiles somewhat lighter over the short-term.*

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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\* examines net and gross sovereign borrowing in OECD countries from 2007 to 2017. It first looks at net and gross borrowing needs of OECD governments in the context of fiscal developments. It then considers recent trends in central government marketable debt in the OECD area and central government debt ratios for groups of selected OECD countries. Finally, the chapter examines funding strategies and growing issuance of debt with 30 or more years of maturities.

### *Key findings*

- Sovereign gross borrowing needs in the OECD area have continued to decline from the peaks attained in 2012. They are expected to be USD 9.5 trillion in 2017, approximately the same level as 2016.
- Net borrowing needs have also declined but continue to be positive and are projected to remain flat in 2017 for the OECD area, reflecting the fact that underlying fiscal balances are becoming more expansionary. Until 2016, net borrowing requirements in the OECD area declined steadily from the peaks attained in 2009.
- Sovereign debt levels have continued to increase and debt levels are high by historical standards, although exchange rate developments are complicating the interpretation of such aggregates.
- After surging from 49.8% to 74.6% between 2007 and 2015, the central government marketable debt-to-GDP ratio has started to decline and is estimated to be 73% in 2017. Among country groups the decline in the debt-to-GDP ratio is more significant for G7 countries.
- Interest rates remain low and are even negative for approximately USD 10 trillion of outstanding high-credit-quality sovereign debt. This situation facilitates the servicing of debt. It also makes debt-funded public investments to kick-start real activity growth relatively less costly and more attractive, without obscuring the medium- to long-term need for continued measured fiscal consolidation.
- Debt managers are reacting to fiscal challenges by lengthening redemption profiles, thus limiting rollover risks. This strategy tends to involve higher debt-servicing costs over the short term but, at the current juncture, such costs are very limited.
- Ultra-long government bond issuance has increased significantly, partly driven by attempts to lock in low long-term interest rates. Annual volumes of ultra-long bonds tripled between 2006 and 2016, with the number of issues doubling over the same period.

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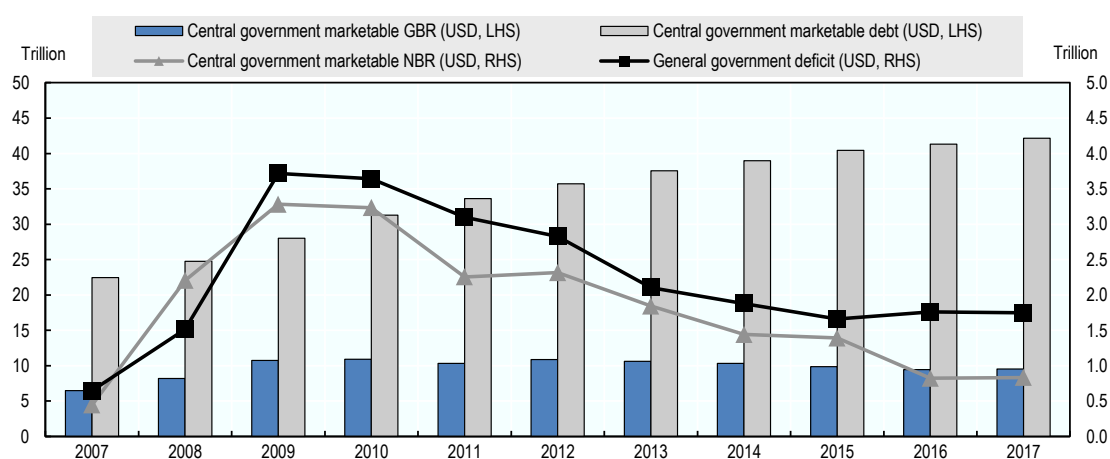
\* This chapter was prepared by Fatos Koc and Sebastian Schich, Senior Policy Analyst and Principal Administrator respectively, OECD Financial Affairs Division, with research and statistical support from Gary Mills, Statistician, OECD Financial Affairs Division.

## 1.2 Gross and net borrowing needs of OECD governments have declined

The gross and net borrowing needs of OECD governments have continued to decline, while net borrowing needs are expected to remain flat in 2017, reflecting the fact that fiscal consolidation has slowed. The fiscal stance is expected to move from broadly neutral to moderately supportive and net borrowing requirements for the OECD area are not expected to contradict this (Figure 1.1).<sup>1</sup>

Looking back, the financial crisis, and the policy response to it, implied drastically increased additional borrowing requirements in 2008 and 2009. From a peak of USD 3.3 trillion attained in 2009, net central government marketable borrowing requirements have fallen considerably since then. Requirements are estimated to amount to USD 833 billion in 2017, a slight increase on 2016.<sup>2</sup> As net borrowing in the OECD area continues to be positive, this observation is reflected in the continued growth of central government marketable debt.

Figure 1.1 Fiscal and borrowing outlook in OECD countries, 2007-2017



*Notes:* GBR = gross borrowing requirement, NBR = net borrowing requirement. General government deficit is derived from the general government net lending as published in the OECD Economic Outlook No. 100 for all OECD countries except for Chile, Mexico and Turkey for which the source is the IMF World Economic Outlook (October 2016). Figures are calculated based on data in national currencies using exchange rates as of 1 December 2009.

*Source:* 2016 Survey on central government marketable debt and borrowing, carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 100; IMF World Economic Outlook (October 2016); Thomson Reuters, national authorities' websites and author calculations.

Outstanding central government debt is expected to increase by 2% from USD 41.3 trillion in 2016, to around USD 42.2 trillion in 2017 (Table 1.1). Compared to the financial crisis period, the pace of debt accumulation has stabilised significantly in recent years. Specifically, central government marketable debt in the OECD area grew, on average, by 3% annually between 2014 and 2015, compared to 6% between 2011 and 2013, and 12% between 2008 and 2010.

Table 1.1. **Central government marketable gross and net borrowing and marketable debt in the OECD area 2007-2017**

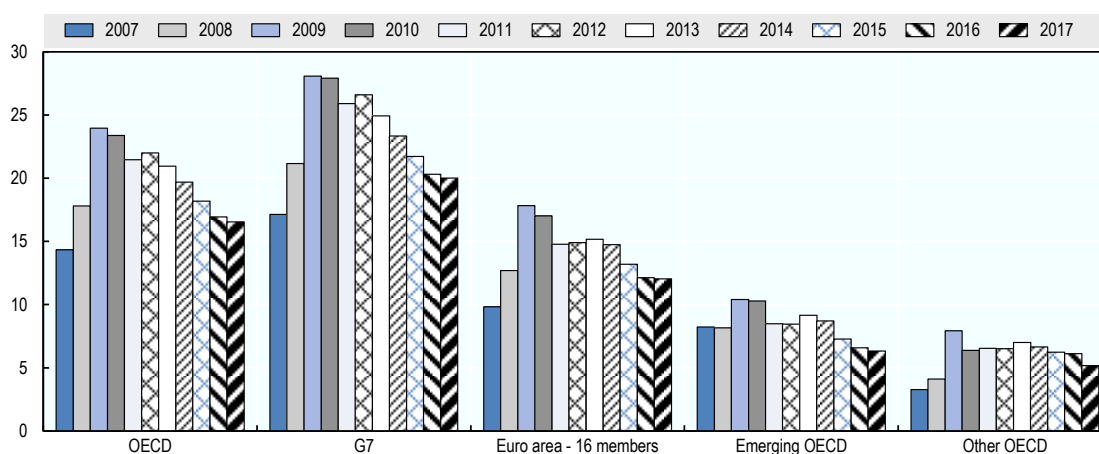
	USD Trillion										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Central government marketable GBR	6.5	8.2	10.7	10.9	10.3	10.9	10.6	10.3	9.9	9.4	9.5
Central government marketable debt	22.5	24.7	28.0	31.3	33.6	35.7	37.6	39.0	40.4	41.3	42.2
Central government marketable NBR	0.4	2.2	3.3	3.2	2.3	2.3	1.8	1.4	1.4	0.8	0.8
General government deficit	0.6	1.5	3.7	3.6	3.1	2.8	2.1	1.9	1.7	1.8	1.7

*Notes:* GBR = gross borrowing requirement, NBR = net borrowing requirement. General government deficit is derived from the general government net lending as published in the OECD Economic Outlook No. 100 for all OECD countries except for Chile, Mexico and Turkey for which the source is the IMF World Economic Outlook (October 2016). Figures are calculated based on data in national currencies using the exchange rates as of 1st December 2009.

*Source:* 2016 Survey on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 100; IMF World Economic Outlook (October 2016); Thomson Reuters, national authorities' websites and OECD calculations.

Figure 1.2. **Central government marketable gross borrowing in OECD countries, 2007-2017**

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. "Euro area - 16 members" includes the following OECD countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain. "Emerging OECD" includes Chile, Czech Republic, Estonia, Hungary, Latvia, Mexico, Poland, Slovak Republic, Slovenia and Turkey. "Other OECD" includes Australia, Denmark, Iceland, Israel, Korea, New Zealand, Norway, Sweden and Switzerland.

*Source:* 2016 Survey on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 100; IMF World Economic Outlook (October 2016); Thomson Reuters, national authorities' websites and author calculations.

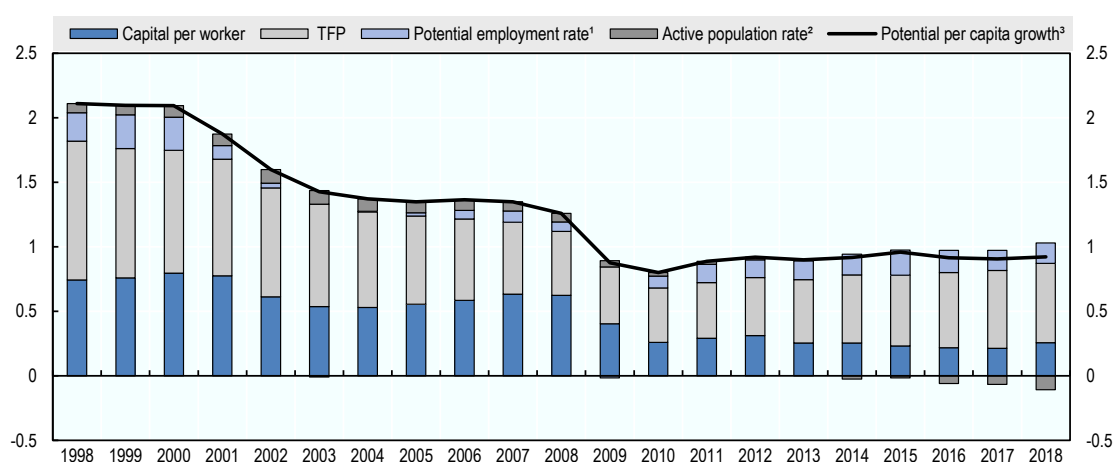
Amongst selected OECD country groupings, aggregate borrowing expressed as a percentage of GDP is relatively high for the group of G7 countries, although it is expected to decline for its fifth consecutive year in 2017 (Figure 1.2). The figure is based on data collected through a survey on central government marketable debt and borrowing for the period from 2007 to 2017 carried out by the OECD Working Party on Debt Management, and includes author projections where applicable.

### 1.3 Enhancing real activity growth through debt-financed public investment

The global economy appears to be caught in a low-growth trap of weak investment and productivity, reflected in low potential per capita output growth (Figure 1.3). As the role of monetary policy to address these issues is limited and monetary policy support for real activity growth is already exceptionally strong, policy advice is reassessing the role of fiscal policies. In addition to structural reforms, a need to reassess fiscal policies has been diagnosed, with the suggested focus of such policies to be placed more sharply on the consequences for growth as opposed to budget balances and debt reduction. According to the recent OECD Economic Outlook No. 100, fiscal space (broadly defined as additional room available for sovereign debt levels to grow before access to new borrowing would be compromised) has increased in many advanced economies, mainly as a result of declining interest rates.

Figure 1.3. **Potential output growth in the OECD area has slowed markedly, 1998-2018**

Contribution to potential per capita growth



*Note:* Assuming potential output ( $Y^*$ ) can be represented by a Cobb-Douglas production function in terms of potential employment ( $N^*$ ), the capital stock ( $K$ ) and total factor productivity ( $E^*$ ) then  $y^* = a * (n^* + e^*) + (1 - a) * k$ , where lower case letters denote logs and  $a$  is the wage share. If  $P$  is the total population and  $PWA$  the population of working age (here taken to be aged 15-74), then the growth rate of potential GDP per capita (where growth rates are denoted by the first difference,  $d(\cdot)$ , of logged variables) can be decomposed into the four components depicted in the figure:  $d(y^* - p) = a * d(e^*) + (1 - a) * d(k - n^*) + d(n^* - pwa) + d(pwa - p)$ .

<sup>1</sup> Potential employment rate refers to potential employment as a share of the working-age population (aged 15-74).

<sup>2</sup> Active population rate refers to the share of the population of working age in the total population.

<sup>3</sup> Percentage changes. Growth in Ireland in 2015 computed using gross value added at constant prices excluding foreign-owned multinational enterprise dominated sectors.

*Source:* OECD Economic Outlook No. 100.

As a result of this favourable interest rate-growth differential<sup>3</sup> environment, even though debt-to-GDP levels remain at historically high levels, debt-servicing is facilitated and relatively larger burdens of debt can be sustained at current levels of interest rates. A case has been made for fiscal measures to supplement structural reforms in attempts to raise the productive capacity of the economy. For example, according to the OECD Economic Outlook No. 100 published in November 2016, OECD governments could finance a 0.5 percentage point of GDP productivity-enhancing fiscal initiative in OECD countries for three to four years on average, without raising the debt-to-GDP ratio in the medium term, provided the selected activities and projects are sound. An easing of the fiscal stance through well-targeted growth-friendly measures is not expected to aggravate the debt-to-GDP ratio in the short term, whilst well-targeted fiscal measures are expected to raise potential output (not only raising soft and hard infrastructure or education spending, but also cutting harmful taxes) so that a temporary debt-financed fiscal expansion need not increase debt ratios in the longer term.

Some countries, including Canada, Japan and the United States, have recently announced expansionary fiscal measures, including raising spending on investment. Elsewhere, fiscal policies in most of Europe were only marginally easier in 2016 than in the previous year, though the United Kingdom has signalled an easing of its fiscal stance. In this context, a communication from the European Commission on fiscal policy in the euro area calls for a “positive fiscal stance”, defined as both expansionary (a fiscal expansion of 0.5% of GDP in 2017) and of high-quality composition (with regard to the cross-country distribution of efforts and, within a country, with regard to the tax and expenditure mix). It recognises that countries which have not reached their medium-term objective or are under an excessive deficit procedure would find it difficult to achieve a fiscal expansion of 0.5% of GDP in 2017.

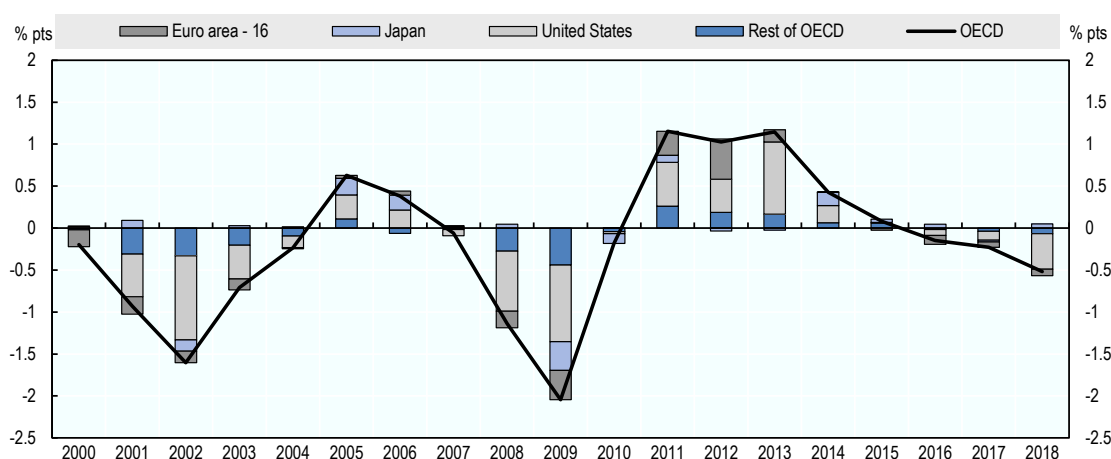
Interest rates continue to be low by historical standards in OECD countries (Figure 1.5). Ultra-low or negative interest rates provide opportunities for governments, given that they tend to have much larger interest-bearing liabilities than interest-earning assets. Interest rates have declined by more than GDP growth and the decline in interest rates more than offsets the increase in the debt-to-GDP ratio. As a result, even though debt-to-GDP levels are still at historically high levels, debt-servicing is facilitated and relatively larger burdens of debt can be sustained at current levels of interest rates. Obviously, these currently favourable metrics should not obfuscate the need to enact necessary structural and fiscal measures that ensure long-run fiscal sustainability.

The OECD Economic Outlook No.100 argues that a continuation of low growth observed during recent years could undermine fiscal sustainability and, eventually, the capacity to address future fiscal challenges. Given the low growth rate environment, there is a case for structural and temporary deficit-creating, well-targeted fiscal measures are required to raise the productive capacity of the economy. Simulations shown in Figure 1.4 suggest that, compared to general government debt<sup>4</sup> interest rate payments during 2014, cumulative interest payment “gains” on an unchanged stock of debt during the subsequent three years from 2015 to 2017, would be considerable if a large proportion of long-term debt (carrying much higher coupons than most recent issues) would be rolled over into debt at currently lower interest rates. The considerable magnitude of effects obtained through these simulations reflects the lower interest rate during the period from 2015 up to mid-2016 compared to 2014, as well as the assumed large proportion of refinancing. The expected effects are particularly high for countries with higher levels of debt and the greater the assumed debt rollover rate, the higher the increased effect. As regards to central marketable government debt in the OECD area, the present Sovereign Borrowing

Outlook estimates that, on average, about 20% will be due in year one and about 40% over the next three years (see also Figure 1.8).

Figure 1.4 Fiscal stance in OECD countries, 2000-2018

Underlying primary balance changes, including projections



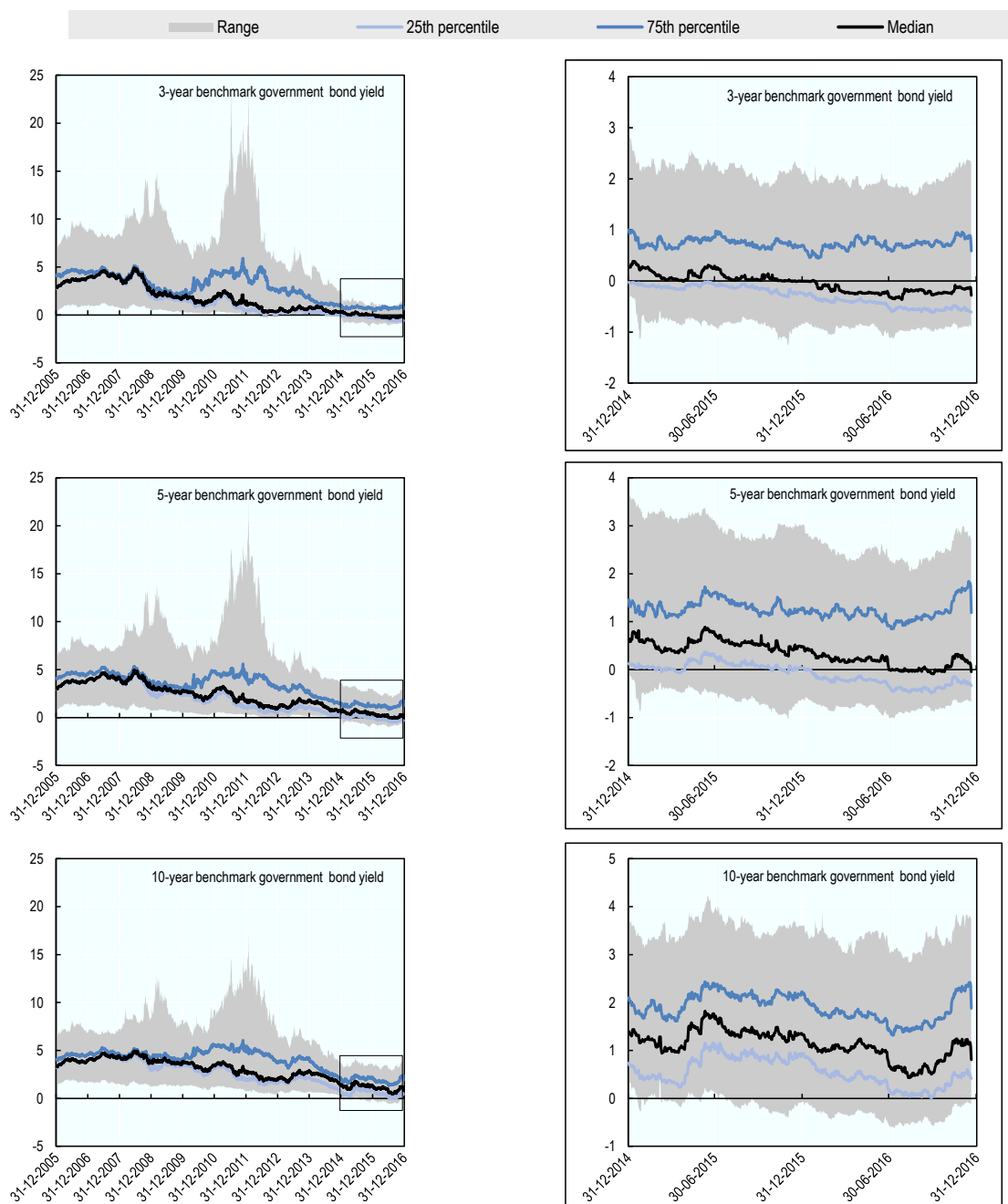
Notes: "Euro area - 16" includes the following OECD countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain. "Rest of OECD" are all other OECD countries excluding the Euro area - 16, Japan and the United States.

Source: OECD Economic Outlook No. 100.

## 1.4 Interest rates and developments in relative debt burden measures

In recent years, the Bank of Japan and several smaller European authorities, following the European Central Bank (ECB), embarked on the uncharted territory of negative interest rates and expanded their monetary policy measures by purchasing government bonds. These developments contributed to unusually low interest rates in financial markets, which also influenced government bond yields. Already low, sovereign bond yields have turned negative in some countries. As a result, instead of paying interest, a number of OECD governments, including Germany, Japan, France and Switzerland, are now being paid for safe bonds up to 10-year maturity (Figure 1.5). As of December 2016, the amount of government bonds yielding negative interest rates is about USD 10 trillion, with Japan, France and Germany accounting for well over two-thirds of that amount. This is an unprecedented phenomenon in financial market history. A more detailed assessment of the implications of low interest rate environment on government debt markets is provided in Chapter 2 of the OECD Sovereign Borrowing Outlook 2017 (forthcoming).

Figure 1.5. Government benchmark interest rates in OECD countries

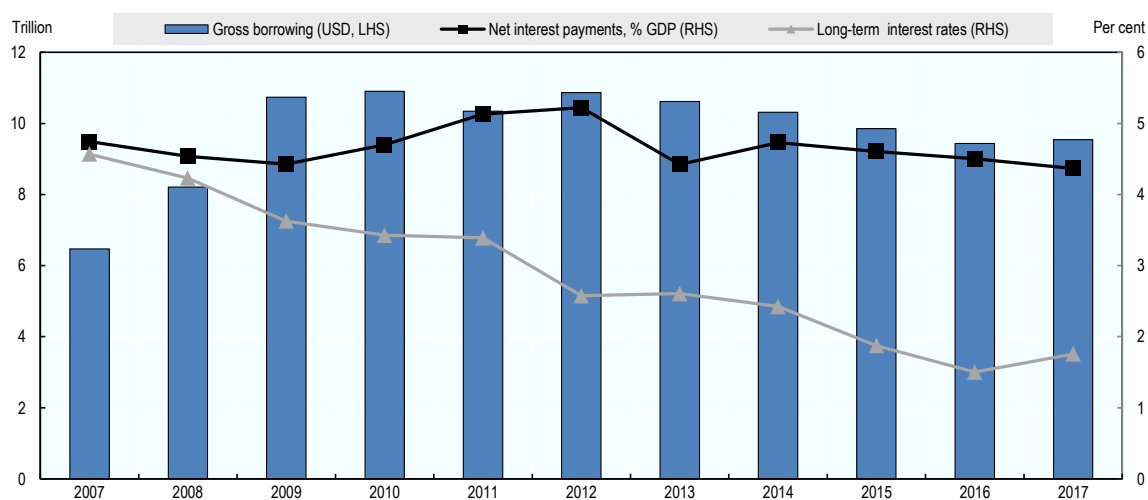


*Notes:* Interest rates in percentages. The charts show the evolution of several metrics (minimum, maximum, 25th percentile, 75th percentile, median) of 3-year, 5-year and 10-year benchmark government bond yields, calculated on the following group of countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Netherlands, New Zealand, Norway (5-year and 10-year yields only), Poland, Portugal, Spain, Sweden, 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.

The ultra-low interest rate environment has changed the trade-off between costs and risks<sup>5</sup> and made it cheaper to insure against rollover risk. Weighted average term-to-maturity (ATM) of borrowing has increased significantly in several OECD countries and a higher ATM figure implies a slower pass-through impact of changes in interest rates to government's interest costs in the future. As the ATM of outstanding marketable debt is reaching eight years and gross borrowing needs are decreasing recently in the OECD area, the impact of falling interest rates on government interest expenses will be somewhat limited.

Figure 1.6 Central government marketable gross borrowing, interest payments and long-term interest rates, 2007-2017



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

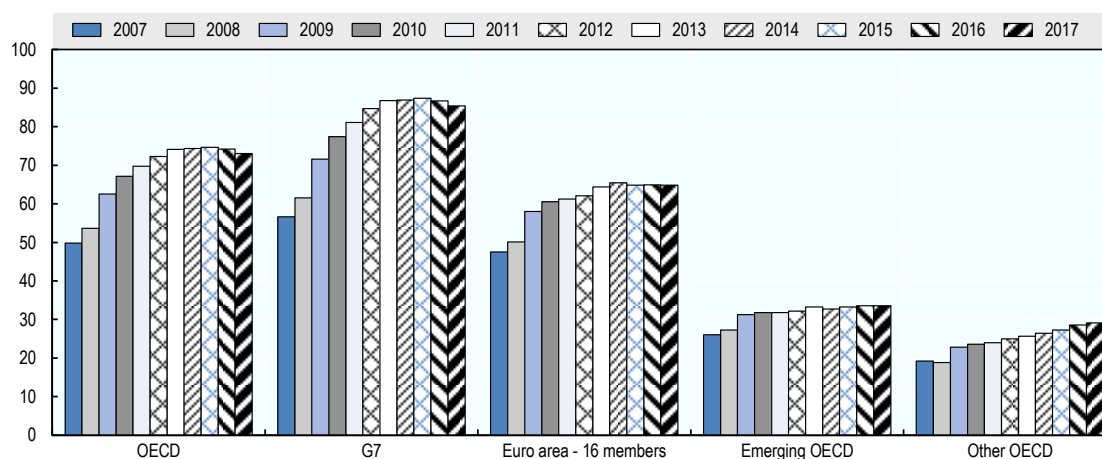
Source: OECD Economic Outlook No. 100 and author calculations.

After surging from 49.8% to 74.6% from 2007 to 2015, the central government marketable debt-to-GDP ratio decreased slightly to 74.1% in 2016 (Figure 1.7). In terms of country groups, the group of G7 countries has the highest debt ratio at 86.7%, followed by the Eurozone country group. As discussed in the OECD Sovereign Borrowing Outlook 2016, current levels of debt burden are high by historical standards, particularly in G7 countries and some Eurozone countries. Looking ahead, central government marketable debt-to GDP ratio is expected to fall gradually to 73% in 2017, mainly driven by the decrease within the G7 country group.

Weak economic activity in Eurozone countries has continued to put pressure on debt-to-GDP ratios. Indeed, the central government marketable debt-to-GDP ratio is expected to remain at the 2016 level in 2017. Financing concerns are currently mitigated by low sovereign funding costs for almost all sovereign rating categories and robust demand for government bonds against the backdrop of the ECB's ongoing asset purchase programme. Despite the fact that debt servicing is currently much easier, risks to debt sustainability are still on the downside in several Eurozone countries.

Figure 1.7 Central government marketable debt in OECD countries, 2007-2017

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. "Euro area - 16 members" includes the following OECD countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain. "Emerging OECD" includes Chile, Czech Republic, Estonia, Hungary, Latvia, Mexico, Poland, Slovak Republic, Slovenia and Turkey. "Other OECD" includes Australia, Denmark, Iceland, Israel, Korea, New Zealand, Norway, Sweden and Switzerland.

*Source:* 2016 Survey on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 100; IMF World Economic Outlook (October 2016); Thomson Reuters, national authorities' websites and author calculations.

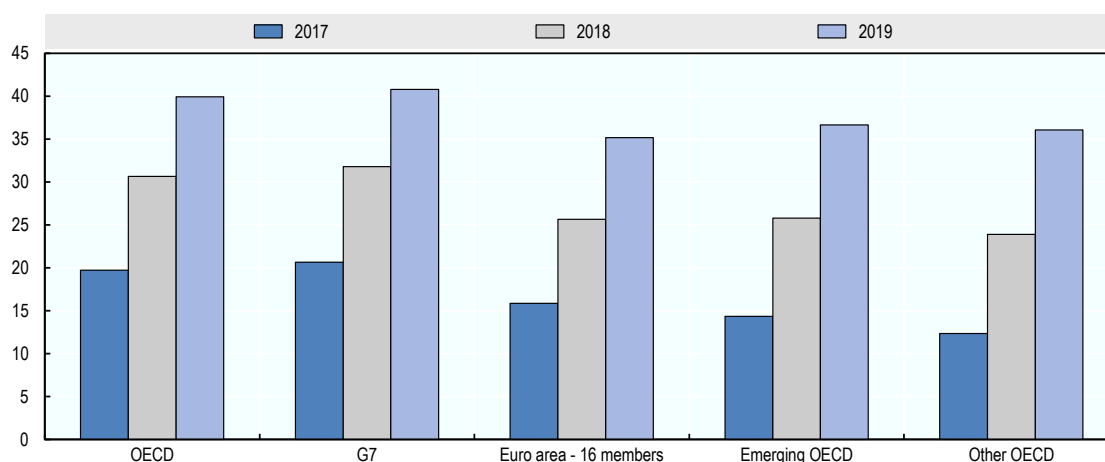
## 1.5 Risk-based government borrowing strategies are in place to manage refinancing risk

Government debt managers routinely measure and monitor refinancing risk exposure of the government debt portfolio by using various metrics. The three most commonly used indicators are: *i*) the ratio of debt maturing in a specific period to the total debt portfolio; *ii*) maturity structure of debt stock; *iii*) the Average Time to Maturity (ATM). As elaborated in the 2016 OECD Sovereign Borrowing Outlook, debt portfolio indicators that measure rollover risk: *(i)* play a diagnostic role for identifying vulnerabilities in the government debt structure; *(ii)* also serve as an important portfolio benchmarking role for reducing portfolio risk. Against this backdrop, an overview of these risk metrics is provided in this chapter.

Figure 1.8 presents the debt service of outstanding medium- and long-term central government marketable debt for the next 12, 24 and 36 months. Total debt service of OECD governments for the following 3 years is around 40% of the outstanding marketable debt, one fifth of which is due in the next 12 months.

Figure 1.8 Cumulative percentage of debt maturing in the next 12, 24 and 36 months

(As a percentage of total marketable debt as of 2016)



*Notes:* Cumulative percentage of debt maturing in the next 12, 24 and 36 months (i.e. in 2017, 2018 and 2019,) as a percentage of total marketable debt stock (without cash) in 2016. 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. "Euro area - 16 members" includes the following OECD countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Netherlands, Portugal, Slovak Republic, Slovenia and Spain. "Emerging OECD" include Chile, Czech Republic, Estonia, Hungary, Latvia, Mexico, Poland, Slovak Republic, Slovenia and Turkey. "Other OECD" includes Australia, Denmark, Iceland, Israel, Korea, New Zealand, Norway, Sweden and Switzerland.

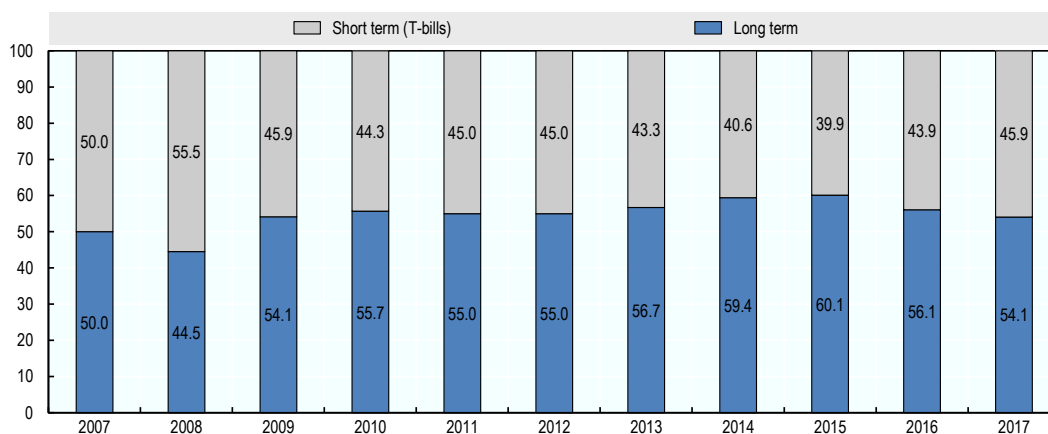
*Source:* 2016 Survey on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; OECD Economic Outlook No. 100; Thomson Reuters, national authorities' websites and author calculations.

Since the onset of the global crisis, the high level of debt servicing, combined with large net borrowing requirements, has generated challenging rollover ratios, and aggravated refinancing risks, for sovereign debt management in the OECD area. In response to the drastic increase in government debt levels, sovereign debt managers in most OECD countries have strategically increased the issuance of long-term as opposed to short-term instruments (Figure 1.11). The share of long-term debt in gross issuance operations in the OECD area has increased by more than five percentage points in 2016 compared to 2007 (Figure 1.9). Also the recent rising maturity of long-term issues, driven partly by growing ultra-long bond issuance (defined here as maturities of 30 years or more), has further mitigated the refinancing risk, as well as maturity mismatches, on the balance sheet.<sup>6</sup>

Although the long-term trend implies a surge in the share of long-term debt in gross issuance operations, Figure 1.9 indicates a slight rise in short-term issues in recent years. The maturity structure of gross issuance operations in the OECD area indicates around a six percentage point increase in the share of Treasury bills from 2015 to 2017. The main driver of this development was the United States Treasury's strategic policy decision to raise its liquidity buffer by increasing the supply of Treasury bills in May 2015<sup>7</sup> which it did to meet growing demand and raise liquidity buffer to an amount equal to 5 days of liquidity subject to USD 150 billion minimum amount in case of market disruption (US Department of the Treasury, 2015). As a result of this policy change, the share of US

Treasury bills in gross short-term issuance in the OECD area, which has already increased by 4 percentage points from 2005 to 2016, is expected to exceed 43% by 2017.

Figure 1.9 Maturity structure of gross issuance operations in the OECD area, 2007-2017



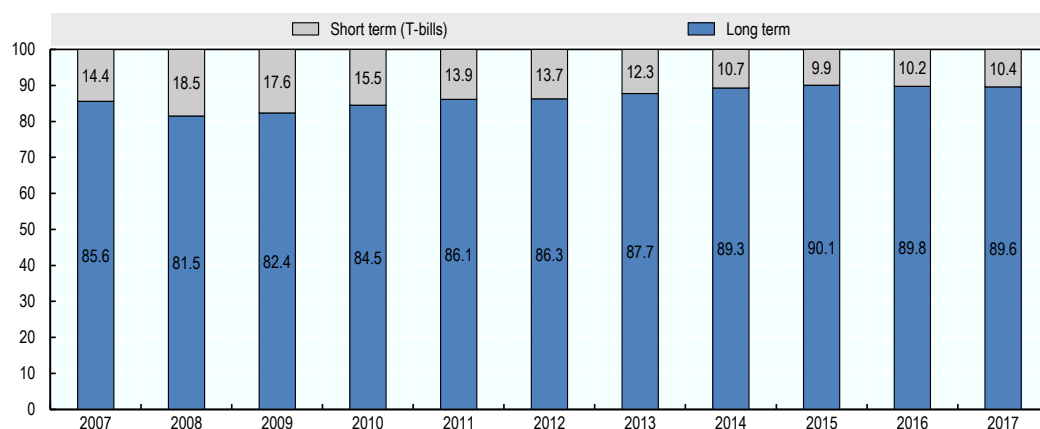
Source: 2016 Survey on central government marketable debt and borrowing carried out by the OECD Working Party on Debt Management; Thomson Reuters, national authorities' websites and author calculations.

As has been noted, the prolonged low interest rate environment and flattened yield curves in several OECD countries has enabled debt managers to lengthen average maturity of issues by easing the trade-off between expected costs and risks<sup>5</sup> along the efficient frontier in favour of costs. Current estimates for debt maturing in the next 36 months are slightly lower than the figures of previous editions of the OECD Sovereign Borrowing Outlook. The estimates cited in the 2013, 2014 and 2016 editions of the Outlook suggested an average of 44% of debt maturing in the following 3 years. Clearly, continued efforts of sovereign debt managers to extend the average maturity of debt stocks are starting to bear fruit.

Reduction in rollover risk exposure also manifests itself in maturity composition of outstanding debt. In parallel to increased borrowing maturities, the share of long-term debt in total central government marketable debt in the OECD area has risen since 2008. This figure has been stable at around 90% in recent years (Figure 1.10).

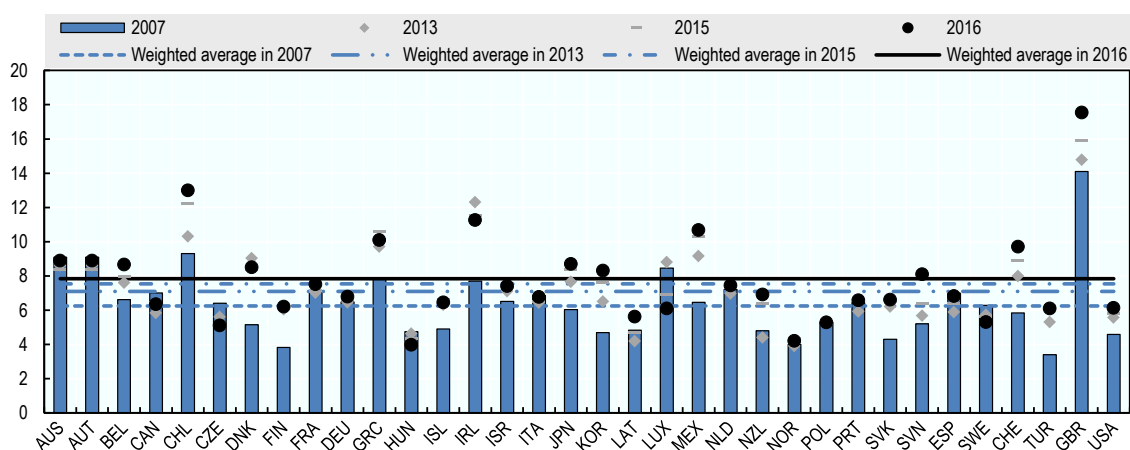
High rollover risk implies that debt can be refinanced at an unusually high cost or, in extreme cases, cannot be refinanced at all; in turn this weakens investors' confidence and can exacerbate or even trigger a debt crisis. This vicious cycle turns into a virtuous cycle when rollover risk is considered low. In recent years, an ultra-low interest rate environment and lengthening average maturities have generated a virtuous cycle in which rollover risk has been further mitigated at relatively cheaper costs.

Figure 1.10 Maturity structure of central government marketable debt for the OECD area



Source: 2016 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 1.11 Average term-to-maturity of outstanding marketable debt in selected OECD countries



Notes: Average term-to-maturity in years (e.g. 0.5 years correspond to 6 months) of outstanding marketable debt. Data are collected from debt management office and national authorities' websites. Data are not strictly comparable across countries. The average term-to-maturity of outstanding debt might include government holdings (e.g. Norway), might include short-term debt (e.g. Denmark, United Kingdom) or exclude it (e.g. Ireland), include the effect of swaps (e.g. for France and Norway) or exclude that effect. The weighted average was calculated based on the data of all countries for which the average term to maturity was available for 2007, 2013, and 2015. The values of central government marketable debt (without cash) in 2007, 2013, 2015 and 2016, expressed in USD values using the December 2009 exchange rates, were used as weights in constructing the average. Figures for 2016 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.

One of the most commonly used measures for refinancing risk is the ATM of outstanding debt, a historical evolution of which is provided in Figure 1.11. The weighted ATM of outstanding marketable debt has increased by 1.5 years compared to the pre-

crisis period, reaching historic highs for several countries including Belgium, Mexico, the United Kingdom and the United States.

Higher ATM and duration figures imply a relatively lower pass-through impact of interest rate changes on government interest costs and, correspondingly, more predictability of debt service payments. Although a high ATM figure is often preferable, debt managers are also cautious about extreme levels to be able to benefit from potential lower interest rates in the future.

In a number of countries (including Denmark, Ireland, Mexico, Switzerland and the United Kingdom), ATMs of outstanding marketable debt rose more than three years between 2007 and 2016. One reason for this is the growing issuance of ultra-long bonds, different aspects of which will be discussed in the last part of this chapter.

## 1.6 Funding strategies and instrument choices

Debt managers often set overall medium and long-term risk targets, and accordingly determine funding strategies which involve the choice of maturities, interest rates and currency types. The funding strategy is formulated principally by cost versus risk considerations. Therefore, expected paths of certain parameters including inflation, interest rates, exchange rates and existing structure of the debt portfolio play an important role in setting up funding strategies.

Against this backdrop, Table 1.2 reflects the funding structures over the past decade, as well as the projections for 2017. As already noted, the data from 2008 to 2015 shows a clear trend in favor of long-term debt issuance. In 2016, the share of long-term instruments fell to 56.1% from 60.1% in 2015. It is expected that this share will drop further to 54.1% in 2017, mainly due to the US Treasury's increased supply of Treasury bills during this period (see Section 1.5). Nevertheless, the ATM of outstanding debt has continued to lengthen partly driven by the growing number of issuances of ultra-long bonds.

Table 1.2 **Funding strategy based on marketable gross borrowing needs in OECD area**

	(Percentage)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Short Term (T-bills)	50.0	55.5	45.9	44.3	45.0	45.0	43.3	40.6	39.9	43.9	45.9
Long Term	50.0	44.5	54.1	55.7	55.0	55.0	56.7	59.4	60.1	56.1	54.1
Fixed rate	43.7	39.4	49.9	51.3	50.2	50.5	51.2	52.0	53.2	49.7	47.9
Index linked	3.3	2.5	1.8	2.3	2.9	3.2	3.7	4.0	3.7	3.1	2.9
Variable rate	1.5	1.0	1.0	0.9	0.7	0.3	0.9	2.6	2.3	2.4	2.4
Other	1.3	1.0	1.2	1.0	0.9	0.7	0.7	0.6	0.5	0.4	0.4
<i>Of which:</i>											
Local currency	49.6	43.4	53.1	55.1	54.3	54.2	55.9	58.5	58.6	55.2	53.0
Foreign currency	0.2	0.5	0.7	0.5	0.4	0.6	0.6	0.7	0.7	0.6	0.6

*Source:* 2016 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.

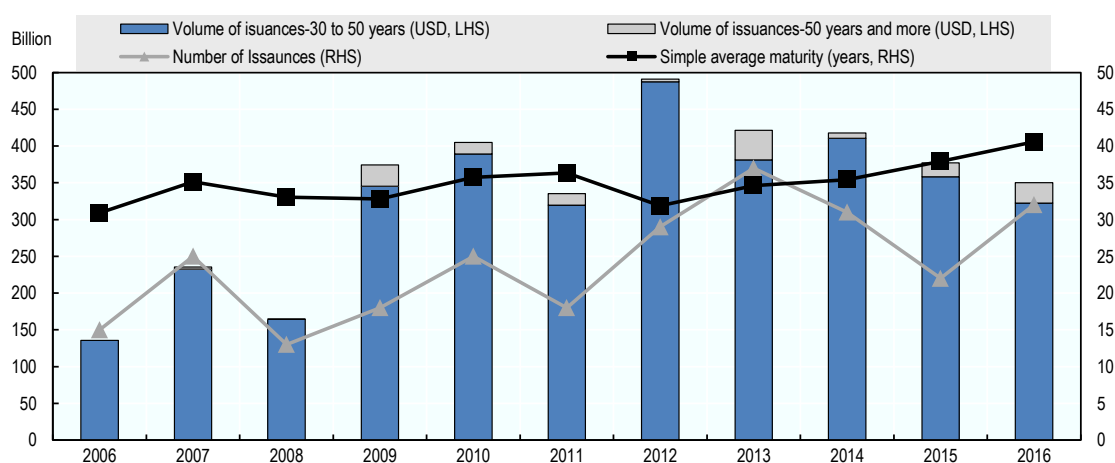
In terms of the interest-rate composition of long-term debt, which is important for assessing re-fixing risk<sup>8</sup> exposure, fixed rate instruments dominate funding strategies with an average share of 90% between 2007 and 2017, albeit a gradual increase in the share of floating debt instruments in recent years. Inflation-indexed bonds, which gained in popularity particularly during the post-crisis period, have a diminishing share in total gross financing since 2015.

## 1.7 Growing issuance of ultra-long government bonds

The history of ultra-long bonds goes back to the 18th Century when the United Kingdom borrowed through issuance of “undated” gilts. More than two centuries later, the last undated bonds in the United Kingdom gilt portfolio were completely redeemed, in 2015. Globally, sovereign bonds with maturities of more than 30 years were a rarity until a decade ago. In recent history, just two sovereigns have issued 100-year bonds: China in 1996 and the Philippines in 1997. The change in the playing field was triggered by low and sometimes even negative interest rates.

In recent years, governments are extending the average length of their public debt and locking in low borrowing rates in a historically low interest-rate environment. Figure 1.12 reflects aggregate figures for government issuance of ultra-long bonds. Compared to pre-crisis years, government ultra-long bond issuances have increased significantly since 2009 as a result of increased borrowing requirements as well as maturity choice in issuance strategy. Specifically, the annual volume of ultra-long bond sales has almost tripled from 2006 to 2016, as the number of issues doubled in the same period. In recent years, several countries including Australia, Austria, the United Kingdom,<sup>9</sup> the United States, Japan, France, Italy, Spain, Canada and Switzerland have issued a number of securities maturing in 30 to 70 years. Mexico, Belgium and Ireland have sold 100-year bonds, which are called “century bonds”. As a result, not only the volume, but also the average maturity of ultra-long bond issues has significantly increased.

Figure 1.12 Issuance of government bonds with maturities of 30 years or more

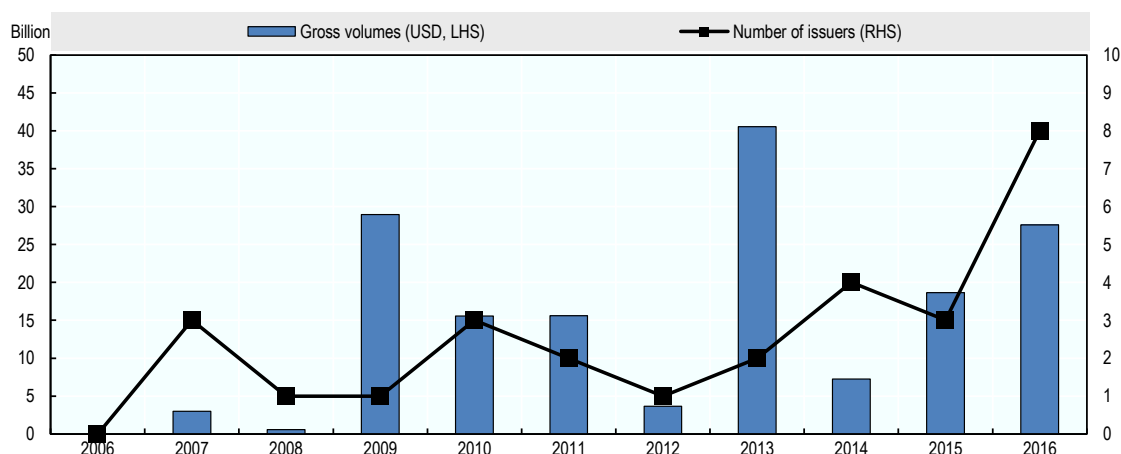


Notes: As of December 2016 for OECD countries only, volume is based on issuance amounts using flexible exchange rates.

Source: Thomson Reuters, national authorities' websites, OECD Economic Outlook No. 100 and author calculations.

As of December 2016, the outstanding stock of ultra-long bonds issued since 2006 has reached USD 3.7 trillion which comprises 9% of the central government marketable debt. While ultra-long bonds are still a small component of the government debt market, they are a fast-growing maturity segment. In 2016, six sovereigns sold 50-year bonds and two sovereigns sold 100-year bonds with a total volume of USD 27.6 billion (Figure 1.13). Various aspects of these issues were discussed during the last annual meeting of the OECD Working Party on Public Debt Management (WPDM) held on 7-8 November in 2016. Debt managers acknowledged potential benefits and risks associated with issuance of ultra-long bonds. Long-term debt issuance, and ultra long-term debt in particular, provides predictability of redemptions over decades in advance. Debt managers benefit from long-term bond issuances to diversify a government's debt portfolio and reduce maturity mismatches on the sovereign balance sheet,<sup>6</sup> as well as to mitigate refinancing risk of the outstanding debt. Hence, for several large issuers including the United States, the United Kingdom, Japan and Italy, 30-year bonds have long been a part of their regular borrowing programs as a result of strong and sustained investor demand. The majority of issuers noted that bonds with longer than 30-year maturities are tactical decisions to lock in historically low interest rates and rapidly reduce re-financing risk.

Figure 1.13 Issuance of government bonds with maturities of 50 years or more



Notes: As of December 2016, for OECD countries only, volume is based on issuance amounts using flexible exchange rates.

Source: Thomson Reuters, national authorities' websites, OECD Economic Outlook No. 100 and author calculations.

In addition to the advantages, debt managers also consider potential risks related to fixing the rate of interest payable on debt over such a long period. In this context, some countries, including the United Kingdom, Denmark and Sweden, highlighted “regret risk” i.e., being cautious about assuming current rates as unique. Anecdotal evidence suggests that ultra-long bonds were issued in the past when borrowing costs were thought to be at their lowest level, only to see rates fall further. A potential future downside to the risk of locking into a high quantum of long-term borrowing is that it turns out to be unnecessary and/or costly after the fact (OECD, 2011). Several countries, including the United States, Sweden and Turkey, stressed that, in the absence of continued demand, ultra-long issuance might be opportunistic and inconsistent with regular and predictable financing policies. Against this backdrop, debt managers agreed that careful consideration needs to

be given to the depth and sustainability of investor demand for such instruments and the potential impact of issuance on the long-term functioning of the government bond market, including the risk of fragmenting market liquidity at the long end of the yield curve, as well as the potential impact of supply on the shape of the yield curve.

With regard to investor type, the main buyers of these securities are insurance companies and pension funds as they need to match liabilities that span decades. Therefore, these bonds are expected to have lower secondary market liquidity compared to conventional maturity segments. In addition to liability-driven investors, much of the demand for long-term bonds is driven by a broader spectrum of investors searching for positive yields in recent years. Also, portfolio managers who are specifically aiming to protect against a sudden decline in yields, invest in these bonds as they exhibit positive convexity.<sup>10</sup>

In countries where 30-year bonds are already part of financing programs, auctions are the primary distribution method. As these bonds are often regularly issued and re-opened after the initial issuance, their outstanding volume and trade levels in the market are adequate for an efficient price formation of new issues through auctions. For a debut issue of a longer dated bond, several debt management offices (DMOs) prefer syndications while a few small issuers use private placements (Annex 1.A1). With these approaches and in the absence of a benchmark bond, issuers get a better sense of borrowing costs and demand before committing to a sale. These methods enable debt managers to retain flexibility in aligning demand with supply as each syndication is placed according to the size and quality of investor demand.

## 1.8 Recent developments in markets for index-linked bonds

Given the currently high sovereign debt levels, low interest rates and weak real activity growth outlook, the idea of governments issuing financial instruments whose repayments are indexed to domestic GDP has received renewed attention. Fuelling that debate, a recent paper with contributions from several central banks,<sup>11</sup> argues that, in theory, the case for issuing such forms of state-contingent debt might be particularly strong now.<sup>12</sup> The paper argues that GDP-linked bonds offer additional fiscal space in downturns and an alternative way of delevering from high debt levels, which implies that the benefits from issuing such instruments are likely to be largest when debt levels are already high relative to GDP and there is an attempt to minimize the probability of debt reaching an unsustainable trajectory.

Issuing debt instruments whose payments are indexed to economic variables such as domestic GDP, consumption or inflation is not a new idea, although historical examples are rare. A widely-quoted early example of a type of inflation-indexed bond is a “depreciation note”, indexed to a basket of goods including corn, beef, wool and leather, by the State of Massachusetts in 1780. Following the debt crises of the 1980s, interest in the idea of sovereigns issuing bonds whose service or repayments would be linked to measures of the debtors’ payment capacity, exports or commodity prices rose, although the discussion remained mostly academic. Numerous proposals were made during the late 1980s and 1990s for making promised payments contingent on some form of index. Concerns were expressed about the possibility of moral hazard on the part of the debtor, which is why indices were thought preferable as they are less directly influenced by debtors’ actions. One form of debt instrument with indexed payments that has met with some success, in terms of actual proliferation of instruments, are inflation-indexed bonds.

Many OECD countries issue bonds that are linked to inflation-indices. The United Kingdom established an inflation-linked government bond program in 1981. Among OECD countries, this issuance choice was followed by Australia in 1985, Canada in 1991, Sweden in 1994, the United States in 1997, France in 1998, Italy in 2003, Japan in 2004, and Germany in 2006. As shown in Table 1.2 above, the issuance of index-linked bonds which fell during the global financial crisis, fell again after having increased from 2011 to 2014 and is currently standing at levels around those observed before the global financial crisis. Around 3% funding of gross borrowing needs in the OECD area in 2016 and 2017 is in the form of index-linked debt. Today, the United States Treasury Inflation-Protected Securities (TIPS) programme accounts for 39% of the outstanding sovereign linkers in the OECD area. This is followed by the United Kingdom (19%) and Italy (12%).

An important aspect of such issuances is the choice of inflation index. Several countries, including the United States, Japan, Canada, Sweden and Turkey, use the consumer price index (CPI), while the United Kingdom uses the retail price index (RPI). In the Eurozone area, France and Italy issue bonds which are linked to the national consumer price index excluding tobacco, as well as bonds that are linked to the Eurozone harmonised index of consumer prices excluding tobacco (HICP ex-tobacco). Bonds tend to have guaranteed redemption at par, which implies that the redemption amount will be equal to the face value of the bond in case of deflation, rather than inflation, during the lifetime of the bond. Tax regimes and perceived credit quality differ depending on the issuing country.

Further discussion of inflation-linked government bonds is provided in the Chapter 3 of the OECD Sovereign Borrowing Outlook 2017 (forthcoming).

## 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 2016 and the cut-off date for other data considered in this chapter was December 2016.
2. This assessment is based on estimates of OECD aggregates using the assumption of exchange rates that are fixed as of 1 December 2009 when converting national values to USD equivalents.
3. One of the key determinants of government debt dynamics is the differential between interest rate paid to service government debt and the growth rate of the economy ( $r-g$ ). Simply, higher interest rates imply higher interest payments to service government debt so adversely influencing debt dynamics, whereas higher nominal GDP growth rate reduces the debt burden by increasing the denominator. In this context, an interest rate-growth differential of lower than zero reduces debt-to-GDP ratio, for a given primary budget balance. Public debt sustainability frameworks suggest that debt stock grows by the existing debt stock ( $d$ ) multiplied by  $r-g$ , less the primary budget balance ( $pb$ ):  $\Delta dt = -pb + (rt - gt) dt-1$ . Hence, for a given primary balance and initial net debt ratio, the rate of increase in the debt-to-GDP ratio is positively related to the interest-rate-growth differential (Spinelli and Turner, 2011).
4. General government debt is a wider concept than the central government debt considered in the previous sub-sections.

5. Sovereign debt managers face a cost-risk trade-off in the choice between short and long duration debt when determining how to finance the government's borrowing requirements. A normal (positive) yield curve indicates that reducing cost implies issuing short-term debt while reducing rollover risk implies issuing long-term debt. Since the government debt entails interest-rate risk because future debt financing and debt costs are subject to future unknown interest rates, short-duration debt (short-term or floating) is usually considered more risky than long duration (long-term, fixed-rate) debt (OECD, 2005).
6. From a sovereign asset liability management perspective, correlation between the interest and maturity structure of the balance sheet may decrease the volatility of the balance sheet against demand and supply shocks, and contributes to reduce budget risk. Since non-financial assets on the government balance sheet are usually long-lived assets, such as lands and buildings, an attempt to match maturity profile of government liabilities with that of assets implies lengthening the average maturity of borrowing (Koc 2014).
7. In May 2015, the United States Treasury Borrowing Advisory Committee of the Securities Industry and Financial Markets Association announced the increase of its minimum cash balance to USD 150 billion - an amount of cash necessary for approximately one week - in case of a market disruption, and to maintain a higher cash balance to mitigate risks associated with the temporary loss of market access. The Committee agreed that Treasury should issue additional bills to support a higher cash balance framework and to meet increased market demand for short-dated high quality assets. It was also noted that increasing Treasury bills would be consistent with Treasury's goal of funding government at the lowest cost over time and that this recommendation should not be viewed as a change to the strategy of extending the weighted average maturity of the debt (US Department of the Treasury, 2015).
8. Re-fixing risk refers to the risk that debt servicing costs are higher than expected because interest rates, when interest rate is re-fixed, are higher than expected.
9. The UK government real yield curve has an inverted shape; this situation supports the assumption of a 'negative' term premium existing in long-dated real yields due to heavy demand from institutional investors, particularly pension funds. As a result, the UK DMO adopted its funding strategies to capture this premium through issuance of long-dated index-linked gilts (OECD, 2011).
10. Convexity refers to the second derivative of the price of a bond. Convexity is a measure of the curvature of the price/yield relationship of a bond and provides an approximation of the part of the price change of a bond for a given change in yield that is not captured by modified duration. A bond with positive convexity will have larger price increases due to a decline in yields than price declines due to an increase in yields.
11. Prepared by Bank of England staff, with contributions from the Banco Central de la República Argentina and the Bank of Canada.
12. Such debt could be issued as part of debt restructurings, although the focus here is on the proposal for issuance of such bonds in normal times.

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## ANNEX 1.A1

### *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 countries: 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 Other OECD group includes 15 countries: Australia, Chile, Czech Republic, Denmark, Hungary, Iceland, Israel, Korea, Mexico, New Zealand, Norway, Poland, Sweden, Switzerland 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 is calculated using nominal GDP data from the OECD Economic Outlook No. 100, November 2016.
- To facilitate comparisons with previous Outlooks, 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 to that approach explicitly. 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 one of the Sovereign Borrowing Outlook 2016.

- All figures refer to calendar years.
- Aggregate figures for gross borrowing requirements (GBR), net borrowing requirements (NBR), central government marketable debt, redemptions, and debt maturing are compiled from the answers to the Borrowing Survey. The Secretariat inserted its own estimates/projections in cases of missing information for 2016 and/or 2017, using publicly available official information on redemptions and central government budget balances.

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