

## Government finances: Central bank bond purchases increase sensitivity to interest rate changes

*In the euro area, the current very low interest rate level is creating favourable funding conditions across all maturities. This is probably one of the reasons why the euro area countries have increasingly taken on longer-term debt. In doing so, they have better protected themselves against the impact of short-term interest rate rises. At the same time, however, it is important to bear in mind that the central banks' extensive bond purchases are ultimately increasing the interest rate sensitivity of government finances.*

*On the one hand, central banks' bond holdings generate interest income during the holding period; on the other, bond purchases lead to deposits from commercial banks (subject to a short-term interest rate) with the central bank. If the interest on assets (bond holdings) is higher than that on liabilities (deposits), net interest income is positive (and negative if the reverse is true). This initially increases the central bank's profits and, through its profit distribution, government revenue too. If the deposit rate rises, net interest income falls in the short term, thus also reducing the central bank's potential profit distribution. An interest rate reversal may also lead to balance sheet losses.*

*The specific payments that central banks make to their national governments depend on various factors, including balance sheet risk provisioning. For example, provisions for interest rate risk or default risk change the timing of such payments. As a case in point, some central banks (including the Bundesbank) distributed little or no profits for the year 2020, instead topping up their provisions as a precautionary measure.*

*In view of the policy decisions applicable at present, the Eurosystem central banks are likely to expand their balance sheets and significantly increase their already large government bond holdings. Next year, the public bond holdings of member countries and supranational entities in the Eurosystem could thus come close to 40% of gross domestic product (GDP). This is likely to be accompanied by a further rise in deposits from commercial banks.*

*In a sense, the euro area countries are paying the medium to long-term market rates on their national central bank's holdings of their bonds to themselves; consequently, the effective funding costs for this component of government debt ultimately depend on the Eurosystem's short-term interest rate. The more unfavourable a member country's current funding conditions on the capital market, the more financially advantageous this is. At the same time, it makes the government budgets of all euro area countries more dependent on changes in the short-term interest rates.*

## Interest developments affect government budgets

*Interest burden falling in euro area despite significant debt increase*

Through interest expenditure, government debt places an ongoing burden on government budgets. The debt ratio in the euro area has seen a sharp rise, particularly in the wake of the financial and economic crisis of 2008-09 and in the current coronavirus crisis. By contrast, interest expenditure has continued to decline. This is mainly because euro area countries have been able to access very cheap funding for some years now – in recent years, sometimes even at negative interest rates. This has also caused the average interest rate on government debt to fall to record lows (see the chart below).

*Interest expenditure reacts at different speeds to change in capital market rates*

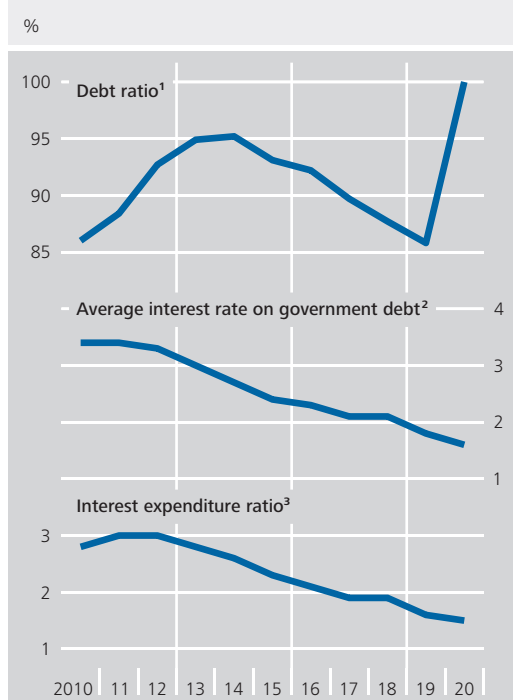
The impact of the current funding conditions on interest expenditure depends on the level of new borrowing as well as on the volume and structure of the debt securities that need to be refinanced. The residual maturity structure thus

plays a key role in the interest sensitivity of public budgets. Short-term debt is often rolled over, i.e. replaced with new debt. The shorter the maturity of outstanding fixed rate liabilities, the faster interest expenditure responds to changes in funding conditions. It also reacts quickly if liabilities have longer maturities but variable interest rates.<sup>1</sup> In addition, longer-term fixed rate liabilities can, for example, be tied to a variable interest rate via derivatives (such as interest rate swaps), or vice versa.

Through their debt management, governments can thus influence how strongly interest rate changes affect their budgets in the short term. For example, if a government borrower wants to secure a current low interest rate for the long term, it may make sense for it to issue more debt securities with a longer interest fixation period. A longer maturity is usually initially associated with higher average interest rates. On the other hand, there is then a corresponding lag before rising – or falling – interest rates are reflected in interest expenditure. This means that governments have more time to respond to a general or country-specific interest rate increase. Government finances with lower interest sensitivity can also help to reduce the pressure on monetary policy to keep government funding costs low. As government debt is currently very high in some countries and funding conditions are very favourable, it is understandable that many governments are further lengthening the maturity structure of their debt. Since the launch of monetary union, the average residual maturities of euro area government bonds had already risen noticeably (see the chart on p. 41 for information on the five largest Member States).

*Government debt management influences interest expenditure*

**General government fiscal ratios for the euro area**



Source: Eurostat. **1** Gross government debt as a percentage of gross domestic product. **2** Ratio of interest expenditure to the average debt level for the year. **3** Interest expenditure as a percentage of gross domestic product.

<sup>1</sup> Here, the interest rate is usually tied to a largely risk-free short-term interest rate, such as the EURIBOR. This means that the government is, at least, protected from a change in the risk premium. This premium only becomes relevant again if the debt security needs to be refinanced at maturity.

## Interest burden influenced by central banks' bond purchase programmes

*De facto shortening of interest rate fixation through central banks' bond purchases*

In addition to the debt structure, central banks' bond purchase programmes are also influencing the government debt burden.<sup>2</sup> In effect, the impact of these programmes is similar to a reduction in the interest rate fixation period for government debt. The main factor at play here is the balance sheet connection between the central bank and government finances. Government bond purchases influence central banks' profits and hence their payments to the government. This balance sheet connection thus does not change the government's interest expenditure but it does change its revenue (from the central bank's profit distribution and, in some cases, also tax payments from the central bank).

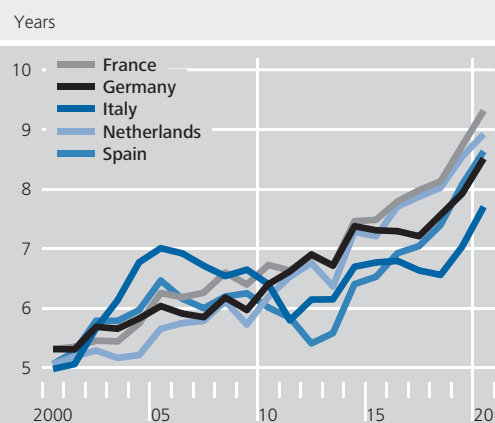
*In 2022, Eurosystem public bond holdings could come close to 40% of GDP*

The basic mechanisms at work are illustrated below using the example of the Eurosystem.<sup>3</sup> The European Central Bank and the national central banks have been purchasing government bonds on a large scale, particularly via the public sector purchase programme (PSPP) and the pandemic emergency purchase programme (PEPP).<sup>4</sup> Further purchases are envisaged for the coming months. Next year, the public bond holdings of member countries and supranational entities in the Eurosystem could thus come close to 40% of GDP.<sup>5</sup> The vast majority are accounted for by the national central banks; their PSPP and PEPP holdings primarily comprise the debt securities of their own countries, and they alone bear the associated default risk.<sup>6</sup> The resulting interest income effectively accrues to the respective national central bank.<sup>7</sup>

*Balance sheet structure of central banks: purchases of long-dated government bonds on the assets side ...*

The bond purchases<sup>8</sup> are affecting central banks' balance sheet structure and profits. They have a broad maturity range, with the average residual maturity of the PSPP and PEPP holdings across the entire Eurosystem coming to around seven and a half years at the end of 2020. The government bond portfolios generate interest income, which accrues either until

Average residual maturities of government bonds\*



Source: Bloomberg. \* Year-end figures, central government bonds.  
 Deutsche Bundesbank

<sup>2</sup> Central bank government bond purchases have a variety of economic effects on the interest rate level for government bonds. In this article, however, the focus is limited to the balance sheet connection between the government and the national central bank and the associated effects on government finances.

<sup>3</sup> See Deutsche Bundesbank (2017).

<sup>4</sup> See European Central Bank (2015a, 2020a). Furthermore, the Eurosystem is still holding government bonds acquired under the securities markets programme (SMP), which ran from 2010 to 2012. Various Eurosystem national central banks are also holding government bonds for non-monetary policy purposes. See also Deutsche Bundesbank (2016).

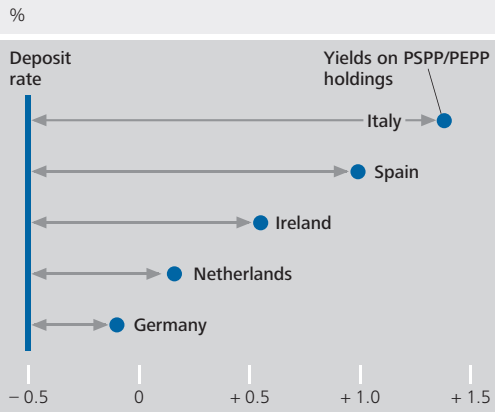
<sup>5</sup> PSPP purchases of euro area government bonds are guided by the ECB capital key on a stock basis. However, the capital key is not only based on a member country's GDP share (currently the average of the years from 2011 to 2015) but also on its population size (as at 2016). As part of the expansion of purchases introduced by the PEPP in 2020, a more flexible purchase approach guided by the capital key is temporarily being applied. By the end of the PEPP purchase horizon, temporary deviations are to be evened out again, however.

<sup>6</sup> See European Central Bank (2015b). As agreed, this applies to 80% of the PSPP/PEPP volume. Around 10% is held by national central banks in the form of supranational bonds, whose income contributes to the Eurosystem's profit and is distributed according to the capital key; the same applies to the ECB's direct purchases, which make up approximately 10% of the PSPP/PEPP volume, and to the SMP holdings.

<sup>7</sup> For the purposes of the Eurosystem's general profit distribution based on the capital key, the main refinancing rate – not the effective interest rate – is applied to government bond holdings. See European Central Bank (2016), last amended by European Central Bank (2020c).

<sup>8</sup> If, instead of national government bonds, the central bank purchases other balance sheet-lengthening assets at its own risk (such as corporate bonds (with risk sharing)), governments become more tightly bound to the short-term interest rate. With risk sharing, however, interest income from purchases is distributed differently within the Eurosystem.

### Yields on PSPP/PEPP holdings in 2020 compared to the Eurosystem's standard deposit rate



Sources: Annual reports of the respective central banks.  
 Deutsche Bundesbank

system).<sup>10</sup> The interest rate on this excess liquidity currently corresponds to the Eurosystem's deposit rate.<sup>11</sup> The deposit rate was positive until 2012 and was mostly 1 percentage point below the refinancing rate. In mid-2012, the deposit rate was lowered to 0%, and it has stood at -0.5% since September 2019.

The impact of expanding central bank balance sheets<sup>12</sup> is twofold. On the one hand, central banks' interest income goes up. This income is thus largely tied to yields on medium to longer-term government bonds (at the time of purchase), and is even negative in some Member States. On the other hand, it generates interest expenditure, which is based on the short-term deposit rate and is therefore currently negative for all central banks across the board. This type of maturity transformation generally drives up central bank profits at first because the deposit rate is usually lower than the interest rate on medium to longer-term government bonds.

*Maturity transformation has driven up central bank profits*

the bonds are sold or over their entire residual maturity. The effective interest rate results from the coupon and the difference between the purchase price and the repayment amount (the chart above provides information on central banks for which the relevant data have been published).<sup>9</sup>

If interest rates (and with them, the deposit rate) rise, central banks' net interest income falls as a direct result: while interest income on the holdings of longer-term bonds initially remains more or less stable, interest expenditure rises directly with the deposit rate. In such a case, central bank profits thus respond quickly to changes in

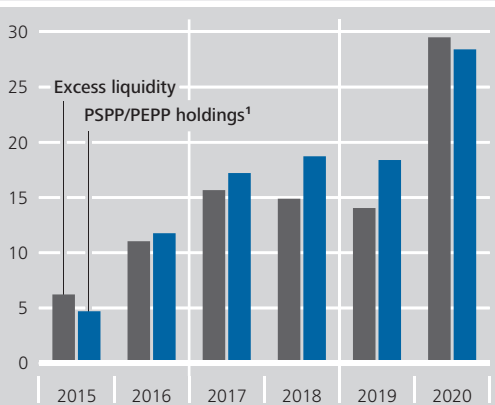
*Rising interest rates then weigh on central bank balance sheets ...*

*... versus short-term deposits on the liabilities side*

Above all, the bond purchases increase excess liquidity. This means that, in effect, the balances that banks hold on their deposit accounts with national central banks exceed their respective minimum reserve requirement (see the chart below for developments in the Euro-

### PSPP/PEPP holdings and excess liquidity in the Eurosystem

As a percentage of GDP



Source: ECB. <sup>1</sup> Cumulative net purchases.  
 Deutsche Bundesbank

<sup>9</sup> For the profit and loss account, amounts resulting from a premium/discount are allocated over the term of the bond on an accruals basis.

<sup>10</sup> The bond purchases could, in principle, also have other balance sheet effects. For example, if banks still funded themselves to a large extent via regular Eurosystem refinancing operations at the main refinancing rate of 0%, their volume could be expected to initially decline – before the banks end up holding funds on their central bank account and paying an interest spread. However, the volume of regular refinancing operations underwent a significant decline quite some time ago. At present, the government bond purchases are effectively increasing excess liquidity on a broadly similar scale.

<sup>11</sup> As long as it exceeds six times the minimum reserve requirement, which is relatively low. Unlike with income from government bonds, interest expenditure on (currently, interest income from) deposits with the national central banks is distributed within the Eurosystem according to the ECB's capital key – regardless of which central bank holds the deposits in the form of excess liquidity.

<sup>12</sup> Balance sheets are expanded when a transaction affects both the assets and liabilities side of the balance sheet to the same extent, increasing the balance sheet total overall.

interest rates. An interest rate reversal may then even lead to negative net interest income. Both the extent of the interest rate rise and the volume of bond holdings have a role to play here. For a transitional period, the reduced current income lasts for as long as central banks still have legacy holdings of bonds bearing relatively low interest. Higher income may be on the cards going forward if maturing bonds are to be refinanced at higher rates of interest.<sup>13</sup>

*... and profit transfers to government*

The government participates in the risks and earnings of a central bank's activities through profit transfer. Euro area central banks' distributions are largely destined for their own government.<sup>14</sup> The funds distributed are usually central bank profits, but in some cases there are special circumstances.<sup>15</sup> In some Member States (for instance France and Italy), central bank profits are taxed. In this case, they are passed on to the government partly as tax payments and partly as profit transfers. There may also be time lags in transferring central bank profits. For instance, risk provisions may be built up or released, thus lowering or raising the annual profit.<sup>16</sup> Any losses that may arise can be offset against future profits or capital injections from the government.<sup>17</sup> Ultimately, fluctuations in central bank income are passed through to government finances.

*Transforming risky long-term interest rates into risk-free short-term interest rates*

The link between government and central bank balance sheets means that the medium to long-term fixed interest rates on government bonds held by central banks are, in effect, transformed into a variable interest rate. If, for the sake of simplicity, the government and central bank are considered as one entity, the government is effectively no longer receiving funding – in the amount of the fixed rate bonds held by the central bank – from the yields on its bonds. Instead, it is ultimately charged the deposit rate for this portfolio.<sup>18</sup> If the financial market applies a risk premium for government bonds, the government, in effect, pays itself the premium. Governments with poorer market valuations then do not receive these risk premia in the amount of their central bank's

government bond purchases. These effects also apply if the central bank purchases variable rate or very short-term government bonds and is therefore not bound by the lower fixed interest rates described above.

## ■ Relief varies

As a concrete example, yields on German government bonds reported on the Bundesbank's 2020 balance sheet were slightly negative (average of -0.1%).<sup>19</sup> Given the difference to the deposit rate of -0.5%, the PSPP and PEPP government bond holdings can be estimated to have yielded a profit contribution of roughly €2 billion in 2020. The extremely low, almost risk-free medium to long-term yields have effectively been transformed into interest at an even lower, risk-free central bank rate.

*Short-term arithmetical rise in Bundesbank profit due to bond holdings despite negative yields ...*

However, a whole host of other income and expenditure is associated with the distributable balance sheet profit.<sup>20</sup> Given the potential

*... but, in return, weighed down by risk provisioning*

<sup>13</sup> If bonds are sold before they mature, central banks sustain these losses in income from rising interest rates at an earlier stage because the bonds are recognised at amortised cost.

<sup>14</sup> Some central banks (e.g. those in Italy and Belgium) also have private shareholders that participate in profits, too. However, their share of the distributions is much smaller than that of the government.

<sup>15</sup> Central bank profits are also dependent on a number of other factors, including institutional and legal requirements as well as accounting standards. These requirements also have a bearing on decisions relating to setting up provisions, and ultimately determine the discretionary scope for central bank management.

<sup>16</sup> See Deutsche Bundesbank (2021), pp. 65 f.

<sup>17</sup> See European Central Bank (2020b), pp. 28 f.

<sup>18</sup> The "transformation" takes place at the time of purchase and at the market conditions that apply to the bonds purchased. This does not include provisions due to potential interest rate rises or default risk.

<sup>19</sup> Interest income in relation to average holdings of government bonds under the PSPP and PEPP (mean of holdings at the start and end of 2020). Yields on new purchases were, in some cases, below -0.5%.

<sup>20</sup> In 2020, the profit was hit particularly hard by negative interest income from refinancing operations with banks at favourable interest rates (targeted longer-term refinancing operations, or TLTROs). These operations enable banks, under certain conditions, to obtain liquidity via longer-term refinancing operations that bear even more favourable interest rates than the deposit rate (even further into negative figures). See Deutsche Bundesbank (2021), pp. 54 ff. The same is also true for other Eurosystem central banks.

### Profits of euro area national central banks for the 2020 financial year

As a percentage of GDP

Euro area central banks	Profit before taxes	Taxes and distribution to government
Belgium	0.2	0.1
Germany	0.0	0.0
Estonia	0.0	0.0
Ireland	0.2	0.2
Greece	0.6	0.4
Spain	0.2	0.2
France	0.2	0.2
Italy	0.5	0.4
Cyprus	0.0	0.0
Latvia	0.1	0.1
Lithuania	0.1	0.0
Luxembourg	.	.
Malta	0.3	0.3
Netherlands	0.0	0.0
Austria	0.0	0.0
Portugal	0.4	0.3
Slovenia	0.2	0.0
Slovakia	0.2	0.0
Finland	0.1	0.0

Deutsche Bundesbank

losses due, inter alia, to changes in interest rates, the provisions were topped up by €2.4 billion using model-based calculations. On balance, the Bundesbank did not distribute any profit in 2020 and announced a further increase in the risk provisions for the current year.<sup>21</sup>

*Other central banks with sharper rise in profits from higher-yielding government bonds*

In other Member States, the profit contribution from government bond purchases is considerably higher in some cases. The market called and still calls for risk premia in the form of interest surcharges. At the end of the day, in such cases, it is the national central bank that takes on default risk and receives the risk premia.<sup>22</sup> Ultimately, there could be several reasons for differences in the amounts of profit that national central banks transfer to the government (profit distribution and payments of profit-related taxes). However, the varying rates of interest paid on government bond purchases play a major role. The highest profit distribu-

tions last year amounted to almost ½% of GDP (Italy and Greece, see the adjacent table).<sup>23</sup>

National central banks' net income from government bond purchases could grow further going forward. Holdings increased last year. Moreover, the framework agreed for the PSPP and PEPP was far from exhausted at the end of 2020. However, the market yield on government bonds in the euro area is currently still somewhat lower than in previous years.

*Bond holdings to grow further*

However, if monetary policy takes on a new, less expansionary stance, things could change. Rising deposit rates would lead to pressure on earnings in the short term and then eat into or eat up profits from purchasing bonds – if no risk provisions have been set up already as a precautionary measure. If interest rates were to rise, bond sales would also result in losses, in particular for long-term securities. This, too, would have an impact on central bank profits and, at the least, lower potential profit distribution for an extended period of time. Depending on its scale, an interest rate reversal can even lead to negative annual results. For instance, a one percentage point rise in the deposit rate and excess liquidity of 40% of GDP, amid otherwise unchanged conditions, would directly result in additional annual interest expenditure of 0.4% of GDP for central banks. This would mean around €48 billion for the euro area as a whole each year, and €14 billion for Germany.

*Rising interest rates weigh on central bank balance sheets*

<sup>21</sup> See Deutsche Bundesbank (2021), pp. 65 f.

<sup>22</sup> To the extent that risk sharing is excluded under the PSPP and PEPP, no sovereign solvency risk is redistributed among the national central banks. The national central banks therefore receive the risk premia and may set up risk provisions.

<sup>23</sup> The relative significance compared to economic output is higher the further the share in the purchase programme lies above the share of the country's GDP and the greater the number of government bonds held in other portfolios.



*Government bond purchases counteract extended maturity structure of government finances*

## Effective maturity transformation makes government finances more sensitive to changes in interest rates

All in all, through various channels and lower interest rates, Eurosystem bond purchases help to ease the burden on government finances. In the current low interest rate environment, governments are often advised to extend maturities and increasingly turn to long-term bonds. A trend in this direction can indeed be observed. The intention behind this is to secure low interest rates for the long term. However, it is all too often neglected that a central bank's government bond purchases have the same ef-

fect as shortening the average interest rate lock-in period. Through the link between government and central bank balance sheets, as soon as bonds are purchased, they effectively switch from the medium to long-term market conditions to the risk-free central bank interest rate. Taken in isolation, the short-term fiscal advantage of central bank purchases is therefore greater the more expensive a country's market financing. At the same time, the government budgets of all euro area countries become increasingly dependent on changes in the short-term interest rates. This counteracts the extended maturity structure of government bonds.

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