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# Government bond rates and interest expenditure of large euro area member states: A scenario analysis

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## Abstract

This paper assesses the possible development of government interest expenditures for Germany, France, Italy and Spain. Until 2021, governments could anticipate a substantial further reduction in interest expenditure. This outlook has changed drastically with the surge in inflation and government bond rates. Assuming that bond rates remain at the levels implied by yield curves from December 2022, interest expenditure rises substantially. We also examined scenarios with a further upward shift in yield curves by one or two percentage points. They indicate major medium-term risks for highly indebted member states with interest expenditure approaching or exceeding levels last observed on the eve of the euro area debt crisis. Governments should take action to achieve a decline in debt-to-GDP ratios towards safe levels. They need to make sure public debt remains sustainable at the higher interest rates that are required to achieve price stability in the euro area.

## KEYWORDS

bond yield curves, euro area, government interest expenditure, public debt sustainability

## JEL CLASSIFICATION

E43, F45, H68

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## 1 | INTRODUCTION

With the rise of inflation expectations and then inflation over the course of 2021 and 2022 medium- and long-term interest rates in the euro area have also increased substantially. Investors want to be compensated for expected inflation and inflation risk. Bond rates also incorporate the anticipation of a future increase in policy rates. This makes sense. The European Central Bank (ECB) needs to adjust policy to fight inflation. If it delays it will ultimately need to raise rates further to contain inflation expectations. In 2022, higher bond rates apparently triggered new concerns about the ability of highly indebted member states to service their debt. In fact, spreads relative to bonds of AAA-rated member states also increased somewhat. On 14 June 2022, the ECB called an emergency meeting of the Governing Council to discuss a new selective bond purchase program that aims to control government bond spreads. By 21 July, it unveiled the new so-called Transmission Protection Instrument (TPI).

The purpose of this paper is to assess the possible development of government interest expenditures as a share of GDP for large member states. Interest expenditure is a key determinant of debt sustainability. This is clear from the simplest version of the debt accumulation equation,

$$\Delta b_t = \left( \frac{i_t - g_t}{1 + g_t} \right) b_{t-1} - pb_t, \quad (1)$$

which shows the crucial influence of the differential between the nominal interest rate  $i_t$  and nominal GDP growth,  $g_t$ , on the change of the government gross debt-to-GDP ( $\Delta b_t$ ) ratio. Here,  $pb_t$  refers to the primary budget balance and  $i_t b_{t-1}$  corresponds to interest expenditure. This equation is a key element of macroeconomic models that are used to simulate debt accumulation with endogenously determined GDP growth, interest rates and budget balances. It assumes that government debt consists of one-period bonds and  $i_t$  is the one-period interest rate.

In practice, however, government debt is characterized by a rich maturity structure that plays a key role in the development of interest expenditure. Thus, we take a step back and use a more mechanical approach for calculating the potential path of interest expenditure, which however makes use of available information on the maturity structure of government debt, implied future debt redemption payments and the relevant sovereign yield curves. Rather than using a macroeconomic model to derive nominal growth and short-term interest rates endogenously, we employ forecasts by the International Monetary Fund (IMF) for the debt-to-GDP ratio in calculating the path of interest expenditure.

Our analysis focuses on four large euro area member states — Germany, France, Italy and Spain. In 2021, the latter two states recorded debt-to-GDP ratios of 151% and 118%, respectively. In France, the debt-to-GDP ratio stood at 113%, in Germany at 70%. In recent years, these countries were able to reduce interest expenditure relative to GDP and relative to total government expenditure. Until 2021, they could anticipate a further reduction of interest expenditure in the future. Government bond rates in the euro area had been very low for an 8-year-period. Thus, member states rolling over debt issued during or before the euro debt crisis of 2011 and 2012 could expect a substantial further decline in interest expenditure.

Our retrospective calculations show that if the extremely low yield curve from August 2021 (and previous years) had persisted, governments could have anticipated a rapid further decline in the interest burden of public debt. For example, interest expenditure on German central

government debt would have fallen below zero by 2028 as the German government was issuing debt at negative rates. The Italian government could have anticipated to pay interest of 1.2% of GDP by 2030. This is less than a quarter of the interest expenditure relative to GDP at the peak of the euro debt crisis in 2012. Spanish government interest could have been expected to reach 0.7% of GDP by 2030. Yet, for now, this benign outlook is history.

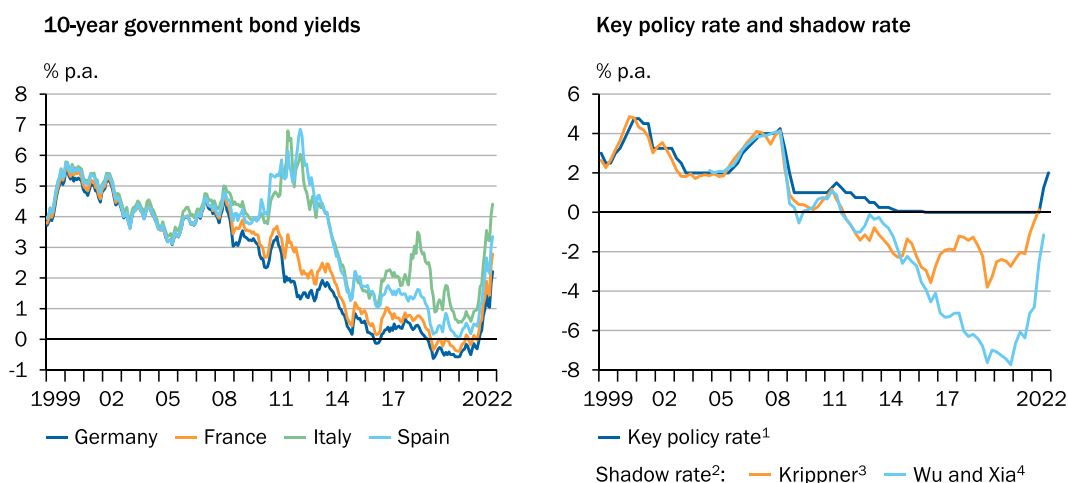
Assuming that bond rates remain at the levels implied by yield curves from December 2022, interest expenditure rises substantially. By 2030 it would correspond to 1.1%, 1.9%, 3.8% and 2.4% of GDP in Germany, France, Italy and Spain, respectively. Note, this scenario incorporates a declining debt-to-GDP ratio due to high inflation and hence high nominal GDP growth as predicted by the IMF forecasts for Germany, Italy and Spain till 2027. For France, the IMF anticipates a slow rise in the debt-to-GDP ratio over this period.

Additionally, we examine the implications of a further upward shift in the yield curves of 1 or 2 percentage points relative to the 12 December 2022 yield curve. These scenarios suggest major medium-term risks to fiscal sustainability in highly indebted member states with interest expenditure approaching or exceeding levels last observed on the eve of the euro area debt crisis. Already a one-percentage-point-upward shift of bond yields is sufficient to drive interest expenditure in Italy and Spain to 4.6% and 3.1% of GDP, respectively, by 2030. Hence, governments should take decisive action to set debt-to-GDP ratios on a sustained downward trajectory. They bear the responsibility for making sure that government finances can weather the higher interest rates which are required to achieve price stability in the euro area. In particular, this calls for continued efforts toward market-oriented structural reforms that can raise potential growth.

The paper proceeds as follows. Section 2 reviews the past period of low inflation and low interest rates that set government interest expenditures on a steady decline even though the debt-to-GDP ratios increased substantially as a result of the global financial crisis and the coronavirus crisis. Section 3 shows how this situation changed rapidly with the rise of inflation in 2021 and 2022. Section 4 reviews factors that cushion or exacerbate the immediate impact of rising bond rates on interest expenditure. Section 5 presents the scenario results in detail, while Section 6 discusses policy implications and concludes.

## **2 | WHERE WE COME FROM: DECLINING BOND YIELDS, RISING DEBT-RATIOS AND FALLING INTEREST EXPENDITURE**

Following the global financial crisis and the euro area debt crisis, the euro area experienced a protracted period of low inflation and low interest rates. The European Central Bank reduced its main refinancing rate to 0% and the rate on the deposit facility to –0.5%. From 2015 onwards it embarked on large-scale quantitative easing by means of asset purchases — primarily government bond purchases. Consumer price inflation, as measured by the Harmonized Index of Consumer Prices (HICP), averaged 1.2% between summer 2008 and the end of 2019 (see also Lagarde, 2020). Core inflation averaged 1.1% over the same period. The rate of inflation with regard to domestic goods and services as measured by the GDP deflator slowly rose from 1.3% in 2013 and reached 1.7% in 2019. Yet import prices fell, on average, and kept consumer price inflation low (Wieland, 2021). In this environment of low inflation, low policy rates and government bond purchases, government bond rates steadily declined towards historically low levels (Chart 1, left panel). One way of summarizing the effect of asset purchases on the



**CHART 1** Historical interest rate developments in the euro area. Footnotes: 1, Interest rate for main refinancing operations in the second month of each quarter. 2, Quarterly data for the shadow rate is calculated as the average of monthly data. 3, Updated estimates based on Krippner (2013, 2015). 4, Updated estimates based on Wu and Xia (2017, 2020). Source: ECB, Krippner (2013, 2015), OECD, Wu and Xia (2017, 2020). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

monetary policy stance, is to estimate a short-run shadow rate as in Krippner (2013, 2015) or Wu and Xia (2017, 2020) (Chart 1, right panel). The big difference between the two types of estimates serves as a reminder of the large degree of uncertainty surrounding such estimates.

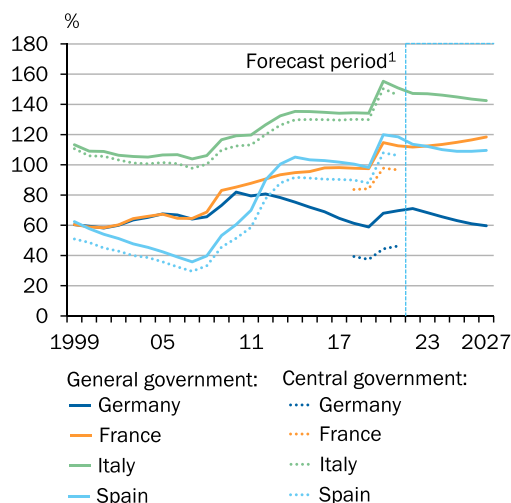
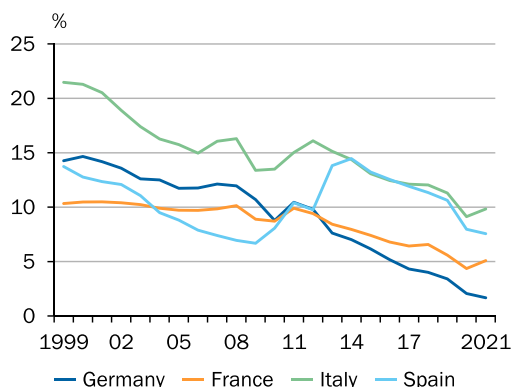
In France, Italy and Spain, government debt has increased significantly relative to economic activity over the past 20 years: Of course, the global financial crisis and again the coronavirus crisis caused substantial upward shifts in the debt-to-GDP ratio. In France, the debt-to-GDP ratio increased from 65% in 2007 to 112% in 2021, in Spain from 36% to 119% and in Italy from 104% to 151%. By contrast, Germany was able to reduce its debt ratio after the financial crisis (Chart 2, left panel). As of 2021, it stood at 70%.

Despite the sustained rise in debt ratios, interest expenditure fell significantly in relation to total government expenditure over the same period (Chart 2, right panel). In this regard, the decline in government bond rates more than offset the increase in debt. Commentators such as Blanchard et al. (2020) expected that interest rates were going to remain persistently below growth rates and, as a result, debt-to-GDP ratios would decline too far. They argued that member states of the euro area would have to run smaller primary surpluses or even primary deficits so as to keep debt-to-GDP ratios stable.

### 3 | WHAT HAPPENED POST-COVID: THE RISE OF INFLATION AND INTEREST RATES

Following the coronavirus recession of spring 2020, economies around the world recovered relatively quickly. This recovery caused an initial reduction of debt ratios in 2021 relative to 2020. Forecasts by the International Monetary Fund from October 2022 anticipate a further decline in debt-to-GDP ratios for 2022 to 2027 in Germany, Italy and Spain and a slight increase in France (Chart 2, left panel) (IMF, 2022a, 2022b).

Debt-to-GDP ratios

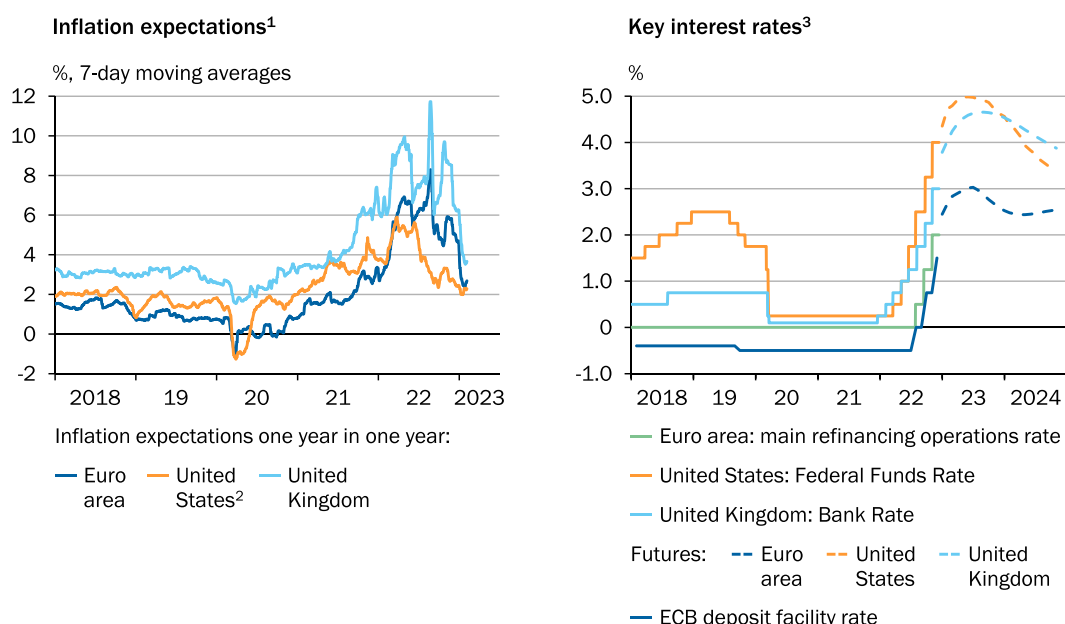
Interest expenditure to total expenditure<sup>2</sup>

**CHART 2** Debt-to-GDP ratios and interest-expenditure ratios. Footnotes: 1, October 2022 forecast by the IMF; 2, Central Government. *Source:* Eurostat, IMF, own calculations. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

While inflation had declined a bit during the recession, it increased along with the recovery. Aggregate supply did not catch up with aggregate demand that was supported by large-scale fiscal transfers and easy monetary policies. This was evident in persistent shortages of raw materials and intermediate products, higher shipping costs, production capacity constraints as well as rising energy prices. Over time companies started to complain about labor shortages. Inflation rose throughout 2021. In 2022 the Russian war on Ukraine added further fuel to inflation but also hurt the growth outlook. In the United States, inflation measured by the Consumer Price Index (CPI) reached a peak of 8.9% in June 2022. In the euro area, inflation measured by the HICP peaked at 10.6% in October 2022. Since then, inflation has declined.

The surge of inflation is reflected in nominal GDP growth rates. For example, euro area nominal GDP growth stood at 7.9% in 2022, and respectively at 7.1% in Germany, 5.5% in France, 7.1% in Italy and 10.1% in Spain. As a consequence, inflation contributes at least initially to a decline in the debt-to-GDP ratio. As long as interest rates do not exceed nominal GDP growth, the negative interest-growth differential is likely to reduce debt-to-GDP ratios further. Accordingly, the IMF forecasts predict such a decline over the coming years in Germany, Italy and Spain. Regarding France, however, the IMF forecasts a rise of the primary deficit to increase the government debt-to-GDP ratio.

During 2021, inflation expectations rose substantially and in a sustained manner across major currency areas. Chart 3 (left panel) shows market-based expectations of inflation over 1 year starting in 1 year for the United States, the United Kingdom and the euro area. The data series shown are derived from 1- and 2-year inflation swaps traded in financial markets. While euro area inflation expectations initially rose more slowly, they have caught up and eventually exceeded inflation expectations for the United States over the course of 2022. In the second half of 2022, inflation expectations started to decline again, first in the United States, somewhat later in the euro area and finally also in the United Kingdom.



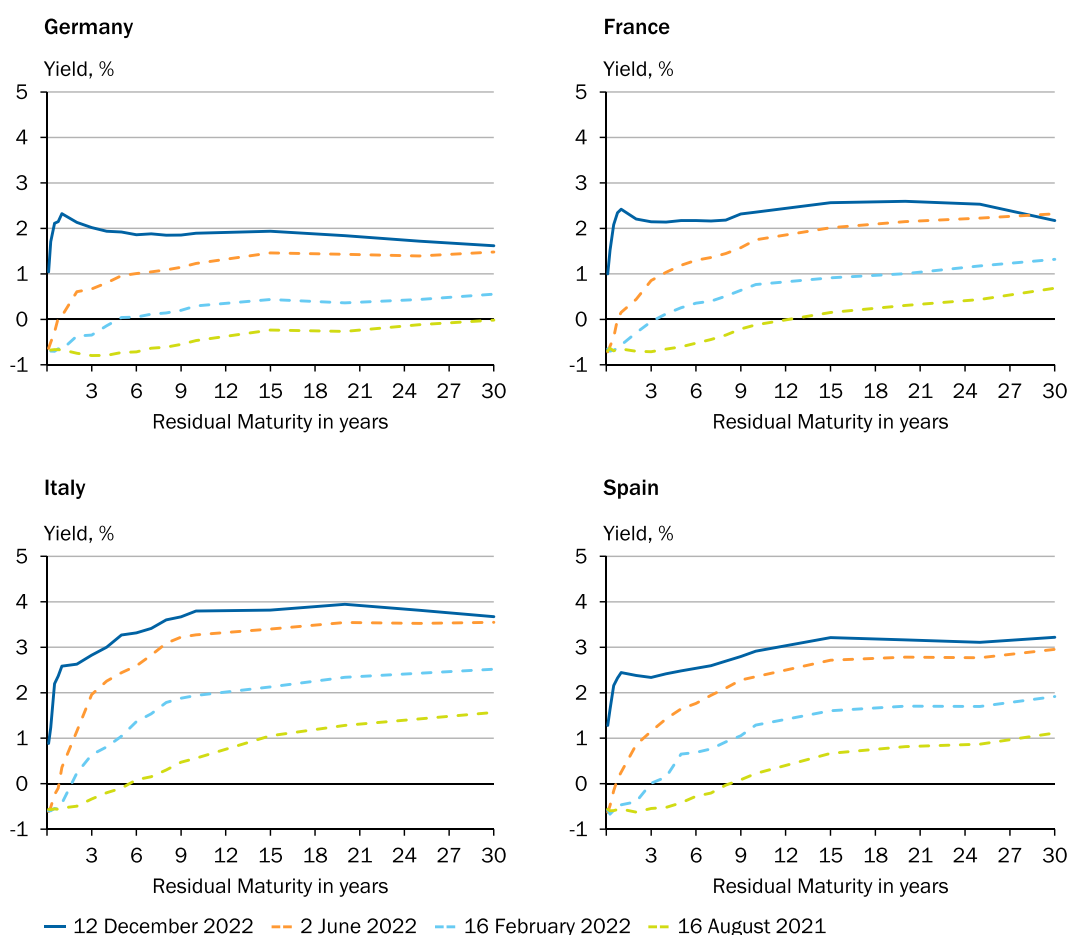
**CHART 3** Development of key interest rates and inflation expectations in selected economies. Footnotes: Inflation expectations of market participants over 1 year starting in 1 year. Determined from the 1- and 2-year inflation swaps. 2, For the United States, eight data points in 2019, three data points in 2020, one data point in 2021 and one data point in 2022 are treated as outliers like missing observations. 3, Market participants' expectations regarding central bank interest rates derived from the 30-day Federal Funds Futures for the United States, the 3-month EURIBOR futures for the euro area and the overnight index swap forwards for the United Kingdom. As of 12 December 2022. Source: BoE, Deutsche Bundesbank, ECB, Fed, ICAP, ICE Refinitiv Datastream, own calculations. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

Along with rising inflation and inflation expectations, markets anticipated that central banks would have to raise short-term policy rates substantially. As of June 2022, expectations for 2023 had already moved to over 3.5% for the United States and 2.5% for the euro area. Since then, the U.S. Federal Reserve and the ECB hiked policy rates quite a bit higher. As of 12 December 2022 markets expected the short-term interest rate to reach a peak of 5% in 2023 in the United States and 3% in the euro area (Chart 3, right panel).

Bond investors want to be compensated for higher expected inflation and they take into account expectations for future short-term rates. As a consequence, the bond yield curve has shifted up over the course of 2021 and more rapidly in 2022 along with rising inflation and short-term interest rate expectations. Furthermore, investors want to be compensated for inflation risk. Thus, the upward shift may also partly reflect higher inflation risk premia. Chart 4 reports yield curves on four different dates throughout this period for Germany (top left), France (top right), Italy (bottom left) and Spain (bottom right).

AAA-rated German government debt represents a nominally very safe asset and enjoys the lowest financing cost. As of 16 August 2021, rates on German government bonds still remained in negative territory up to maturities of 30 years. Up to a maturity of 9 years, rates were even below the ECB's deposit rate of −50 basis points. French, Spanish and Italian government bonds paid a risk premium over German bonds. Even so, France, Spain and Italy also enjoyed negative yields up to maturities of 12, 9 and 6 years. At the time, the observed increase in





**CHART 4** Government bond yield curves. Source: [worldgovernmentbonds.com](http://worldgovernmentbonds.com). [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

inflation was still considered by many including the ECB a short-lived phenomenon that would dissipate towards the latter part of the year.

By January 2022 the yield curves had shifted quite a bit. For Spain, bond yields for maturities between 15 and 30 years stood between 1.0% and 1.5%, for Italy between 1.5% and 2%. By February 16, that is a week before the Russian attack on Ukraine, yields had gained roughly another 50 basis points for medium and longer-term Spanish and Italian bonds. Yields for German and French bonds shifted up in the same fashion but to a slightly smaller extent. Since then, a substantial further upward move and steepening took place in the wake of the Russia-Ukraine war and rising inflation expectations. As of 12 December 2022, the German yield curve is well in positive territory, above 2% for short-term bonds but lower for long-term bonds with 1.6% for 30-year bonds. For France bond rates are above 2% for all maturities, for Spain between 2.3% in the short-term and 3.2% in the long-term, and for Italy between 2.5% and 3.9%.

Over the past decade, discussions of central banks' interest monetary policy have been heavily influenced by the concept of a neutral interest rate at which aggregate output is equal to potential and inflation is stable. This rate can be expressed in real terms. Then it is often referred to as real equilibrium interest rate or R-star (see Brand et al., 2018; Holston et al., 2017; Laubach &





Williams, 2003). The nominal neutral rate is the sum of R-Star and the central bank's inflation target. In 2022, this concept still featured heavily in ECB policy analysis. Lagarde (2022) emphasized its importance in policy normalization. A number of ECB Governing Council Members said that they see the nominal neutral rate between 1.5% and 2% (see, e.g., Holzmann, 2022; Stournaras, 2022; Vileroy de Galhau, 2022) and hence the real equilibrium rate between  $-0.5\%$  and  $0\%$ . If so, the German yield curve seems already quite close to their estimate of the safe neutral rate with medium to longer-term yields between 1.6% and 2%. However, neutral rates remain very uncertain and may have risen recently (Beyer & Wieland, 2019; Luzetti et al., 2022).

The substantial increase in bond rates since summer 2021 changes the outlook for interest rate expenditure and debt sustainability, particularly as bond rates come closer to or exceed potential growth rates. The yield curve for 16 August 2021 formed the basis for a quantitative assessment of the likely path of government interest expenditures in the Annual Report of the German Council of Economic Experts (2021) from November 2021. In the following, we update this assessment and evaluate further scenarios with potentially higher sovereign yield curves.

## 4 | FACTORS CUSHIONING OR EXACERBATING THE IMMEDIATE IMPACT OF BOND RATES ON GOVERNMENTS' INTEREST EXPENDITURE

### 4.1 | Maturity structure

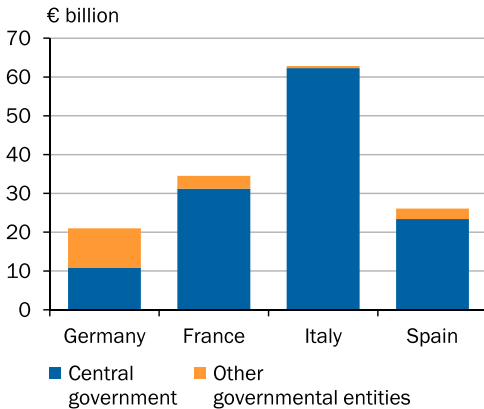
There are some factors that help cushion or exacerbate the impact of higher bond rates on the average cost of government financing. For example, by choosing the maturities of bonds, debt management can influence the interest to be paid as well as its sensitivity to changes in bond rates. Bonds with shorter maturity typically come with lower interest rates but they bring greater exposure to interest rate changes with them. In recent years, governments have taken advantage of historically low interest rates to issue longer-dated bonds. As a result, the average maturity of government bonds has increased significantly (Nöh, 2019) (Chart 5, right panel). In Germany and Italy, it is about 7 years, in Spain and France close to 8 years and above, respectively. The increase in average maturity implies that interest expenditure has become less susceptible to short-term changes in interest rates. Furthermore, there are still a good number of older bonds that were issued during the euro area debt crisis and before rates declined substantially. As these bonds expire, the debt can still be rolled over at substantially lower rates. Furthermore, in recent years many 30-year and, in the case of France, Italy and Spain, sometimes up to 50-year bonds were issued and have locked in the very low interest rates over this period. Over time, as more bonds with low rates mature and new bonds with higher rates need to be issued, the average financing cost of governments may rise.

Chart 6 shows the volumes that each government will have to repay or replace with new bonds in the coming years. In addition, the chart shows the coupons (i.e., the interest rate) for the expiring bonds. This roll-over has been key in driving interest payments down in recent years, despite little or no reduction in debt ratios.

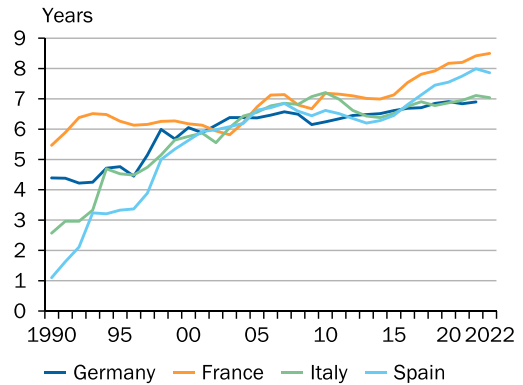
### 4.2 | Indexed debt

A factor that makes government interest expenditure more sensitive to a rise in interest rates is the use of index-linked bonds, in particular inflation- and interest-indexed bonds. Over the past

## Interest expenditure in the year 2021

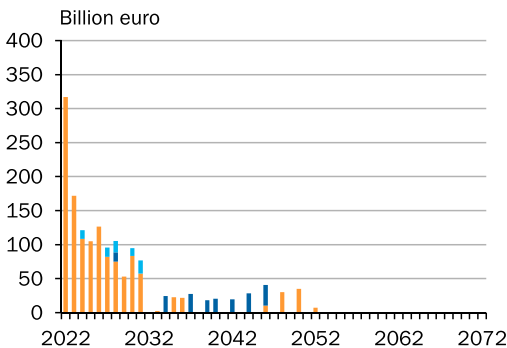


## Central government debt average maturity

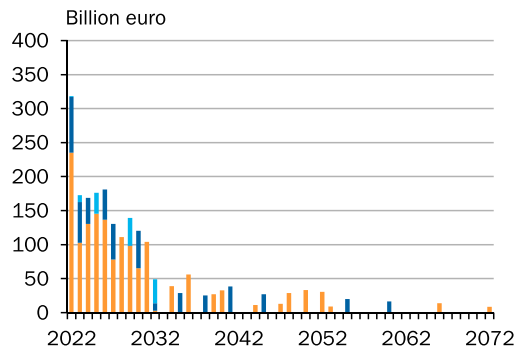


**CHART 5** Interest expenditure by government level and maturity structure.<sup>1</sup> Footnotes: 1, Expenditure-oriented interest expenditures. In contrast to origination-oriented interest expenses, premiums and discounts, for example, are spread over the term of the bond. *Source:* Eurostat, National Debt Management Offices, own calculations. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

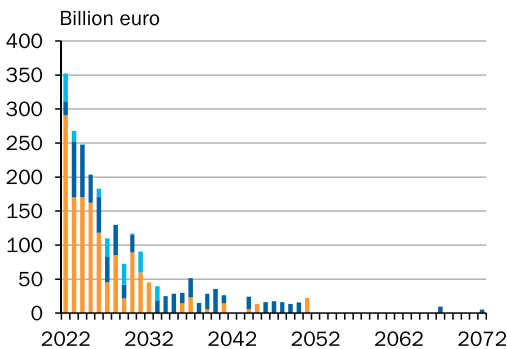
## Germany



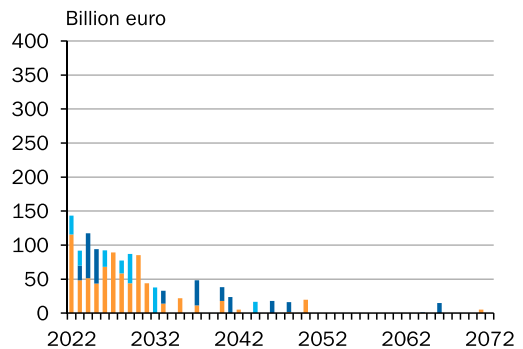
## France



## Italy

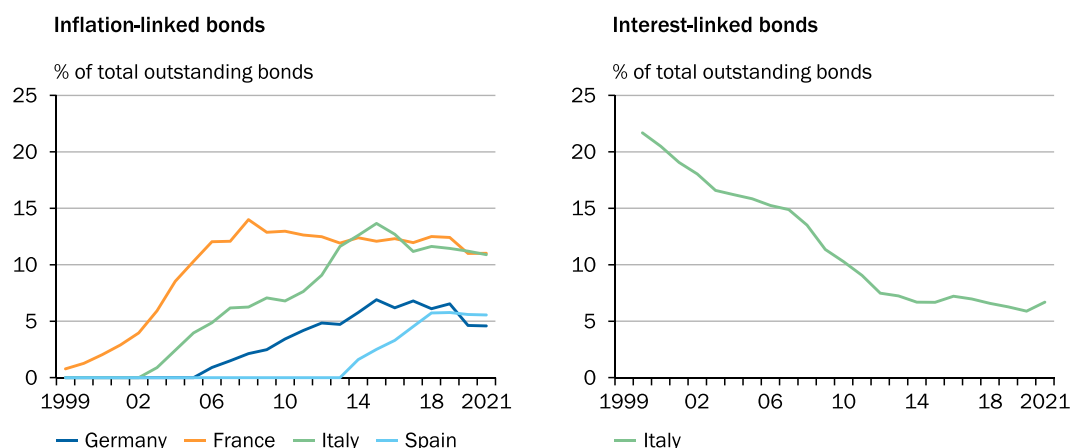


## Spain



Amount of maturing bonds with a coupon of: ■ ≤ 2 % ■ > 2 % to < 5 % ■ ≥ 5 %

**CHART 6** Redemption payments of central government debt at the end of 2021. *Source:* Agence France Trésor, Deutsche Finanzagentur, Ministry of Economy and Finance Italy, Ministry of the Finance and Public Administrations Spain, own calculations. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



**CHART 7** Inflation- and interest-linked bonds. Sources: National Debt Management Agencies. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

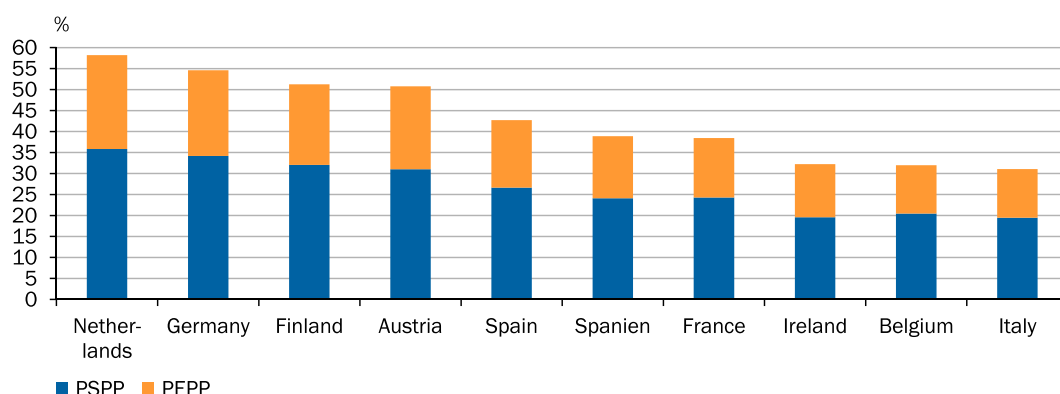
20 years, more and more inflation-indexed bonds have been issued. They offer a guarantee of inflation protection to investors. In periods of sustained low inflation, this may be a cheaper source of financing but costs rise with inflation. In Italy and France, they account for over 10% of government debt, in Spain and Germany for about 5% (Chart 7, left panel). Interest-indexed bonds were mainly used by Italy, but their share is declining (Chart 7, right panel).

The cost of inflation-indexed bonds is the likely driver for the increase in interest expenditure in 2021 in Italy and France (Chart 2, right panel). According to the French statistical office Insee, in 2021 the reduction in interest rate costs due to issuance at low rates was more than offset by higher spending on inflation-indexed bonds (Insee, 2022a). The additional expenditure compared to the previous year due to inflation-indexed bonds amounts to 8.8 billion Euro in 2021 (Insee, 2022b). For Italy, there is no transparent information on the composition of interest expenditure, but a significant part of the rise in interest rate expenditure is also likely to be due to inflation-indexed bonds. In 2022, these expenditures are expected to increase further due to higher inflation. The four German inflation-indexed bonds currently outstanding also feature inflation-indexed interest rates. However, a large part of the indexation concerns the final payment, which is higher when inflation rises. In order to prevent the final payment from leading to a cluster risk, corresponding reserves are formed in a special fund.

A high proportion of inflation-indexed bonds renders governments' interest expenditure vulnerable to high inflation. It also means that a monetary policy that brings inflation back to target reduces those costs. While a policy tightening raises interest expenditure on new bonds issued at higher rates, it also helps to lower future interest expenditure on inflation-indexed bonds to the extent it succeeds in curbing inflation.

#### 4.3 | Government bonds purchased by the Eurosystem

An important feature of the current fiscal situation in the euro area is the large share of public debt of member states that is held on the balance sheet of the ECB. This is the consequence of two large-scale asset purchase programmes — the Public Sector Purchase Programme (PSPP), which was started in 2015, and the Pandemic Emergency Purchase Programme (PEPP), which



**CHART 8** The ECB holds a large share of the general government debt of member states in the euro area.<sup>1</sup> Footnotes: Euro area member states government debt held by the Eurosystem central banks under the PSPP and PEPP as a share of general government debt of each member state. The general government debt is based on Eurostat data referring to the consolidated general government debt. Since the amount of government debt of a country that is eligible for purchase under the PSPP and PEPP is not provided by the central banks, there may be deviations from the information shown here. Data as of 2022Q4. Source: ECB, Eurostat, own calculations. PEPP, Pandemic Emergency Purchase Programme; PSPP, Public Sector Purchase Programme. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

was initiated in March 2020. As a result, the ECB holds between 25% and more than 45% of the general government debt of member states on its balance sheet (Chart 8). In Italy the share is smallest at 25% due to the large amount of government debt outstanding. For France, Spain and Germany, the share of debt held by the Eurosystem corresponds to 28%, 34% and 41%, respectively.

Net purchases under the PEPP have ended in March 2022 while net purchases under the PSPP have ended in June 2022. Reinvestments of maturing bonds, however, will likely continue for years. As of February 2023, the ECB has announced only a very small reduction of reinvestments under the Asset Purchase Programm (APP), which includes the PSPP, by 15 billion Euro per month from March to June 2023. As concerns the PEPP, the Governing Council intends to reinvest the principal payments from maturing securities purchased under the programme until at least the end of 2024.

When the ECB announced the PEPP in March 2020, it stated that ‘For the purchases of public sector securities, the benchmark allocation across jurisdictions will continue to be the capital key of the national central banks. At the same time, purchases under the new PEPP will be conducted in a flexible manner. This allows for fluctuations in the distribution of purchase flows over time, across asset classes and among jurisdictions’. Thus, effectively, the ECB can tilt its portfolio towards selected member states in order to reduce their government bond spreads. This flexibility also applies to reinvestments of maturing debt. The Governing Council has repeatedly emphasized that it will continue applying flexibility in reinvesting redemptions coming due in the PEPP portfolio, with a view to countering risks to the monetary policy transmission mechanism related to the pandemic (see also Böninghausen et al., 2022). In line with this concern, some ECB research has suggested that heterogeneity in the capacity to absorb shocks via fiscal and market-based channels could contribute to an uneven transmission of monetary policy across jurisdictions (see Hauptmeier & Renault, 2022). At the same time,



ECB communications have repeatedly emphasized that deviations from the capital key will be temporary (ECB, 2022a, 2022b).

When starting the PSPP the Governing Council decided that purchases would largely be executed by the respective national bank on its own accounts. Thus, risks from holding the national government debt will be covered by the respective national central bank and they will receive interest paid on this debt. At the end of the year interest earned will be accounted for in the national central bank's profit and loss statement. Profits will be paid out to the member state finance ministry. As a result, member states such as Italy and Spain that paid positive interest rates on debt owned by the central bank throughout the low interest period ultimately recover the interest paid. Effectively, member states are funded at the cost of the central bank money issued when the central bank purchased their debt. In economic terms, the debt is financed by monetary means. This reduces the interest expenditure for highly indebted member states below the values calculated and reported in the next section. Of course, national central banks cannot decide on the volume of bond purchases, themselves. These decisions are made by the ECB Governing Council.

Member states that experienced a long period of negative bond rates such as Germany however are in the opposite situation. The negative interest rate reduces profits by the central bank. For example, in 2020 the Deutsche Bundesbank (2021, p. 70) recorded losses on German government bonds of roughly €536 million. Added to this were interest payments for negative interest loans to banks of €1773 million. To ensure it was prepared for future risks, it transferred the remaining profit to provisions for risks rather than paying it out to the Federal Ministry of Finance. Such losses are likely increase in coming years.

The euro area already has effective mechanisms in place to avoid a debt crisis. Highly indebted countries can make use of loans from the European Stability Mechanism (ESM). The ESM already offered credit lines with minimal conditions to Member States during the COVID crisis that were not made use of. In the case of an ESM support package that is accompanied by conditions which enhance fiscal sustainability, the ECB can also engage in large-scale selective purchases in form of so-called Outright Monetary Transactions (OMT) — a programme that has already undergone judicial review.

Yet, when sovereign risk premia were rising in the first half of 2022, the ECB held an ad-hoc meeting on 15 June to discuss 'resurgent fragmentation risks ...that ... contribute to the uneven transmission of the normalisation of monetary policy across jurisdictions'. By 21 July, the ECB announced a new Transmission Protection Instrument (TPI) that could be used to make net securities purchases in affected member states. It can be activated to counter unwarranted, disorderly market dynamics that pose a serious threat to the transmission of monetary policy across the euro area.

In other words, the TPI can be used to reduce sovereign bond premia of selected member states when these premia are considered undesirable by the ECB. There are certain conditions that are meant to be met before activation. These include the requirement that the European Commission must not have initiated proceedings against the respective member state owing to fiscal deficits or macroeconomic imbalances (ECB, 2022c). However, the TPI does not require the existence of an ESM lending programme as in the case of Outright Monetary Transactions. Thus, a debt crisis of a particular member state may push the ECB into unlimited government debt purchases for a particular member state without having ESM fiscal support and conditionality in place that would otherwise help achieve fiscal consolidation and structural reforms.

## 5 | SCENARIOS GOING FORWARD: CURRENT YIELD CURVE VERSUS HIGHER BOND RATES

### 5.1 | Assumptions

To assess the development of future interest expenditure quantitatively we need to make a range of assumptions regarding determining factors. We calculate different interest rate scenarios for central government bond debt for Germany, France, Italy and Spain. Central government bond debt reflects the largest part of general government debt in France, Italy and Spain. In Germany, by contrast, the share of government debt issued by the central government is only about fifty percent. The remainder arises from downstream regional authorities and the social security funds (Chart 5, left panel).

We use a dataset of all outstanding bonds based on information from the respective governments and their debt management agencies. A large portion of the future interest expenditure results from bonds that have already been issued in the past. In most cases, the first interest payment is due one year after issuance. For short-term bonds of less than one year (Treasury discount paper), the price ('interest') is due immediately. The further we look into the future the more bonds expire. In the course of time, the interest expenditure projection is increasingly determined by the assumptions we make regarding the type of new bonds and respective interest rates and less on bonds already known today.

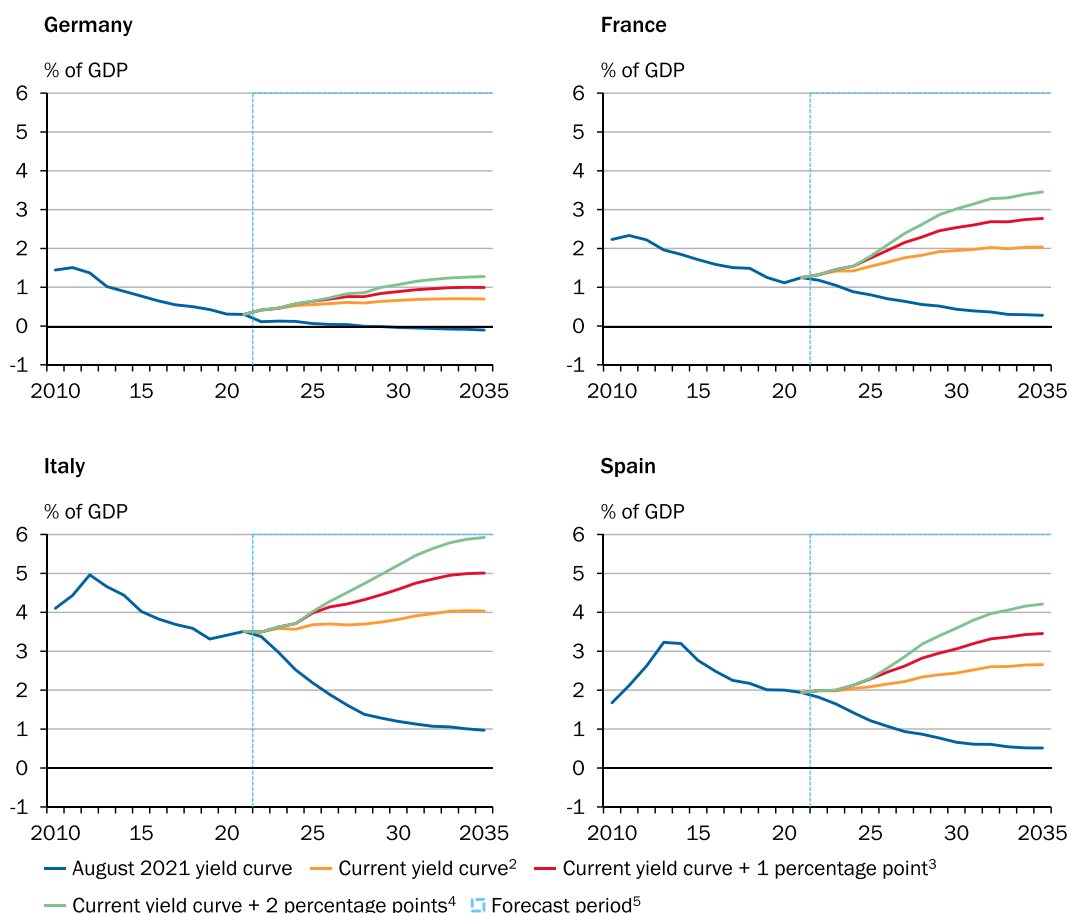
*Debt:* we assume that central government debt ratios relative to GDP evolve until 2027 according to the IMF October 2022 forecast shown in Chart 2 (Left panel). After 2027 debt ratios are assumed to remain constant till the end of the observation period in 2035. In an earlier version of this paper we used the assumption of constant debt-to-GDP ratios starting from 2023 (see Grimm et al., 2022). Of course, this means that as GDP grows, the total amount of debt increases along with it. In addition, the maturity structure from 2019 is assumed for future bond issues. From 2020, the maturity structures were rather unusual due to crisis intervention, which should return to normal from 2023.

*Nominal GDP:* The development of nominal GDP is based on the IMF forecast published in the World Economic Outlook in October 2022. The trend is extrapolated from 2028 to the end of the observation period.

*Bond rates:* We consider four interest rate scenarios that are based on four different yield curves. The resulting paths for interest expenditure relative GDP are shown in Chart 9: (i) the yield curve from August 2021 (blue line), which replicates the baseline scenario from the annual report of the German Council of Economic Experts, (ii) the current yield curve dated from 12 December 2022 (orange line), (iii) a one percentage point upward shift of the 12 December yield curve at all maturities (light blue line), and (iv) a two percentage point upward shift of the 12 December yield curve at all maturities (green line). The upward shift in interest rates in scenario (iii) and (iv) is phased in over time in steps of 0.5% per year.

Neither, an unchanged yield curve nor an unchanged maturity structure are realistic. However, it is likely that if the yield curve changes, government debt management will adjust the maturity structure accordingly. Thus, the two effects may partially cancel each other out. For instance, if the yield curve steepened significantly, debt management could well reduce the issuance of long-term government bonds and partially substitute them with the issuance of short-term bonds.

A reduction in GDP-growth would raise the interest expenditure ratio if interest expenditure itself remains constant. Thus, with lower GDP-growth, fewer bonds are assumed to be issued and



**CHART 9** Scenarios for central government interest expenditure.<sup>1</sup> Footnotes: 1, Assuming that the debt ratio evolves until 2027 according to the IMF October 2022 forecast. After 2027 the debt ratio remains constant in all subsequent years. 2, Yield curve of 12 December 2022. 3, Assuming that the current yield curve increases in 0.5 percentage point steps yearly from 2023 until 2024. 4, Assuming that the current yield curve increases in 0.5 percentage point steps yearly from 2023 until 2026. 5, Scenario calculations are based on the out-standing bonds of the central government. From 2023 on, new issuances follow the maturity structure of the year 2019. For GDP, the IMF October 2022 forecast is used. *Source:* Agence France Trésor, Deutsche Finanzagentur, Eurostat, IMF, Ministry of Finance Italy, Ministry of Finance Spain, Refinitiv Datastream, own calculations. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

total interest expenditure declines. In a *ceteris paribus* analysis, the two effects cancel each other out. However, as economic growth falls, interest rates on government bonds could rise, such that the effect on the interest expenditure ratio would still be greater than zero. Moreover, no adjustment reactions of the market, debt management or fiscal policy are taken into account.

## 5.2 | Results

The findings of the scenario analysis show the dependency of interest expenditure on future bond rate developments. With regard to Germany, it is important to keep in mind that central



government debt is only about 50% of total government debt. Thus, total interest expenditure is about twice as high as is calculated in the scenarios discussed in the following.

*16 August 2021 yield curve:* First, under the 16 August 2021 scenario for long-term interest rates, the ratio of interest expenditure to GDP would have continued to decline very quickly over the coming years. Interest expenditure on German central government debt would have fallen below zero by 2028 because the German government had been issuing debt at negative rates for some time. Even in Italy central government interest expenditure would have fallen below 2% of GDP within 3 years as shown in Chart 9 (lower left panel). Italy could have anticipated to pay interest of 1.2% of GDP by 2030, that is less than a quarter of the interest expenditure relative to GDP at the peak of the euro debt crisis in 2012.

*12 December 2022 yield curve:* The December 2022 yield curve implies that the interest expenditure relative to GDP would increase over the next 10 years by around 0.5 percentage points compared to where it was or a little above in all four member states under consideration. By 2030 it would already correspond to 1.1%, 1.9%, 3.8% and 2.4% of GDP in Germany, France, Italy and Spain, respectively. Thus, interest expenditure will account for a significantly larger share of the budget. The transition to higher expenditure occurs fastest in France, because the IMF forecast of the debt ratio that is used in the calculation increases somewhat over the forecast horizon. In Germany, Italy and Spain the IMF prediction of a small decline in the debt ratios initially helps to slow down the increase in interest expenditure.

*Parallel shift up by 1 percentage point:* This scenario is not unlikely, because the safe long-term equilibrium may well be higher than what is implied in the December 2022 German yield curve. As a consequence, the interest burden of debt increases faster and further than in the December 2022 scenario. Already a one-percentage-point-upward shift of bond yields is sufficient to drive interest expenditure in Italy and Spain to 4.6% and 3.1% of GDP, respectively, by 2030.

*Parallel shift up by 2 percentage point:* This scenario captures the possibility that the euro area economy might escape decisively from the low real interest rate environment of the last decade. If potential growth does not rise along with the real interest rate, then government interest expenditure would rise substantially, in particular in highly indebted member states. By 2030 government interest expenditure relative to GDP in Italy would reach 5.2%, in France 3.0% and in Spain 3.6%—thereby exceeding levels reached during the euro area debt crisis. These are signals of high medium-term sustainability risks due to an adverse movement of the long-run interest-growth differential. The recent Fiscal Sustainability Report 2021 published by the European Commission in April 2022 raises similar concerns about fiscal sustainability in Italy, Spain and France on the basis of a simulation analysis.

## 6 | CONCLUSION AND POLICY IMPLICATIONS

The extremely benign outlook that prevailed in past years with interest rates substantially below long-run growth is most likely history. Assuming that it would last for a long time, it had been argued that more deficit spending would then be needed to prevent debt-to-GDP ratios from declining too far. This outlook had also heavily influenced the discussion on the reform of the European Union's fiscal rules. Yet, independent of what the future will bring in the medium to longer run, the current developments show that the fiscal outlook can change rapidly and fiscal rules need to aim for an appropriate safety margin.



The projection of interest expenditures as a share of GDP on the basis of the 12 December 2022 yield curve anticipates a significant increase. However, this scenario only captures the future path of interest expenditure as long as measures are taken to ensure that debt in most of the countries under consideration actually declines slowly in line with the IMF forecast. Recent forecasts still anticipate a continuation of the recovery from the deep COVID recession. As a consequence, debt-to-GDP ratios are expected to decline in the near-term in Germany, Italy and Spain. However, substantial uncertainty remains regarding the further development of the Russia-Ukraine war and the energy crisis and the resulting implications for the government budgets.

The scenario with a phased-in one-percentage-point upward shift from the 12 December yield curve provides a very relevant alternative outlook. The Fed and ECB rate decisions in the days after 12 December show how quickly interest rates can rise significantly. Also, the long-run-equilibrium of nominal interest rates may well be higher than what is implied by the German yield curve.

Clearly, there is good reason for governments to act timely and decisively to set the economy on a path where government expenditure grows more slowly than GDP and the debt-to-GDP ratio goes on a steady decline. They bear the responsibility for making sure that government finances can weather the higher interest rates which are required to achieve price stability in the euro area. This is also what needs to be done to stay within the EU's fiscal rules once the general escape clause is lifted at the end of 2023.

Of course, member states such as Italy, France and Spain could have made better use of the period of very low interest rates and sustained growth from 2015 to 2019 to improve the sustainability of government finances. Going forward, it is even more important to take advantage of recovery and growth periods to bring debt-to-GDP ratios on a declining trajectory.

The scenario with a phased-in 2% shift shows that it is quite possible that interest expenditure to GDP ratios could breach levels last reached during the euro area debt crisis as soon as 2030. This scenario implies an adverse movement of the interest-growth differential as the path for nominal GDP evolves according to the October 2022 IMF forecast.

In sum, member states should pursue fiscal policies and market-oriented structural reforms that set them on a path with steadily declining debt-to-GDP ratios. This holds in particular for those states that are highly indebted. A safety margin is needed to improve resilience of the euro area economy in times of crisis.

There are a number of factors that support this objective. EU fiscal rules provide a framework for improving sustainability once the currently applied escape clause expires. At this point, the EU is planning to reform the rules. Such a reform should aim to strengthen the rules and improve compliance. With the NGEU package, the European Union has already provided support for public investment, particularly, in countries that have been heavily affected by the COVID crisis. Italy, for example, is a major net recipient. These investments are expected to be accompanied by structural reforms that strengthen potential growth and thereby also debt sustainability. Furthermore, a substantial amount of public debt is held by the national central banks whose profits are returned to national governments. This lowers the actual interest expenditure for highly indebted member states that have paid significant positive bond rates in past years.

Finally, the euro area already has effective mechanisms in place to avoid a debt crisis. Highly indebted countries can make use of loans from the European Stability Mechanism (ESM). ESM already offered credit lines with minimal conditions to Member States during the COVID crisis that were not made use of. In the case of an ESM support package that is

accompanied by conditions which enhance fiscal sustainability, the ECB can also engage in large-scale selective purchases under the OMT program that has already undergone judicial review. Using instead the new TPI in a new debt crisis carries the risk of large-scale ECB purchases on behalf of a particular member state without having ESM fiscal support and conditionality in place that would otherwise help achieve fiscal consolidation and structural reforms.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available for download under [www.volkerwieland.com](http://www.volkerwieland.com) and from the corresponding author upon request.

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