Haut Conseil des Finances Publiques

HCFP Permanent Secretariat

Comparison of the impact of inflation on public finances in 2022 and 2023 in six eurozone countries

Pascal Helwaser and Axelle Lacan[1]

Staff report n°2024-1

May 2024

The High Council of Public Finance and the institutions to which its members belong bear no responsibility for the contents of this document. Sole responsibility lies with its authors.

Executive Summary

The vast majority of eurozone countries have seen their public debt ratios fall between 2021 and 2023. However, the decline varies widely from country to country, ranging from 33.1 points of GDP in Greece to 0.8 points of GDP in Latvia. France's public debt ratio fell by 2.4 points of GDP over the period.

The purpose of this note is to understand the origin of the differences in debt ratio reductions observed in several countries, selected for the diversity of their public finance situations (Germany, France, Italy, Spain, Portugal and Greece), by isolating the specific effect of inflation. To this end, the note aims to consider all the impacts of inflation on the evolution of debt, drawing on numerous sources and findings from previous studies.

The analysis carried out here thus incorporates not only the "mechanical" impact of prices (of GDP, consumer prices, etc.) increase on the denominator of the debt ratio, public spending and revenues via the usual indexation mechanisms, but also the effect of support measures implemented in response to price rise, the increase in the interest expenditure due to rising inflation, and finally the impact of the loss of growth resulting from higher prices and interest rates.

As a result, inflation would have contributed to reducing public debt ratios in all the countries between 2021 and 2023: by 9.5 points of GDP in France (-2.5 points in 2022 and -7.0 points in 2023), 8.3 points in Germany, 9.0 points in Italy and Spain, 11.6 points in Portugal and 16.7 points in Greece. In France, the more contained rise in inflation and therefore in the GDP deflator, that results from the targeted measures on energy prices, limited the positive effect of inflation on the denominator, while only slightly reducing the growth loss caused by the inflationary shock, compared to what has been observed in other countries.

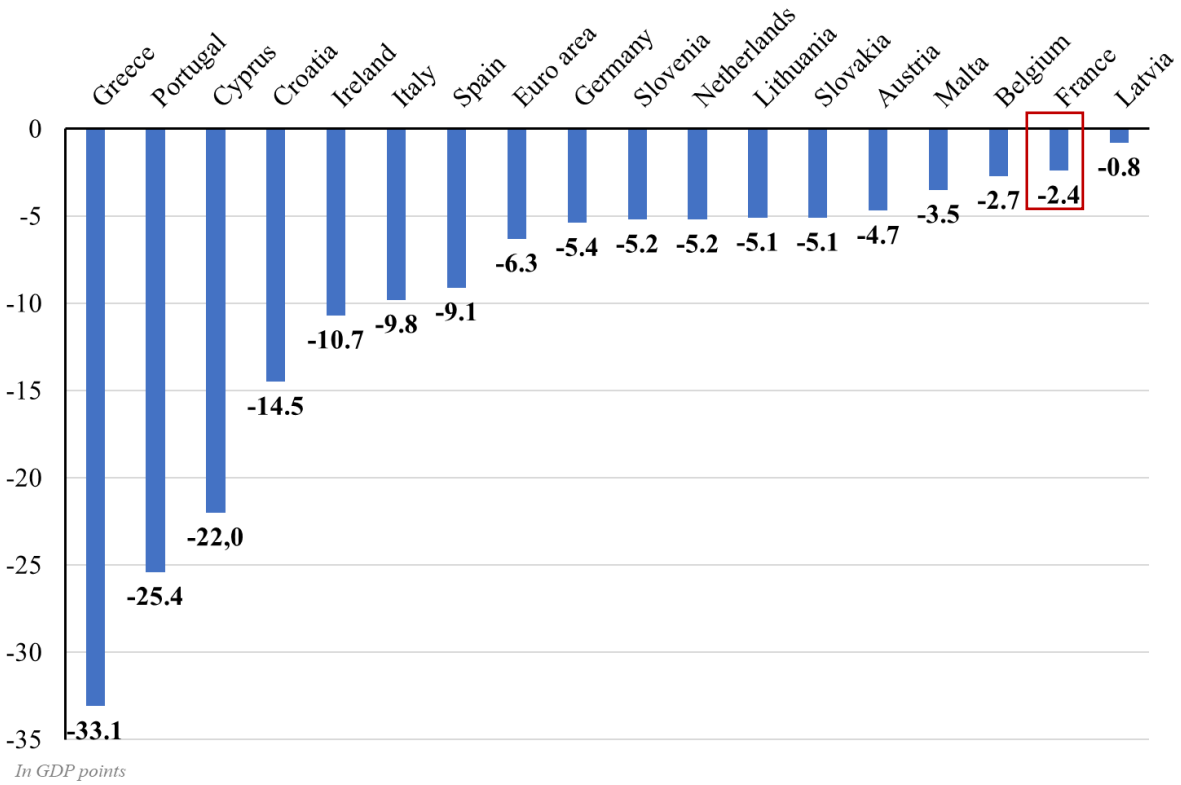
While in some countries (Portugal, Greece), the reduction in the public debt ratio went beyond the effect of inflation alone, the positive impact of inflation is not fully reflected in the public debt ratios of countries like France. This is due to initially unfavourable deficit situations, as assessed by the gap between the general government balance and the debt stabilizing balance in 2021. In France, the inflationary "windfall" on the debt ratio was largely offset by the impact of a high initial public deficit.

---

[1] HCFP Permanent Secretariat. The authors would like to thank Éric Dubois for his invaluable advice, and Emmanuel Giannesini, Guillaume Gilquin, Emmanuel Jessua and Caroline Lebrun for their helpful comments on an earlier version of this note.

Between 2021 and 2023, all eurozone countries saw their public debt ratios decline. However, the decline varies widely from country to country, ranging from 33.1 points of GDP in Greece to 0.8 points of GDP in Latvia[2]. France's public debt ratio fell by 2.4 points of GDP over the period, according to the first results of the national government accounts published by Insee.

Figure 1: decline in the public debt ratio between 2021 and 2023



Source: Eurostat

Inflation has contributed to this downward trend, but its effect does not appear to have been uniform across all countries. The aim of this note is to assess this impact for a sample of several countries, chosen for the diversity of their public finances: Germany, France, Italy, Spain, Portugal and Greece.

As a reminder, the dynamics of public debt in value terms can be written as follows:

$$D_{t+1} = D_t + Int_{t+1} + PD_{t+1} + DF_{t+1}$$

With D public debt, Int interest expenditure, PD primary deficit[3] and DF debt flows[4].

[2] Luxembourg, Estonia and Finland are the only three countries whose public debt ratios increased over the period (to 25.7 points, 19.6 points and 75.8 points of GDP respectively).
[3] General government balance excluding interest expenditure.
[4] Operations that need to be financed without increasing the public deficit in the national accounts (such as the acquisition of stakes by the State in companies), or in the opposite direction, which increase general government resources without reducing the deficit (such as privatizations).

Relating this to GDP Y gives:

$$\frac{Dt+1}{Yt+1} = \frac{\mathrm{Dt} + \mathrm{Intt+1} + \mathrm{PD\ t+1} + \mathrm{DF\ t+1}}{Yt+1}$$

$$\frac{Dt+1}{Yt+1} = \frac{\mathrm{Dt}}{Yt} * \frac{\mathrm{Yt}}{Yt+1} + \mathrm{r_{t+1}} * \frac{\mathrm{Dt}}{Yt+1} + \frac{\mathrm{PD\ t+1}}{Yt+1} + \frac{\mathrm{DF\ t+1}}{Yt+1}$$

$$\frac{Dt+1}{Yt+1} \approx \frac{\mathrm{Dt}}{Yt} * (1 + \mathrm{r_{t+1}} - \mathrm{g_{t+1}}) + \frac{\mathrm{PD\ t+1}}{Yt+1} + \frac{\mathrm{DF\ t+1}}{Yt+1}$$

$$d_{t+1} = d_t + (\mathrm{r} - \mathrm{g}) * d_t - \mathrm{pb_{t+1}} + \mathrm{df_{t+1}}$$

where d is the debt-to-GDP ratio, r is the apparent interest rate on public debt, g is the GDP growth rate in value terms, pb is the primary balance-to-GDP ratio and df is debt flows-to-GDP.

Note that $\Delta \mathrm{d_t} = (\mathrm{r} - \mathrm{g}) * d_t - \mathrm{pb_{t+1}} + \mathrm{df_{t+1}}$

Excluding the effect of debt flows, stabilization of the public debt ratio requires a primary balance equal to the product of the difference between the apparent interest rate on public debt and the growth rate of GDP in value and the public debt ratio. This is referred to as a stabilizing primary balance. A primary public balance higher than the stabilizing primary balance leads to a fall in the public debt ratio.

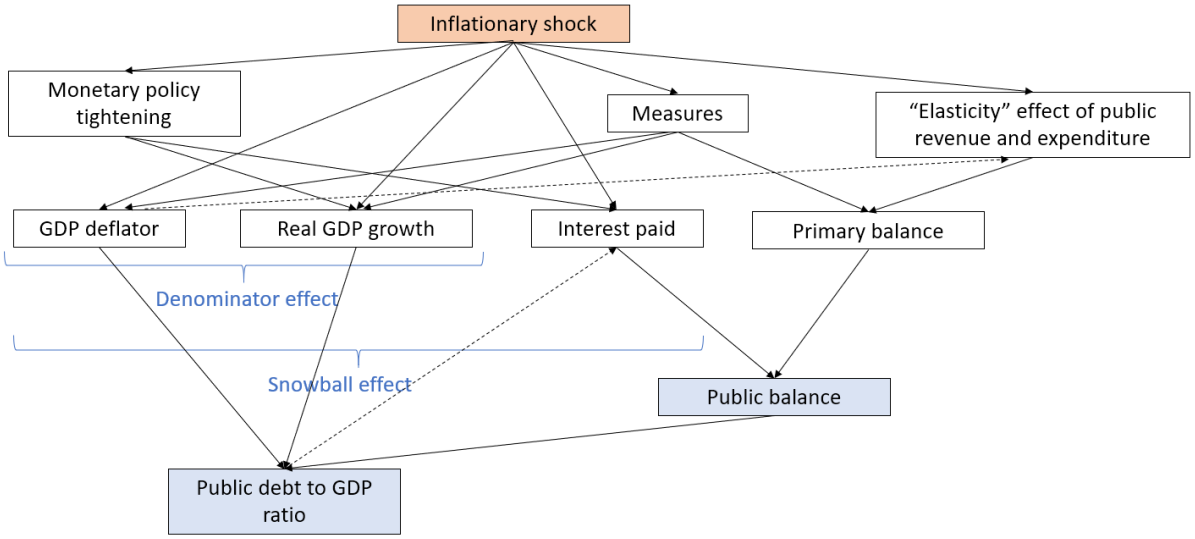
Future trends in public debt therefore depend on the relationship between the spread between the apparent interest rate on debt r and GDP growth in value terms g, on the one hand, and the primary balance pb, on the other.

The spread (r-g) depends on inflation through several channels. Inflation affects:

- GDP growth in value terms g, directly through a price effect (the change in the GDP deflator), but also indirectly through its effect on GDP growth in volume terms (here, through the impact of higher energy bills, tighter monetary policy or fiscal support measures implemented);
- the apparent interest rate on public debt r, through inflation-indexed bonds and changes in interest rates paid on fixed-rate public debt.

The primary balance (pb) is dependent on the "mechanical" impact of increasing inflation on the general government balance through the elasticities of public revenues and expenditures, discretionary measures implemented to limit the impact of inflation on the income growth of households and businesses, as well as the adverse effect on economic growth of higher prices and interest rates.

Figure 2: simplified diagram of the impact of inflation on public finances



Source: authors' diagram based on an illustration by the European Commission

I. Recent analyses

Several analyses of the impact of inflation on public finances have recently been published[5].

a. The European Commission's analysis through the evaluation draft budgetary plans.

As part of its evaluation of budget plan proposals published by eurozone countries, the European Commission has broken down the changes in the public debt-to-GDP ratio according to various contributing factors:

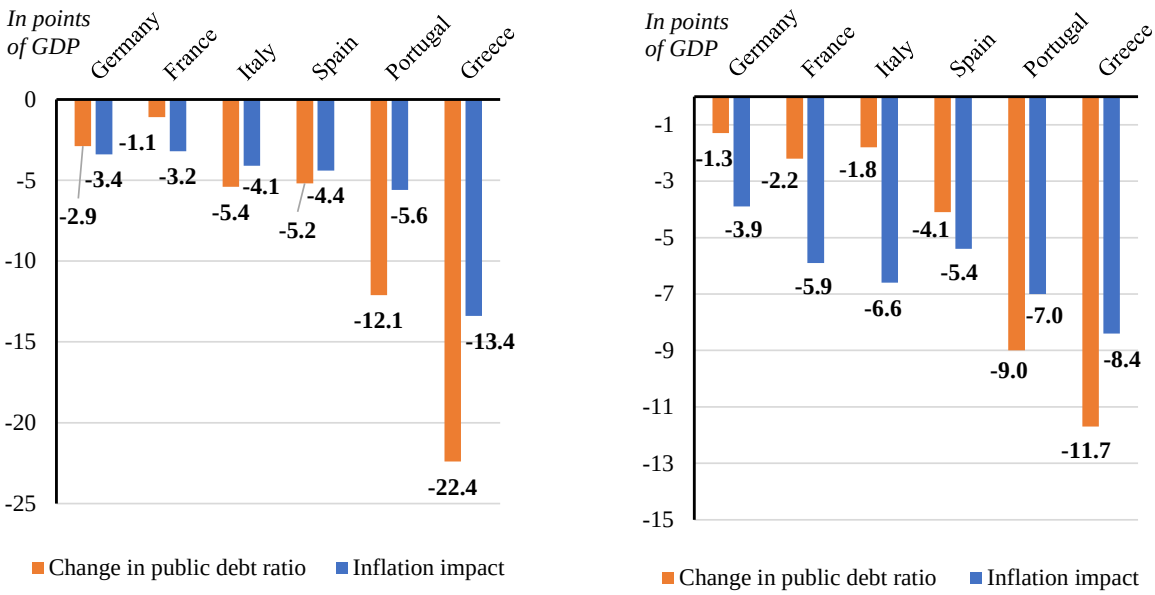
- primary balance;
- "snowball effect", which reflects the impact of:
  - interest expenditure on general government debt;
  - real GDP growth;
  - inflation on the public debt-to-GDP ratio (through the denominator).

- and the "stock-flow" adjustment, comprising other factors impacting on general government debt, such as differences between cash and national accounting (including advances and delays in the disbursement of European Union funds), the net accumulation of financial assets and other residual effects.

The effect on the public debt ratio associated with inflation is equated with the impact of the increase in the GDP deflator on the ratio through its denominator. It is favourable for all countries in 2022 and 2023, but highly heterogeneous, as shown in Figure 3.

[5]A summary of each study is available on request from the authors.

Figure 3: variation in the public debt ratio and the mechanical effect of inflation on the denominator estimated by the European Commission in its analysis of the draft 2024 budget plans (2022 on the left, 2023 on the right)



Source: European Commission
Note for the reader: in 2022, Germany's public debt ratio has fallen by 2.9 points of GDP. The mechanical impact of inflation on the public debt ratio is estimated at -3.4 points of GDP.

This heterogeneity is mainly explained by varying degrees of GDP deflator growth across countries. France would have benefited from a favourable cumulative "inflation" impact of 9.1 GDP points in 2022 and 2023, a low level compared to that observed in other countries studied (see Table 1). Indeed, the growth of the GDP deflator between 2021 and 2023 has been more contained in France than in the other countries studied (see Table 2)[6].

Table 1: "inflation" impact on the public debt ratio in 2022 and 2023 (in GDP points)

Germany	-7.3
France	**-9.1**
Italy	-10.7
Spain	-9.8
Portugal	-12.6
Greece	-21.8

Source: European Commission

Table 2: change in GDP deflator between 2021 and 2023 (in %)

Germany	12.2
France	**8.6**
Italy	9.1
Spain	10.3
Portugal	12.6
Greece	12.7

Source: Eurostat

[6] The differences in GDP deflator growth between countries may reflect those observed in the consumer price index. For example, in 2022, Greece experienced the highest increase in both the GDP deflator and consumer prices; conversely, the smallest increase in GDP prices and consumer prices was observed in France. However, the GDP deflator covers a broader scope than the consumer price index. It can therefore diverge from the consumer price index due to factors such as changes in the prices of gross fixed capital formation (GFCF).

However, the estimated inflation impact does not consider mechanisms for indexing revenues and expenditure to inflation, the impact of discretionary government measures, or the loss of growth associated with higher energy bills.

A number of studies have attempted to assess the impact of inflation on public finances in more detail, through econometric work, structural model simulation or detailed analysis of mechanisms for indexing revenues and expenditure to prices.

b. The European Commission's analysis in its report on public finances in the Economic and Monetary Union

The third part of the European Commission's annual report on public finances in the Economic and Monetary Union (Report on Public Finances in EMU)[7], published in October 2023, evaluates the implications of the recent inflation surge on public finances. This evaluation is based on a panel estimation of the impact of an inflation surprise on the public finances of European Union countries over the period 2000-2020. These estimations lead to the following evaluations:

- A scenario where an inflation shock results in a 5.0% increase in the GDP deflator would lead to a short-term impact on the general government balance ranging from 0.5% to 1.6% of GDP, depending on the country;
- A scenario where an inflation shock leads to an increase in the GDP deflator as projected by the European Commission in its autumn scenario for 2022 would result in a short- term impact on the general government balance ranging from 0.5% to 1.5% of GDP, depending on the country;
- The same inflation shock, considering the indexing of benefits, would result in a short- term impact on the general government balance ranging from -0.5% to 0.5% of GDP, depending on the country.

However, these estimates do not take into account the particularities of the current period, marked in particular by strong fiscal and monetary policy reactions.

c. The analysis of the International Monetary Fund (IMF)

The article[8] by D. Garcia-Macia examines the responses, at different horizons, of public finance variables to an inflation shock by regressing them on inflation and a number of other control variables that may affect public finances. It is estimated that inflation shocks temporarily improve general government balances because nominal revenues closely follow inflation, while nominal primary expenditures take longer to catch up. However, the estimations also show that inflation peaks lead to a persistent reduction in the ratios of public debt to GDP, both due to the improvement in the primary balance and the denominator of nominal GDP.

Like the previous study, this one, however, does not take into account the particularities of the current period and does not provide a differentiated analysis by country.

[7] European commission, *Report on Public Finances in EMU*, *Institutional Paper* 256, October 2023.
[8] D. Garcia-Macia, *The effects of inflation on public finances*, Working Paper 23/93, IMF, May 2023.

d. Analysis of the European Central Bank (ECB)

In December 2023, the ECB presented a detailed country-by-country assessment of the impacts of high inflation on the public accounts of eurozone countries[9]. Unlike previous studies, this one is based on a detailed analysis of the mechanisms for indexing expenditure and revenue to inflation.

The results suggest that the recent inflation surge deteriorates general government balances between 2022 and 2024, particularly in 2024 when expenditures will catch up with inflation due to their delayed indexation. While the results indicate that the effects of inflation vary considerably from one country to another, even in the absence of positive impacts on the budget balance, the study concludes a favourable impact of the recent high inflation on the ratios of public debt to GDP due to the "denominator effect;" i.e., the increase in nominal GDP. Simulations show a reduction of over 3 percentage points for the eurozone due to inflation by 2024.

This insightful analysis, however, does not take into account the total impact of inflation on interest rates and real output, as well as the costs of all discretionary measures adopted by eurozone governments between 2022 and 2023 in response to energy shocks and rising inflation. Additionally, the assumption of perfect indexation of expenditures to inflation after 2 years seems somewhat excessive.

All in all, these various analyses provide some initial information on the impact of inflation on public finances. They do not, however, take into account all the effects associated with an inflationary shock, and in some cases even lead to results that contradict observed data.

The analysis proposed in this note attempts to assess all the impacts of inflation on public debt. The second part presents the mechanical impact of rising inflation on public revenues and expenditure, excluding interest charges. The third part assesses the negative impact of the inflationary shock on growth, the impact of the budgetary measures implemented and the rise in interest charges.

II. The "mechanical" effect on public revenues and expenditure, excluding interest charges

Inflation mechanically affects government revenue and expenditure. These effects can be measured by calculating elasticity coefficients. The elasticity of revenue (respectively expenditure) to an inflation shock is the multiplier coefficient that enables the rate of change in prices to be converted into the rate of change in revenue (respectively expenditure). Public revenues and expenditure are broken down according to the price index they follow, i.e. consumer prices, value-added prices or wages.

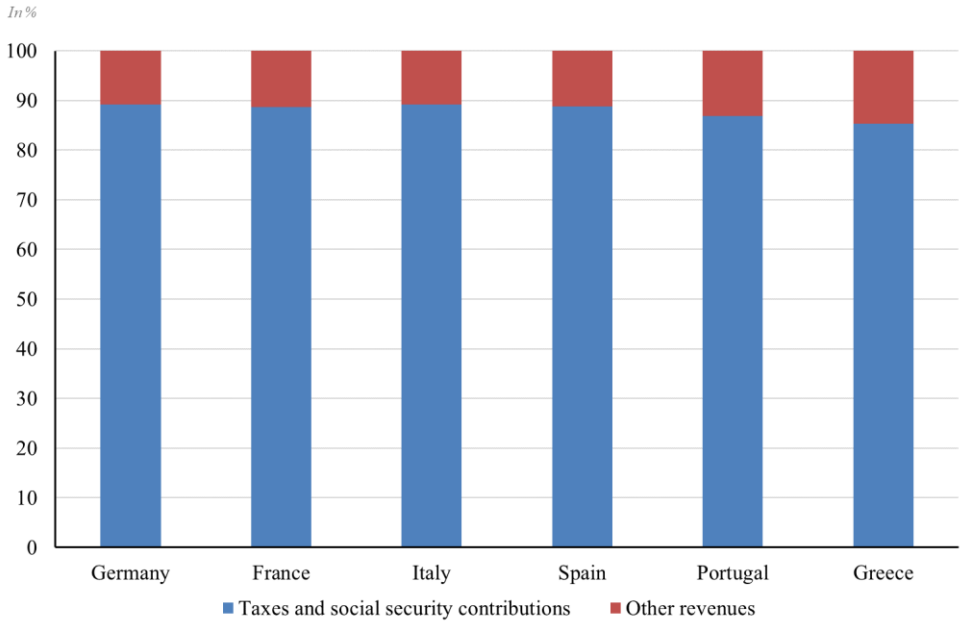
[9] K. Bańkowski, C. Checherita-Westphal, J. Jesionek, P. Muggenthaler, « *The effects of high inflation on public finances in the euro area* », Based on the analysis by the Eurosystem members of the Working Group on Public Finance, Revised December 2023.

a. The "mechanical" effect on revenues

Regardless of the country studied, the share of taxes and social contributions is predominant in total public revenues (see Figure 4). These revenues, with few exceptions, are calculated by applying a rate to a taxable base, expressed in current euros. Consequently, they evolve in the same proportions as the prices of the taxable base to which they apply, subject to the effects related to the potentially progressive nature of certain tax brackets, such as income tax[10]. However, some taxes are calculated based on quantities independent of prices (for example, excise duties on beverages and especially energy and fuels, which are based on consumption volumes).

The *National Tax Lists* published by Eurostat provide annual tax amounts for each country, based on national accounts[11]. This enabled us to carry out a revenue-by-revenue analysis, to determine the extent to which each tax rose or fell with consumer prices, wages and value-added prices[12], by referring in particular, where available, to the tax elasticities estimated by the OECD[13] for each of the countries examined.

Figure 4: share of taxes, social security contributions and other revenues in total public revenues in 2022



Source: European Commission, Ameco data base

[10] Nominal income increases due to inflation can push them into higher tax brackets if tax rates are not indexed ("fiscal drag" effect).
[11] The October 31, 2023 update of the National Tax Lists has been taken into account.
[12] For social security contributions, in particular, the National Tax Lists provide the amount of contributions levied on self-employed workers. It is assumed that these contributions evolve in line with the price of value added, unlike those linked to salaried employment, which evolve in line with wages.
[13] R. W. Price, T. Dang, J. Botev, *Adjusting fiscal balances for the business cycle, New tax and expenditure elasticity estimates for OECD countries*, OECD Economics Department Working Papers, N° 1275, 2015.

Public revenues excluding compulsory levies represent around 10% of total public revenues (see Figure 4). By their very nature, some of these revenues are not very sensitive to price trends (dividends from public enterprises, etc.). Sales revenues, on the other hand, follow consumer price trends.

Detailed results by country and type of revenue are presented in Appendix 1. The elasticities of total revenues to different price and wage indices calculated are shown in table 3. Differences between countries can be explained by structural effects (greater or lesser weight of income tax, for example).

These elasticities are average elasticities, which do not take into account the potential specificities of the period considered in this note. In the case of France, for example, the elasticity of contributions to the average wage per capita may have been reduced by the impact of the automatic revaluation of the SMIC (minimum wage) on contribution reductions (see box). As we are unable to measure these effects for other taxes (e.g., the impact of rising interest rates on property transfer taxes in France), and especially for countries other than France, we have applied average elasticities for all countries.

Table 3: revenue elasticities in the eurozone countries studied in 2022[14]

		Germany	**France**	**Italy**	**Spain**	**Portugal**	**Greece**
Increase in consumer prices	current year	26%	24%	21%	23%	29%	25%
	following year	26%	26%	22%	27%	30%	26%
Increase in wages	current year	54%	40%	23%	24%	28%	24%
	following year	59%	50%	55%	62%	59%	42%
Increase in value-added prices	current year	1%	5%	4%	2%	0%	0%
	following year	7%	19%	24%	23%	16%	14%
Total	**current year**	**80%**	**68%**	**48%**	**49%**	**57%**	**49%**
	following year	**92%**	**95%**	**101%**	**112%**	**105%**	**81%**

Source: authors' calculations.
Note for the reader: a 1% rise in private wages in France in 2022 translates into a 0.5% increase in public revenues with the 2022 revenue structure.

In year n+1, France has an inflation elasticity of public revenues close to unity (0.95).

[14] The results for 2023, also used in the last part of this note and very similar to those for 2022, are presented in Appendix 2.

Box: lower wage elasticity of social security contributions in France in 2021 and 2022?

In France, there are mechanisms for reducing social security contributions on salaries up to 3.5 SMIC. As the minimum wage rose faster than the average wage in 2021 and 2022, the dynamism of the wage bill was not fully reflected in the change in revenues. The cost of general tax breaks thus rose by 15% in 2022, to €68.3 bn, and is expected to rise by 10% in 2023, to €75.4 bn. The existence of these exemptions has reduced the elasticity of social security contributions to wages in France.

Extract from the SMIC expert group's annual report published on December 15, 2023[15]

"The minimum wage (SMIC) was increased seven times between January 1, 2021, and May 1, 2023, with a cumulative rise of +13.5%. [...] The percentage of employees directly affected by the minimum wage increase on January 1 continues to rise in 2023, reaching a historic level of 17.3% (after 12.0% in 2021 and 14.5% in 2022). [...]

In the recent period, private sector contributions have risen sharply (+7.5% in 2022, after +8.7% in 2021), a significant increase but still below the growth of the private sector wage bill subject to contributions (+8.7% in 2022, after +8.9%). This growth in the private sector wage bill is driven partly by the increase in salaried employment and partly by the substantial rise in the average wage per head (+5.8%), influenced by the inflation shock. However, the growth of private sector contributions is constrained by the strong dynamic of the total cost of general reduction schemes in recent years, which would reduce the growth of private sector contributions by 1.6 percentage points in 2022 [...]. According to the Social Security accounts of September 2023, the total cost of general reduction schemes for employees amounted to €68.3 billion in 2022 (compared to €59.4 billion in 2021, an increase of +15% compared to 2021) and is expected to continue growing in 2023 to reach €75.4 billion (an increase of +10% compared to 2022).

Several factors can explain the strong dynamic of general reductions since 2021. Firstly, the successive automatic increases in the minimum wage due to high inflation (as the minimum wage is directly indexed to the price index of the first quintile of the standard of living) have a nominal effect on the contribution base subject to reductions since the reduction schedule is expressed in multiples of the minimum wage. Thus, minimum wage increases raise the nominal level of salaries eligible for contribution reduction schemes, mechanically increasing the base eligible for these exemptions. Secondly, the significant recent increases in the minimum wage may have had an indirect effect on the distribution of wages. Wages above the minimum wage have increased less rapidly than the minimum wage itself, leading to a compression of the wage distribution, bringing more employees into the scope of the general regressive reduction. As a result, a greater number of employees are affected by high reduction rates around the minimum wage, which accentuates the increase in the cost of general reductions. Thus, in the recent period, the base eligible for the general regressive reduction up to 1.6 times the minimum wage, which is most affected by minimum wage increases, has grown much more rapidly than the private sector wage bill in 2022 (+12.1% growth in the cost of the regressive reduction, compared to +6.3% for the private sector wage bill). [...]"

b. The "mechanical" impact on expenditure excluding interest charge

Table 4 shows a breakdown of expenditure by major aggregates: intermediate consumption, compensation of employees, other current expenditure, interest, social benefits and other social transfers in kind, social transfers in kind of market products, subsidies, other capital expenditure and gross fixed capital formation (GFCF).

Table 4: major components of public expenditure in 2022 (in %)

	Germany	France	Italy	Spain	Portugal	Greece
Operating expenditure	**34.3**	**37.7**	**32.2**	**40.6**	**42.6**	**34.2**
Intermediate consumption	12.4	8.9	10.8	12.4	12.5	10.6
Compensation of employees	16.1	21.3	17.1	24.3	24.1	20.8
Other current expenditure	5.8	7.5	4.2	3.9	5.9	2.8
Interest expenditure	**1.4**	**3.3**	**7.6**	**5.0**	**4.4**	**4.8**
Benefits and other transfers	**59.1**	**52.6**	**55.5**	**48.6**	**47.6**	**54.3**
Social benefits other than social transfers in kind	32.3	33.3	37.3	35.9	37.5	34.0
Social transfers in kind of market products	18.5	10.9	4.5	5.9	4.4	5.6
Subventions	3.6	5.4	4.7	4.2	2.5	10.2
Other capital expenditures, including capital transfers	4.6	3.0	9.0	2.5	3.2	4.4
GFCF	**5.3**	**6.4**	**4.8**	**5.8**	**5.4**	**6.8**
Total public expenditure	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: European Commission, Ameco database

Initially, interest expenditure is excluded from the analysis.

Certain mechanisms are common to all the countries studied:

- The extent of the impact of price increases on intermediate consumption is uncertain[16]. Therefore, it is assumed that 50% of intermediate consumption expenditures are indexed to consumer prices;
- Gross fixed capital formation (GFCF) is assumed to follow the evolution of value-added prices and consumer prices.

The category of "benefits and other transfers" represents nearly or more than 50% of public expenditures in the six countries studied. It is mainly composed of social benefits other than social transfers in kind and social transfers in kind of market products. The details of these

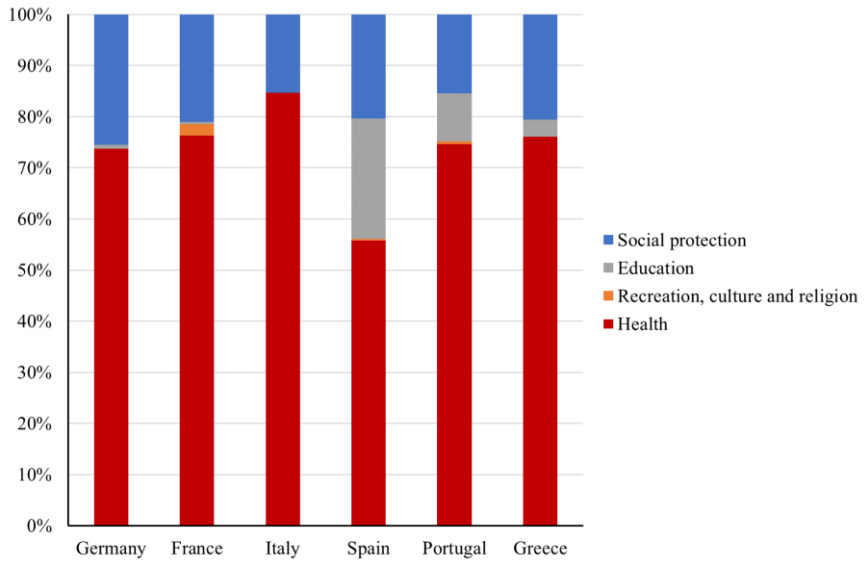
[15] Salaire minimum interprofessionnel de croissance - rapport 2023 | DARES (travail-emploi.gouv.fr)
The text has been translated by the authors of this note. It is not an official translation.

[16] Adjustments can be made in terms of volume, particularly for credits under envelopes but also outside envelopes, in order to limit the deterioration in the general government balance. Conversely, certain intermediate consumption items may be "constrained" expenditure items, which are difficult to adjust downwards significantly in terms of volume.

two categories are provided by the classification of government expenditures in national accounts, the *Classification of the Functions of Government* or COFOG nomenclature[17].

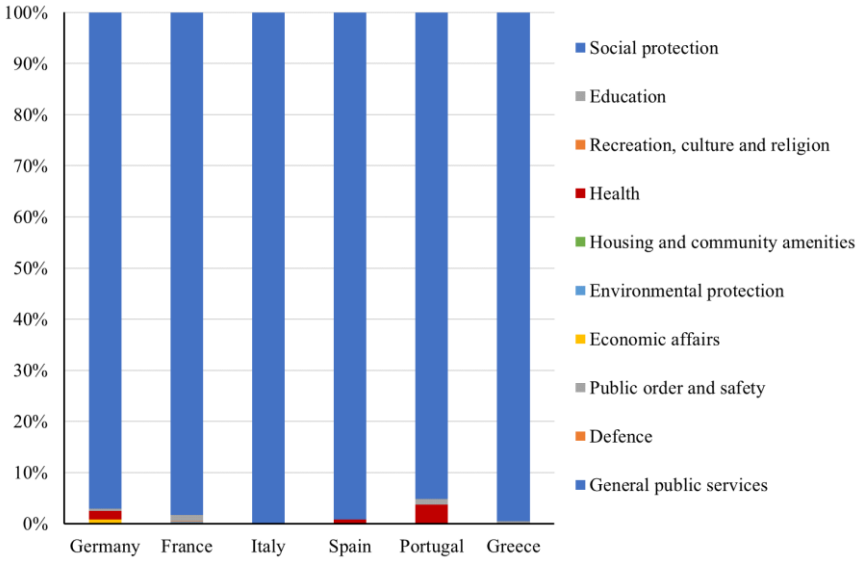
Social transfers in kind of market products (see Figure 5) mostly correspond to health expenditures, which are insensitive to inflation, at least in the short term. In contrast, social benefits other than social transfers in kind (see Figure 6) are almost entirely dedicated to social protection and therefore have indexation mechanisms (pensions, family allowances, etc.).

Figure 5: COFOG breakdown of social transfers in kind of market products in 2022



Source: Eurostat

Figure 6: COFOG breakdown of social benefits other than social transfers in kind in 2022

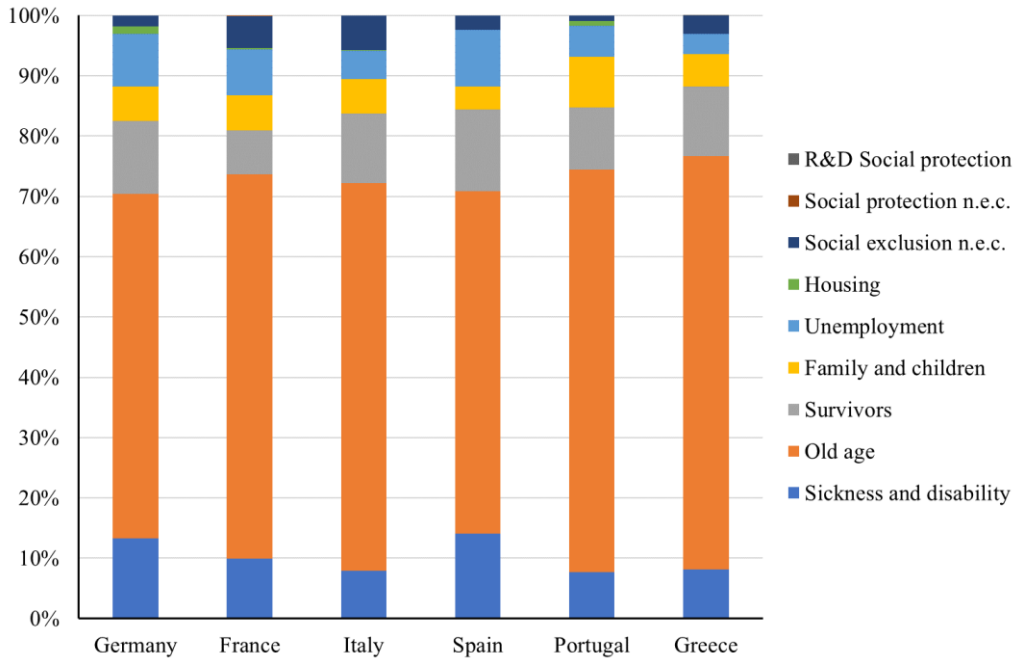


Source: Eurostat

[17] The amounts for 2022 in the COFOG breakdown and those in the Ameco database are equivalent (see appendix 3). The COFOG breakdown is therefore a useful source of information for understanding the content of the two categories concerned.

Within social protection (see Figure 7), spending on so-called "mandatory" pensions, which are recorded as public expenditure and include the "survivors" and "old age" sub-functions, plays a predominant role.

Figure 7: breakdown by COFOG nomenclature of the 'social protection' item for social benefits other than social transfers in kind in 2022



Source: Eurostat

The above-mentioned ECB[18] publication is particularly instructive with regard to the indexation of pensions and public-sector pay. The published document presents an overview of public sector wage and pension indexation systems in the various eurozone countries, based on a questionnaire completed by members of a *Working Group on Public Finance*. It concludes that the indexation of public sector wages to prices is relatively limited in the eurozone[19], while the indexation of pensions to prices and wages is, in most cases, automatic, either partially or totally[20].

Still within social protection, unemployment benefits can also be indexed. In the six countries studied, this is the case in Germany (on past wages and prices), France (on past wages

[18] Checherita-Westphal C., *Public wage and pension indexation in the euro area: an overview*, Occasional Paper Series, N° 299, ECB, August 2022.

[19] This section deals with the automatic indexation of civil service salaries to prices and wages. However, exceptional support measures can be implemented in the face of a major inflationary shock, as was the case in France in 2022 and 2023, when the civil service index point was raised. In such cases, they will be taken into account in the section dedicated to budgetary support measures.

[20] The publication includes a fact sheet for each country, summarizing the responses to the working group's questionnaire. The results used in this note are presented in Appendix 4 of this publication.

and prices) and Spain (on past wages). Similarly, other benefits can be indexed, notably family benefits, and are indexed to consumer prices in most European countries[21].

The elasticity of spending to consumer prices, wages and value-added prices in the various countries studied is shown in table 5[22].

Table 5: spending elasticities in the six eurozone countries studied

Germany			
		2022	**2023**
Increase in consumer prices	current year	9%	8%
	following year	11%	10%
Increase in wages	current year		
	following year	25%	24%
Increase in value-added prices	current year	3%	3%
	following year	3%	3%
Total	**current year**	**12%**	**11%**
	following year	**39%**	**37%**
Italy			
		2022	**2023**
Increase in consumer prices	current year	13%	14%
	année suivante	43%	45%
Increase in wages	current year		
	following year		
Increase in value-added prices	current year	3%	3%
	following year	3%	3%
Total	**current year**	**16%**	**17%**
	following year	**46%**	**49%**

France[23]			
		2022	**2023**
Increase in consumer prices	current year	9%	9%
	following year	32%	32%
Increase in wages	current year	1%	1%
	following year	4%	4%
Increase in value-added prices	current year	3%	3%
	following year	3%	3%
Total	**current year**	**13%**	**14%**
	following year	**39%**	**39%**
Spain			
		2022	**2023**
Increase in consumer prices	current year	10%	9%
	following year	33%	34%
Increase in wages	current year		
	following year	9%	10%
Increase in value-added prices	current year	3%	3%
	following year	3%	3%
Total	**current year**	**13%**	**12%**
	following year	**45%**	**46%**

[21] K. Bańkowski, C. Checherita-Westphal, J. Jesionek, P. Muggenthaler, *The effects of high inflation on public finances in the euro area, Based on the analysis by the Eurosystem members of the Working Group on Public Finance*, N° 332, 2023.

[22] The sources of the assumptions used for each expense category are summarized in Appendix 5.

[23] The results differ from those presented in the previous study (A. Lacan, *In 2022, the higher inflation is expected to increase the public debt burden* , Note no. 2022-4, September 2022), since employee remuneration is included.

Portugal			
		2022	2023
Increase in consumer prices	current year	10%	11%
	following year	26%	27%
Increase in wages	current year		
	following year		
Increase in value-added prices	current year	3%	4%
	following year	3%	4%
Total	**current year**	**13%**	**14%**
	following year	**29%**	**30%**

Greece			
		2022	2023
Increase in consumer prices	current year	9%	11%
	following year	31%	34%
Increase in wages	current year		
	following year		
Increase in value-added prices	current year	3%	5%
	following year	7%	9%
Total	**current year**	**13%**	**16%**
	following year	**38%**	**43%**

Source: authors' calculations.
Note for the reader: in France, a 1% increase in consumer price inflation in 2022 led to an estimated 0.32% rise in public spending in 2023.

These results are close to those estimated for the eurozone by the European Central Bank[24]. At eurozone level, the proportion of automatically indexed expenditure in 2022 is estimated at just over one-third of total public spending (31% of total expenditure).

In France, public spending (excluding interest charges) has an inflation elasticity of around 40%, due to the various indexation mechanisms in place, particularly for social benefits and pensions.

III. In addition to the mechanical impact on public revenues and expenditure, we also need to take into account the effects of discretionary measures, the impact of inflationary shocks on growth, and changes in interest charges.

a. The cost of measures implemented to limit the impact of inflation on agents' incomes

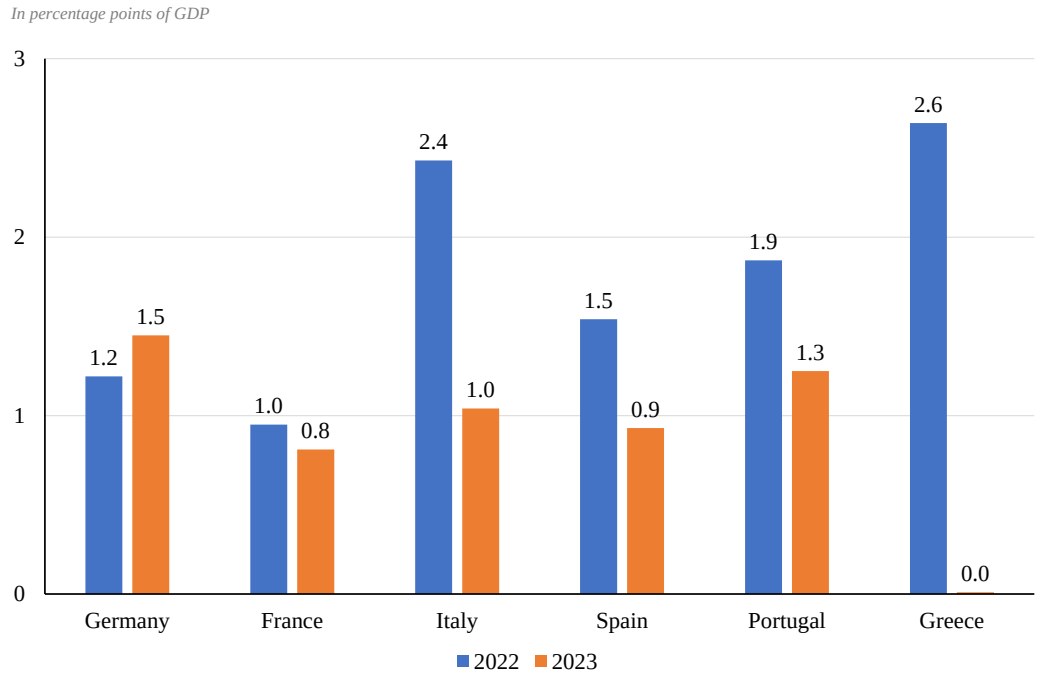
All the countries on the panel have introduced public support measures to cope with rising energy prices. In France, in particular, the Government has adopted measures targeting both prices (gas and electricity rate shield) and household purchasing power (inflation allowance, support vouchers for low-income households, etc.).

At the beginning of January 2024, the European Commission provided an estimate of the net budgetary cost for all EU countries of the support measures implemented in response to rising energy prices. In the countries studied, they represent a net public support of between 1.0

[24] Fiscal policy and high inflation (europa.eu).

and 2.6 percentage points of GDP in 2022, then between 0.0 and 1.5 percentage points of GDP in 2023[25].

Figure 8: net budgetary cost of support measures for rising energy prices (in GDP percentage points)



Source: European Commission[26]

In addition to these measures, there are also those that increase the income of civil servants. Only Italy partially indexes civil service salaries to inflation. However, most of the other countries studied have implemented support measures:

- In Germany[27], measures were announced at the beginning of 2023[28,29]. On June 1, 2023, employees of the Federation and the local authorities (TVöD) received a bonus of 1,240 euros to compensate for inflation. Payments of 220 euros per month are scheduled between July 2023 and February 2024. With 1.6 million civil servants affected by these measures, the total cost can be estimated at €4.1 billion in 2023[30] ;

[25] The European Commission's follow-up does not include measures to increase the income of civil servants.
[26] European Commission, *Developments of energy prices in the euro area and policy responses*, *Note to the attention of the Euro Group*, 2024.
[27] Until 2005, joint collective agreements were in force for the Federation, the Länder and the municipalities. Since then, there have been independent collective agreements for employees of the Federation and the municipalities (TVöD) and for employees of the Länder (TV-L), with the exception of Hesse, which negotiates its own collective agreements (TV-H).
[28] Inflation in Germany: positive steps for public sector workers – CESI.
[29] Collective agreements - German Federal Statistical Office (destatis.de).
[30] The Länder collective agreement signed in November 2021 led to the payment of a bonus to TV-L Länder employees of €1,300 in March 2022, and their salaries increased by 2.8% on December 1, 2022, at an estimated cost of €2.2 bn. These measures, decided at the end of 2021 in response to the increased activity of civil servants in the context of the health crisis, are not included in the present analysis, which focuses on the effects of the inflationary shock.

- In France, a first index point increase was decided for civil servants in July 2022 (+3.5%, for an estimated effect on the general government balance in national accounts of -3.7 bn€ in 2022 and -7.4 bn€ in 2023). Measures to raise civil service salaries were presented by the Minister for Transformation and the Civil Service on June 12, 2023 (1.5% increase in the civil service point on July 1, 2023, allocation of additional points, purchasing power bonus, additional measures) at a cost of €2 bn in 2023;

- In Italy, a one-off bonus has been distributed to civil servants, equivalent to 1.5% of their salary, paid over 13 months in 2023. From January 1, 2024, it will be replaced by contractual increases. The cost has been estimated at €1 billion[31];

- In Spain, the government announced in October 2021 a 2% pay raise for civil servants in 2022, at a total cost of €3 bn[32,33]. It then decided, in September 2022, to increase civil servants' salaries by 8% between 2022 and 2024[34], bringing the increase to 3.5% in 2022 (i.e., an additional 1.5% increase on what had been announced at the end of 2021, with retroactive effect from January 2022, at a cost of €2 bn[35]) and to 2.5% in 2023 (at an estimated cost of €4.6 bn[36]). For 2023, the Finance Bill provided for an additional 1% increase if defined inflation and nominal GDP growth thresholds were exceeded[37] : an additional 0.5 percentage point increase was to be applied if the sum of the harmonized CPI (HICP) for 2022 and the year-on-year change in the CPI published by the National Statistics Institute for September 2023 exceeded 6%. These conditions having been met[38], an additional increase of 0.5%, at an estimated cost of €0.8 bn[39] should be taken into account;

- In Portugal, in 2022[40], the government increased the salaries of 730,000 civil servants by 0.9%, at a total cost of €0.225 bn, as well as 1.6% for other benefits (promotions, progressions, career reviews), at a cost of €0.05 bn. In 2023[41], it has been decided to increase the basic minimum wage for public-sector employees by 3.6%, at a cost of €0.905 billion. The government is also planning a 0.3% increase in meal allowances, at a cost of €0.077 billion. Finally, a 1.2% increase in other valuations is planned, with an associated cost of €0.338 bn. In total, these measures represent a cost of €1.32 bn.

[31] Ragioneria Generale dello Stato - Ministero dell Economia e delle Finanze - Emolumento accessorio una tantum 2023 (mef.gov.it).
[32] PLAN PRESUPUESTARIO 2022 (hacienda.gob.es).
[33] La subida del sueldo de los empleados públicos de un 2% costará 3.000 millones | Economía nacional e internacional | Cinco Días (elpais.com).
[34] Spain - Government offers additional pay increase - September 30, 2022 - WageIndicator.org.
[35] Los empleados públicos recibirán una paga este año del equivalente a subir su sueldo un 1,5% más desde enero | Economía nacional e internacional | Cinco Días (elpais.com).
[36] La subida de los salarios de los empleados públicos en 2024 costará 4.746 millones de euros (europapress.es)
[37] La Moncloa. 04/10/2022. El Gobierno aprueba el proyecto de Presupuestos Generales para 2023 [Consejo de Ministros/Resúmenes].
[38] HICP for 2022 was 5.5% and CPI is up 3.2% year-on-year in September, so the sum (8.7%) meets the condition.
[39] La Moncloa. 06/10/2023. Incremento del 0,5% en las retribuciones del personal al servicio del sector público [Prensa/Actualidad/Hacienda y Función Pública].
[40] Apresentação do PowerPoint (portugal.gov.pt).
[41] Apresentação do PowerPoint (oe2023.gov.pt).

b. The "growth effect" associated with the inflation shock results from the combined impact of the negative impacts of higher energy costs and monetary tightening, partially mitigated by the discretionary fiscal measures implemented.

i. The negative impact of rising energy prices

The inflation that particularly affected the eurozone in 2022 and 2023 was initially imported inflation, resulting from rising energy commodity prices. This led to an increase in the energy bills of the countries studied.

Table 6: annual average change in energy import prices (in %)

	2022	2023
Germany	111.2	-35.4
France	110.6	-35.8
Italy	72.8	-35.7
Spain	87.6	-23.6
Portugal[42]	99.3	-33.7
Greece	58.1	-25.8

Source: Eurostat

This price-driven increase is evaluated by applying the rise in energy import prices observed in 2022 to energy imports in 2021 (noted as C in Table 7). The volume effect is the balance between imports actually observed (B) and the result previously obtained (C). The same principle applies in 2023. The results are shown in Tables 7 and 8.

Table 7: breakdown of the increase in the energy bill into price effect and volume effect (in €bn) in 2022 (1st table) and 2023 (2nd table)

	2021 imports of energy products (A)	2022 imports of energy products (B)	Variation	Price effect (assuming unchanged volumes) (C)	Volume effect (B - C)	Change in energy bill in 2022 due to the "price" effect (C - A)
Germany	108	196	89	228	-31	120
France	61	150	88	129	20	68
Italy	64	141	77	110	30	47
Spain	46	90	44	87	3	41
Portugal	10	18	9	19	-1	9
Greece	17	33	16	27	6	10

Sources: Eurostat, authors'calculation

[42] Data for Portugal is not available from Eurostat. We use a weighted average for the other countries.

	2022 imports of energy products (A)	2023 imports of energy products (B)	Variation	Price effect (assuming unchanged volumes) (C)	Volume effect (B - C)	Change in energy bill in 2023 due to the "price" effect (C - A)
Germany	196	123	-73	127	-3	-69
France	150	101	-49	96	5	-53
Italy	141	88	-53	90	-3	-50
Spain	90	63	-27	69	-5	-21
Portugal	18	12	-6	12	0	-6
Greece	33	23	-10	24	-1	-8

Sources: Eurostat, authors' calculation

In 2022, a volume effect negatively impacted Germany, particularly due to the closures of production sites. Conversely, in France, the reliance on energy imports increased despite rising prices; hindered by the low availability of the nuclear fleet, primary energy production decreased more than primary consumption[43].

Table 8: change in energy bill due to the "price" effect (in GDP points)

	2022	2023
Germany	3.1	-1.7
France	2.6	-1.9
Italy	2.4	-2.4
Spain	3.0	-1.5
Portugal	3.9	-2.3
Greece	4.8	-3.8

Sources: Eurostat, authors' calculation

The increase in energy import prices has short, medium, and long-term macroeconomic effects. In the short term, it leads to a decrease in household purchasing power and consumption, as well as an increase in production costs for companies and a decrease in their profit margins. Companies raise their selling prices, leading to increases in intermediate consumption prices and production prices, followed by wages and consumer prices. In the medium term, demand is affected, which negatively impacts employment and therefore demand. In the long term, there is a sustained negative effect on the level of demand and economic activity. To evaluate these effects for 2022 and 2023, the impact derived from the Mésange macroeconometric model of the French economy was applied to all countries, due to the lack of equivalent results for other countries[44], taking into account the observed changes in the energy bill in each country.

[43] Data-Lab ; *Bilan énergétique de la France en 2022*, avril 2023.

[44] Results are not available for the 6 countries covered by this note, but the effects of a $10 rise in the price of oil on short-term GDP, derived from the Nigem model and presented in the March 2019 Insee economic outlook note for France, Germany, Italy and Spain, are close to the impact estimated for France using Mésange.

Table 9: estimate of the "growth" effect associated with changes in the energy bill due to the "price" effect (in %)

	2022	2023
Germany	-0.9	-0.7
France	-0.8	-0.4
Italy	-0.7	-0.2
Spain	-0.9	-0.7
Portugal	-1.2	-0.8
Greece	-1.4	-0.6

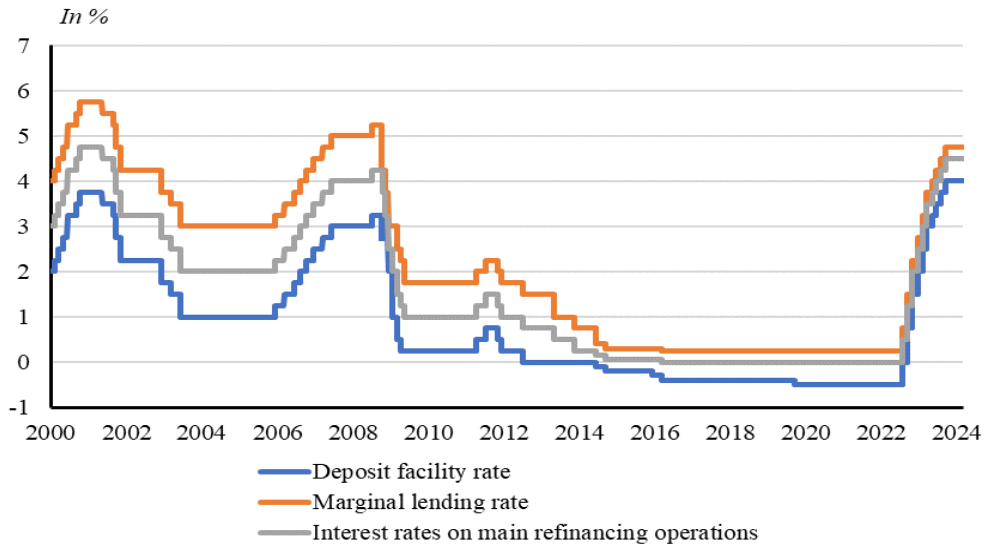
Source: authors' calculation

Note for the reader: the rise in France's energy bill by 2.6 points of GDP in 2022, then its fall by 1.9 points of GDP in 2023, had a negative effect on GDP growth estimated at 0.4 points in 2023.

ii. The negative impact of rising interest rates

Rising inflation in the eurozone has led the ECB to tighten monetary policy, raising key rates (see Figure 9) and reducing asset purchases.

Figure 9: ECB key rates



Source: BCE

This tightening of monetary policy affects the economy *via* various transmission channels, notably interest rates, asset prices and expectations. The associated loss of growth has unfavorable impacts on public finances, and must therefore be factored into the analysis[45].

The negative effects of an increase in the ECB's key interest rates on GDP, particularly their transmission speed, vary significantly across countries. Therefore, it is important to have country-specific estimates using the same methodology. The ones proposed by Peter Van Els and his co-authors in the *Journal of the European Economic Association*, based on the

[45] The estimate provided remains partial, as the effects of the tightening of so-called unconventional monetary policy have not been included.

aggregation of models from national central banks, were adopted for the subsequent analysis[46]. They are listed in Table 10.

Table 10: effect of a 100bp increase in the ECB's main refinancing rate on the level of real GDP (in %)

	Year 1 average	Year 3 average
Germany	-0.28	-0.33
France	-0.15	-0.28
Italy	-0.26	-0.60
Spain	-0.12	-0.43
Portugal	-0.22	-0.62
Greece	-0.33	-0.62

Source: Journal of the European Economic Association

The estimated effects on real GDP growth of key rate increases in 2022 and 2023 are shown in table 11.

Table 11: impact of the observed rise in key interest rates on real GDP growth (in %)

	2022	2023
Germany	-0.2	-0.9
France	-0.1	-0.6
Italy	-0.2	-1.0
Spain	-0.1	-0.6
Portugal	-0.1	-0.9
Greece	-0.2	-1.2

Source: author's caculation

Note for the reader: the increase in ECB rates by 58 basis points in 2022 and 323 basis points in 2023 as an annual average had a negative effect on GDP growth estimated at 0.6 points in 2023 in France.

The impact of the ECB's monetary policy tightening has remained fairly limited in France at this stage, as the structure of household and business debt, which is mainly made up of fixed-rate, long-maturity loans, protects them in the short term against a rise in interest rates[47].

iii. The positive impact of measures implemented in the context of inflation

The support measures taken by governments, while contributing to increase public spending, also helped to limit the loss of growth associated with the inflationary shock. This impact must therefore also be taken into account in the analysis.

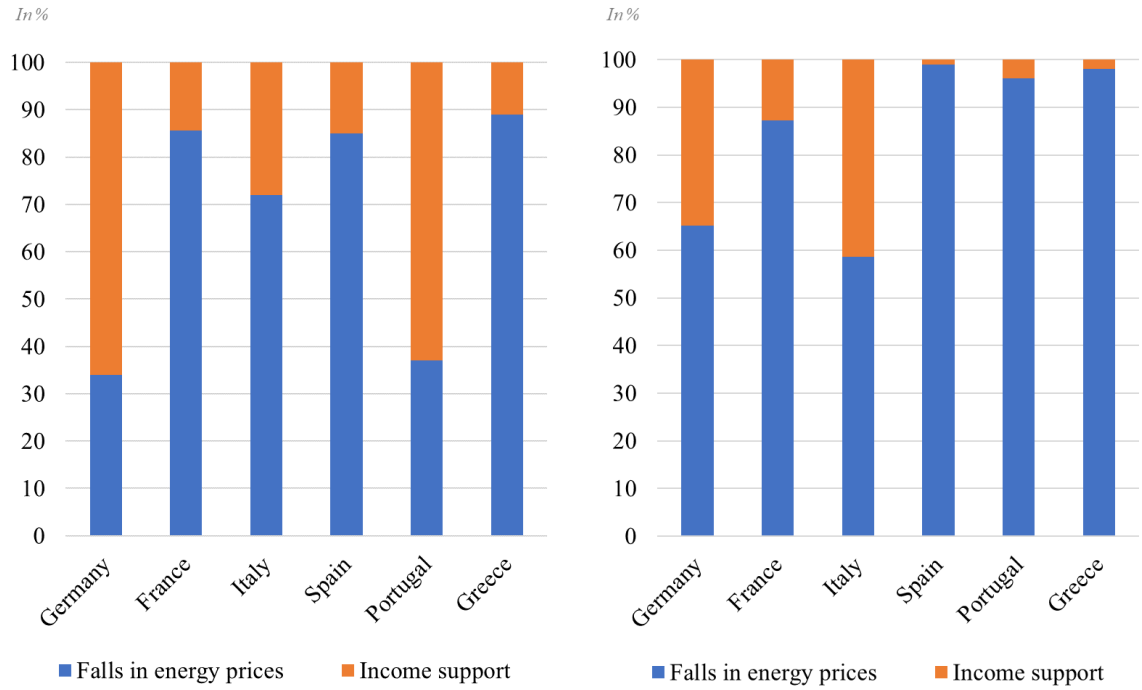
The composition of the measures implemented varies from country to country. They fall into two categories:

[46] Van Els, P., Cocarno, A., Morgan, J. and Villetelle, J., *Monetary Policy Transmission in the Euro Area: What Do Aggregate and National Structural Models Tell Us?*, ECB Working, Paper No. 94, 2001.
[47] Banque de France, Risk assessment of the French financial system, 2023.

- measures to cap retail gas and electricity prices, such as gas and electricity price shields in France, with a direct impact on inflation, limiting the risk of second-round effects;
- other measures, including social cash transfers to households, "inflation" vouchers, increased subsidies for public transport use, etc.

France stands out for the high share of energy price reduction measures in 2022, well above that of income support measures.

Figure 10: composition of public support measures in 2022 (left chart) and 2023 (right chart)



Source: Cour des Comptes report on exceptional measures to combat rising energy prices[48], based on European Commission data.
Note: the European Commission has classified the "brakes" on electricity and gas implemented in Germany in 2023 as income support measures. They are reclassified as price-cutting measures in the chart above and in the rest of the analysis, since they are designed to limit the prices paid by consumers. Their cost is estimated at €31.2 bn in 2023[49].
As data is not available for Italy in 2023, the OECD tracker is used.

The feedback effect of these measures on business is uncertain, due to their specific nature and complexity. Nevertheless:

- as measures to reduce energy prices cushion the impact of energy price rises, the same variant as that used to assess the impact of energy price rises was used for these measures;
- other measures, including those aimed at civil servants, were treated as classic fiscal stimulus measures. Their feedback effect on GDP growth was thus incorporated *via* a fiscal multiplier estimated at 0.75 (a fiscal expansion of 1 point of GDP increases

[48] Cour des Comptes, *Les mesures exceptionnelles de lutte contre la hausse des prix de l'énergie*, Rapport public thématique, 2024.
[49] makrooekonomische-effekte-entlastungspakete-und-abwehrschirm.pdf (bundesfinanzministerium.de)

the level of GDP by 0.75 points over 1 and 2 years, compared to a scenario without the implementation of support measures). This multiplier was estimated on the basis of a panel of 27 European Union member states over the period 2004-2013[50], and is used in the IMF's annual reports on public debt, the *Debt Sustainability Monitor*[51].

The total feedback effect of these measures on activity is shown in Table 12.

Table 12: effect on growth of all support measures implemented (in %)

	2022	2023
Germany	0.7	0.2
France	0.5	0.4
Italy	1.0	0.2
Spain	0.8	0.2
Portugal	1.2	-0.1
Greece	0.9	0.0

Source: authors' calculation

Note for the reader: the support measures implemented in Germany boosted GDP growth by 0.7 percentage points in 2022.

iv. Assessing the total macroeconomic impact of the inflationary shock

The macroeconomic effect on GDP of the inflationary shock resulting from the evolution of energy costs, the tightening of monetary policy and the implementation of measures to support activity is estimated in table 13.

Table 13: full "growth" effect associated with the inflationary shock (in %)

	2022	2023
Germany	-0.4	-1.4
France	-0.4	-0.6
Italy	0.2	-1.0
Spain	-0.1	-1.1
Portugal	-0.1	-1.9
Greece	-0.7	-1.9

Source: authors' calculation

Note for the reader: inflation has reduced French growth by 0.6% in 2023, taking into account higher energy costs, tighter monetary policy and budgetary measures.

c. The effect of higher inflation on interest expenditure and the general government balance

Interest expenditure is affected by rising inflation, *via* index-linked bonds (see i.), and by the resulting increase in interest rates (see ii.), *via* short-term securities and long-term securities maturing and being renewed.

[50] Carnot, N. and de Castro, F., *The discretionary fiscal effort: an assessment of fiscal policy and its output effect*, European Economy Economic Papers 543, 2015.

[51] https://economy-finance.ec.europa.eu/publications/debt-sustainability-monitor-2022_en

i. The effect of rising inflation *via* index-linked securities

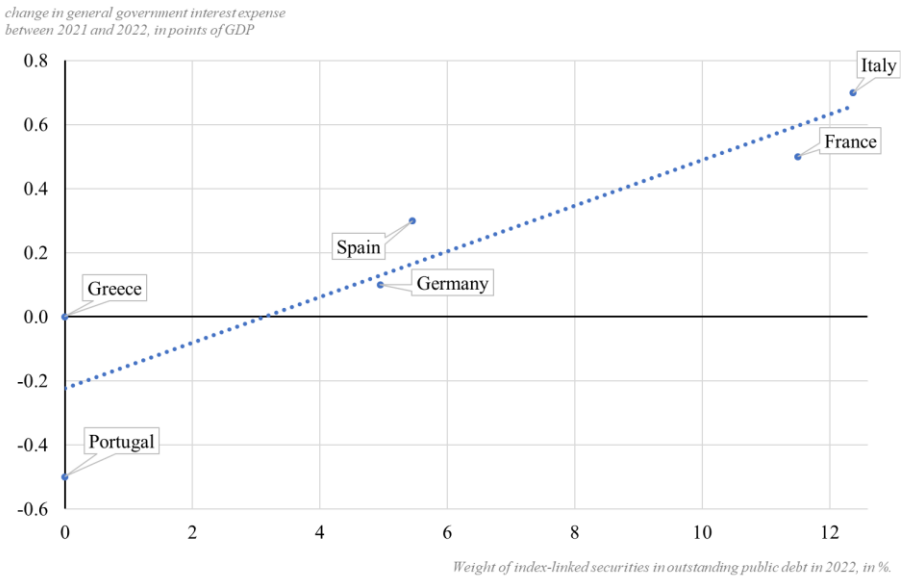
The share of inflation-linked bonds (see box for details of their definition and use) in the total stock of securities issued by general government in the eurozone is generally low, but can vary from country to country. The Bank for International Settlements provides data for all the countries studied, with the exception of Greece. Greece's variable-rate central government debt, which includes inflation-indexed debt, was zero at December 31, 2022[52].

Box: inflation-indexed bonds

Inflation-indexed bonds are debt securities whose coupon and principal repaid at maturity are indexed to inflation. The issuance of inflation-indexed bonds serves a dual purpose: on one hand, to save on the inflation risk premium. The investor, who does not have to bear the risk associated with inflation fluctuations until the bond matures, demands a lower yield compared to what they would have required if they had subscribed to a conventional bond with the same characteristics; on the other hand, to benefit from sustained demand for these securities through diversification of the investor base. Inflation-indexed securities meet the asset-liability management needs of financial institutions, insurance companies, and pension funds whose financial commitments are partly indexed to price changes.

Countries with the highest proportion of index-linked securities (France and Italy) saw their interest expenditure rise more sharply in 2022 (see Figure 11), all the more so as these two countries had a high level of outstanding debt, in excess of 100 points of GDP. Greece, on the other hand, was protected by the specific composition of its debt, which limited the evolution of its interest expenditure (see Figure 12).

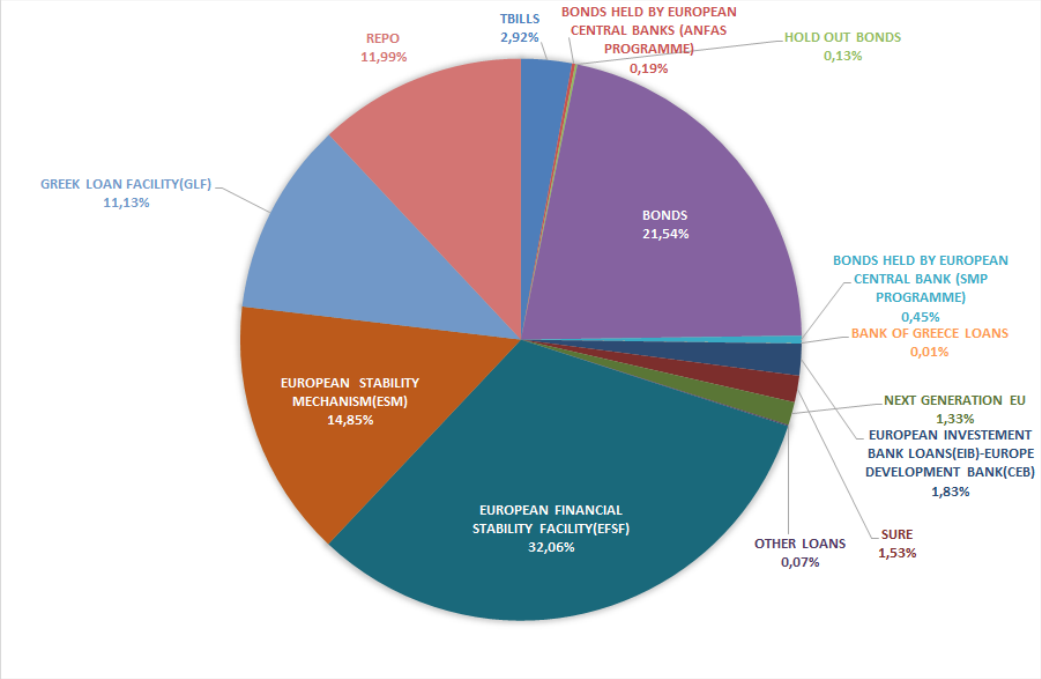
Figure 11: share of index-linked securities and rise in general government interest expenditure in 2022



Sources: BIS, the Greek public debt management agency, Eurostat

[52] Bulletin No_108 (1).pdf.

Figure 12: composition of Greek debt by financing instrument



Source: the Greek public debt management agency

Table 14 shows the provision for indexation of French inflation-indexed bonds (OATi) and eurozone inflation-indexed bonds (OAT€i) in France for national accounting purposes[53].

Table 14: provisions for indexation charges in France (national accounts) (in € billions)

2021	2022	2023
8.0	23.0	8.5

Source: AFT

The provision for indexation increased by €15.0 bn between 2021 and 2022, in line with the upturn in year-on-year price rises between November 2021 and November 2022, used to calculate the indexation charge in national accounts (see Appendix 6).

Information on the cost of index-linked securities is not readily available for other countries. Public debt management agencies, equivalent to Agence France Trésor (AFT) in France, provide information on outstanding inflation-indexed debt, but give little information on the associated interest charges paid. However, taking into account the composition of index-linked debt (see table 15) and based on a rating published by Fitch[54], we can estimate that the provision for index-linking charges on index-linked securities has increased, in 2022, by €5.8 bn in Germany, €18.7 bn in Italy and €5.6 bn in Spain.

[53] The main differences in methodology between cash accounting and the national accounts are presented in Appendix 6; depending on the year and the country, there may be greater or lesser differences between these two types of accounting. The analysis in this note is based on national accounts.
[54] Fitch, *Inflation-indexed bonds increase interest expenditures*, 2022.

Table 15: index-linked debt at December 31, 2022 (as a % of index-linked debt)

	Indexation to national inflation	Indexation to inflation in the eurozone
Germany	0.0	100.0
France	30.7	69.3
Italy	33.6	66.4
Spain	0.0	100,0

Sources: public debt management agencies in each country

In 2023, the provision for index-linking charges on index-linked securities fell back, reflecting the downturn in the year-on-year change in consumer prices. In France, the provision for indexation charges on index-linked securities is down by €14.5 bn between 2022 and 2023, from €23.0 bn in 2022 to €8.5 bn in 2023. In Germany, Spain and Italy, the decline in the cost of index-linked securities is estimated using the same method as for 2022. The results obtained are shown in Table 16.

Table 16: estimated change in index-linking expense for index-linked securities in 2022 and 2023

		Germany	France	Italy	Spain
2022	**in €Bn**	+5.8	+15.0	+18.7	+5.6
	in points of GDP	0.1	0.6	1.0	0.4
2023	**in €Bn**	-4.3	-14.5	-14.6	-4.1
	in points of GDP	-0.1	-0.5	-0.7	-0.3

Sources: Eurostat, AFT, author's assumptions
Note for the reader: in 2022, France and Italy are the two countries with the highest interest expenditure on index-linked securities (€15 bn and €18.7 bn respectively).

ii. The effect of rising interest rates on interest expenditure

Rising short-term and long-term interest rates have increased interest expenditure.

a. The effect of rising short-term interest rates

Short-term debt represents between 5.1% and 17.5% of total debt in the six countries studied (see table 17). By applying the observed rise in short-term rates (see table 18), it is possible to estimate the associated increase in interest expenditure (see table 19).

Table 17: breakdown of debt by initial maturity in 2022 (as a % of total debt)

	Short-term debt	Share of medium- and long-term debt
Germany	10.2	89.8
France	8.3	91.7
Italy	13.1	86.9
Spain	5.1	94.9
Portugal	17.5	82.5
Greece	6.6	93.4

Source: Eurostat (short-term: less than one year)

Table 18: increase in 6-months government interest rates (in basis points)

	2022	2023
Germany	86	399
France	91	403
Italy	102	396
Spain	99	394
Portugal	81	355
Greece	103	355

Source: ECB

Table 19: effect of rising interest rates on interest expenditure on short-term securities (in GDP points)

	2022	2023
Germany	0.1	0.3
France	0.1	0.4
Italy	0.2	0.7
Spain	0.1	0.2
Portugal	0.2	0.6
Greece	0.1	0.4

Source: authors' calculation

b. The effect of rising long-term interest rates on sovereign bonds reaching maturity and needing to be rolled over.

The average maturity of public debt in the countries studied is long (around 7 to 8 years, see table 20). The effect of a rise in long rates is therefore gradual.

Table 20: average remaining maturity of total debt (in years)

	Oct. 2022
Germany	7.5
France	8.4
Italy	7.6
Spain	7.7
Portugal	7.4
Greece[55]	22.1

Source: Debt Sustainability Monitor 2022 (European Commission)

In the short term, it is channelled through the renewal of maturing bonds.

[55] Greece has a very long maturity, but a limited proportion of its debt is negotiable on the markets. Estimates should therefore be treated with caution.

Table 21: share of public debt with a remaining[56] maturity of less than one year (excluding short-term debt) at end-2021 and end-2022 (as a % of total debt)

	End 2021	End 2022
Germany	10.4	11.1
France	7.2	7.2
Italy	8.5	9.3
Spain	6.4	9.0
Portugal	5.8	3.7
Greece*	8.5	9.3

Source: Eurostat (data not available for Greece; the weighted average for other countries is used).*

The impact on interest expenditure of these bond renewals is estimated by taking into account the increase in the break-even inflation rate between 2021, 2022 and 2023. Break-even inflation is the difference between the yield on nominal (non-indexed) bonds and that on inflation-indexed bonds. It provides an indication of the level of inflation expected by market participants up to the bond's maturity: its variation relative to the year 2021 can thus be considered as the impact of inflation on long rates[57]. The break-even inflation rate taken into account is the difference between the yield on the OAT €i maturing in July 2036 and that on the OAT maturing in May 2036[58]. Anticipated inflation was 1.57% on average in 2021, 2.31% in 2022 and 2.48% in 2023.

Table 22: impact of inflation on interest expenditure associated with the renewal of medium- and long-term securities (in GDP points)

	2022	2023
Germany	0.0	0.1
France	0.1	0.1
Italy	0.1	0.1
Spain	0.1	0.1
Portugal	0.0	0.0
Greece	0.1	0.1

Source: authors' calculation

All in all, the effect of inflation on the interest expenditure associated with the renewal of medium- and long-term securities in GDP points has remained fairly limited for the time being, due to the long maturity of government securities.

[56] Whereas the initial maturity of the debt measures the time elapsed between the issue date and the repayment date, the remaining maturity of the debt measures the time remaining at an instant t until the repayment date. Debt with a remaining maturity of less than one year, at the end of 2021 and 2022, respectively, represents debt scheduled for repayment in 2022 and 2023.

[57] In practice, however, the break-even inflation rate is an imperfect measure of borrowers' expectations, mainly because of the difficulty of isolating the risk and liquidity premiums attached to nominal and index-linked securities.

[58] AFT data.

iii. Total effect of inflation on interest expenditure

The total effect of higher inflation on interest expenditure is estimated as the sum of the previous effects.

Table 23: total effect of inflation on interest expenditure (in GDP points)

	2022	2023
Germany	0.3	0.2
France	0.7	-0.1
Italy	1.2	0.1
Spain	0.5	0.0
Portugal	0.2	0.6
Greece	0.2	0.5

Source: authors' calculation

In 2022, inflation led to a sharp rise in France's interest expenditure, which added to the country's public deficit, notably due to the high proportion of its debt indexed to European inflation, which was more dynamic than French inflation over the period. In 2023, the effect of higher nominal interest rates was more than offset by the impact of lower inflation on the indexation charge[59].

IV. Conclusion on the total impact of inflation on the public debt ratio

Estimates of the impact of inflation on public finances are given below[60].

Box: comparison with the previous analysis by the HCFP Permanent Secretariat

The Permanent Secretariat published a note in July 2022 on a similar subject[61]. There is a major difference in the approach adopted.

In the current note, it is the effect of inflation that is studied, rather than an inflation surprise, as in the previous note, which assessed the impact, for 2022, of the upward revision of inflation forecasts between the initial budget bill (LFI) for 2022 and the first amending budget bill (PLFR) presented in July 2022.

The impact of the rise in the GDP deflator on the denominator is thus greater in the current note, due to the inclusion of a 2.9% rise in the deflator in 2022, compared with a 0.9% difference on the same variable in the previous note, representing the difference between the 1.4% forecast in the LFI 2022 and the 2.3% forecast in the PLFR.

[59] A framework for the consistency of the results is provided in Appendix 7.
[60] The table showing all the data used in the calculations (inflation, deflator and wages) is presented in Appendix 8.
[61] Lacan A., *In 2022, the higher inflation is expected to increase the public debt burden*, Note no. 2022-4, September 2022

i. The various mechanical effects of inflation help to reduce debt ratios

a. The rise in the GDP deflator has reduced public debt ratios

Table 24: impact on the debt ratio of the rise in the deflator in the denominator of the ratio (in GDP points)

	2022	2023
Germany	-3.6	-4.4
France	-3.3	-6.1
Italy	-5.3	-7.4
Spain	-4.8	-6.6
Portugal	-6.2	-8.1
Greece	-15.3	-7.8

Source: authors' calculation

b. Higher inflation elasticities on revenues than on public spending have improved primary public balances.

The inflation elasticities of expenditure and revenue calculated above are used in this section. In 2023, the effect of inflation in 2023 is taken into account, as well as the lagged effects of inflation in 2022.

Table 25: mechanical impact of 2022 and 2023 inflation on the primary public balance, *via* inflation elasticities of expenditure and revenues (in GDP points)

		2022	2023
Germany	Inflation impact 2022	-1.8	-1.4
	Inflation impact 2023		-2.3
France	Inflation impact 2022	-1.7	-1.5
	Inflation impact 2023		-1.4
Italy	Inflation impact 2022	-1.0	-0.9
	Inflation impact 2023		-0.8
Spain	Inflation impact 2022	-1.0	-1.2
	Inflation impact 2023		-0.9
Portugal	Inflation impact 2022	-1.5	-2.3
	Inflation impact 2023		-1.2
Greece	Inflation impact 2022	-1.2	-1.0
	Inflation impact 2023		-0.7

Source: authors' calculation

ii. Other effects offset the impact of inflation on the public debt ratio

a. Government measures have increased public debt ratios

The amounts presented below include measures to raise the salaries of civil servants.

Table 26: impact of measures implemented in response to the inflationary shock (including for civil servants) on the public debt ratio (in GDP points)

	2022	2023
Germany	1.2	1.5
France	1.1	1.1
Italy	2.4	1.1
Spain	1.9	1.3
Portugal	2.0	1.7
Greece	2.6	0.0

Source: authors' calculation

b. The "growth" reduction of the inflationary shock was ultimately relatively limited, given the measures adopted to support activity.

The "growth" reduction due to higher energy bills, tighter monetary policy and the feedback effect of the measures implemented, presented in table 13, had an impact on the public debt ratio through:

- the effect on the general government balance, which can be estimated at first glance by using a unitary elasticity of compulsory levies to GDP growth;
- the effect on the "denominator" of the public debt ratio.

Table 27: "growth" impact on the public debt ratio (in GDP points))

		2022	2023
Germany	**"**General government balance**"** effect	0.2	0.7
	"Denominator**"** effect	0.2	0.9
France	General government balance**"** effect	0.2	0.3
	"Denominator**"** effect	0.5	0.6
Italy	General government balance**"** effect	-0.1	0.5
	"Denominator**"** effect	-0.3	1.5
Spain	General government balance**"** effect	0.1	0.5
	"Denominator**"** effect	0.2	1.2
Portugal	General government balance**"** effect	0.1	0.8
	"Denominator**"** effect	0.1	2.1
Greece	General government balance**"** effect	0.3	0.9
	"Denominator**"** effect	1.4	3.3

Source: authors' calculation

c. Higher interest expenditure slightly worsened debt ratios

Table 28: change in interest expenditure due to inflation (in GDP points)

	2022	2023
Germany	0.3	0.2
France	0.7	-0.1
Italy	1.2	0.1
Spain	0.5	0.0
Portugal	0.2	0.6
Greece	0.2	0.5

Source: authors' calculation

iii. All in all, inflation over the last two years has helped to reduce the debt ratios of the countries examined. However, the fall in France's debt ratio was smaller than in the other countries, mainly due to the smaller initial gap between its actual balance and its stabilizing balance.

The total impact of inflation on public debt ratios is shown in the table and figures below.

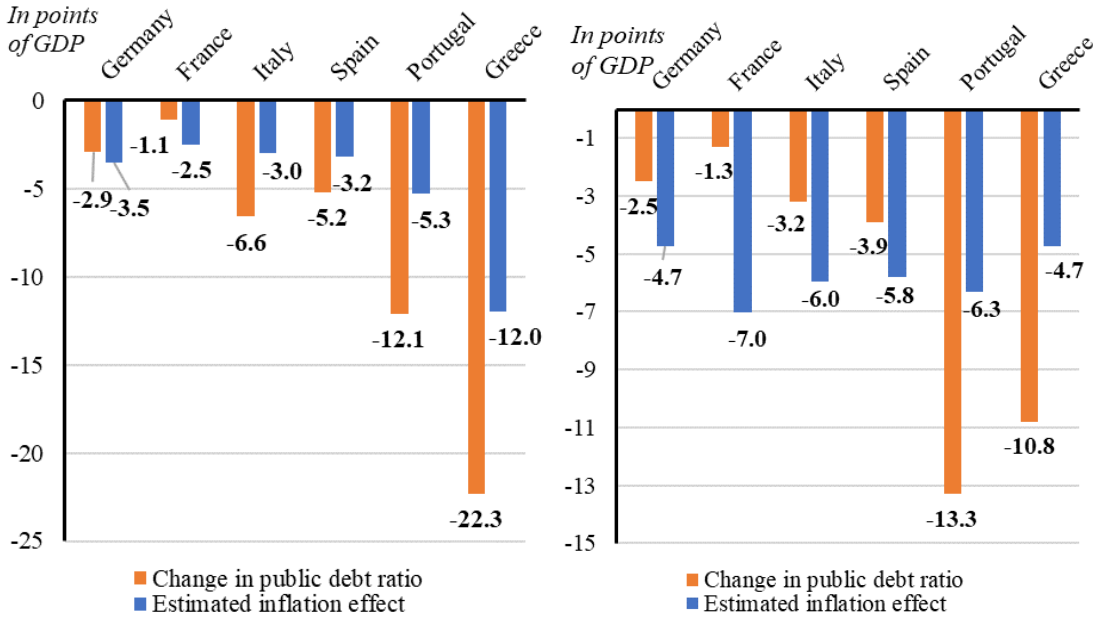
Table 29: total effect of inflation on the public debt ratio (in GDP points)

	2022	2023	Total
Germany	-3.5	-4.7	-8.3
France	-2.5	-7.0	-9.5
Italy	-3.0	-6.0	-9.0
Spain	-3.2	-5.8	-9.0
Portugal[62]	-5.3	-6.3	-11.6
Greece	-12.0	-4.7	-16.7

Source: authors' calculation

[62] For Portugal, see also the article by Ruano F., *Additional-Inflation Impact on the Tax Revenue and Social Contributions in 2022 and 2023*, Blog, CFP, May 2024..

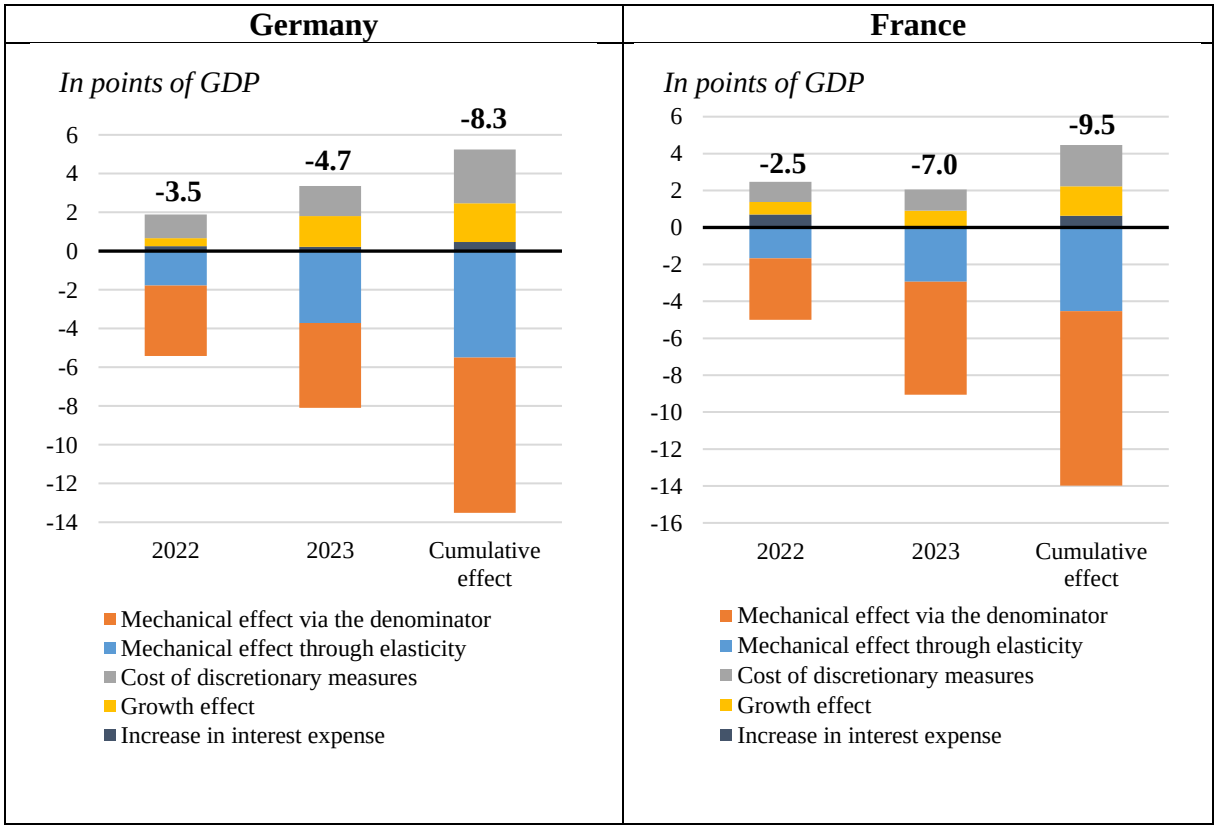
Figure 13: change in public debt ratio and inflation impact according to authors' estimates (2022 left, 2023 right)



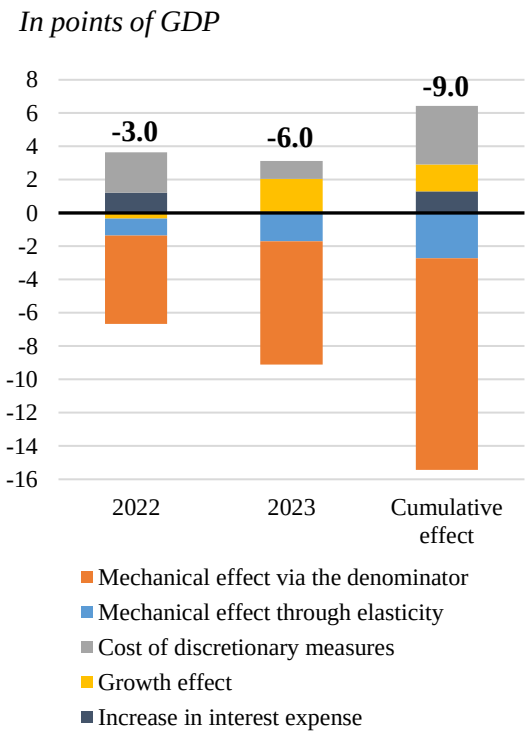
Sources: Eurostat, authors' calculation

The breakdown of this total effect is shown in Figure 14 and summarized in table 30.

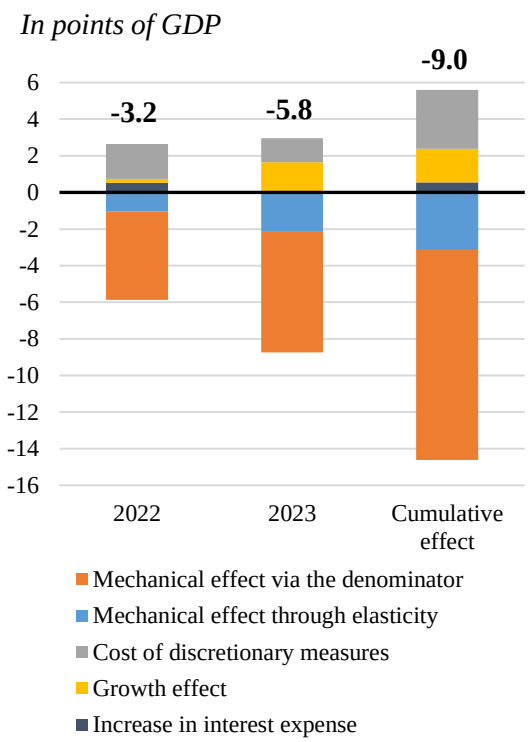
Figure 14: breakdown of the inflation impact on the public debt ratio, as estimated by the authors



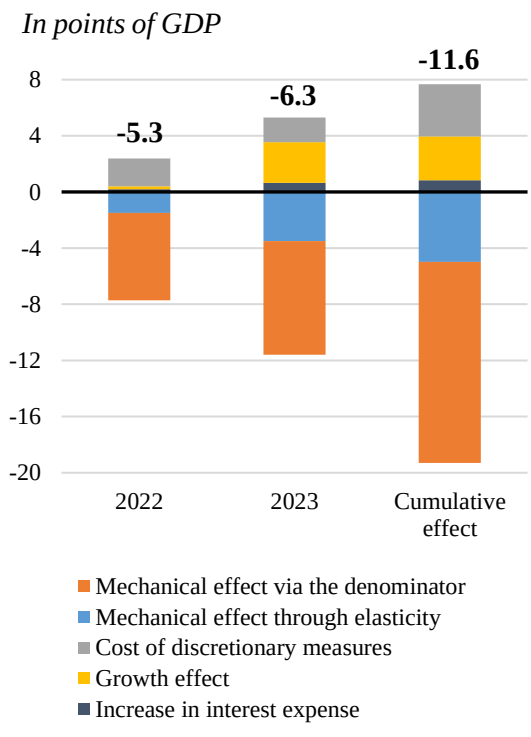
Italy



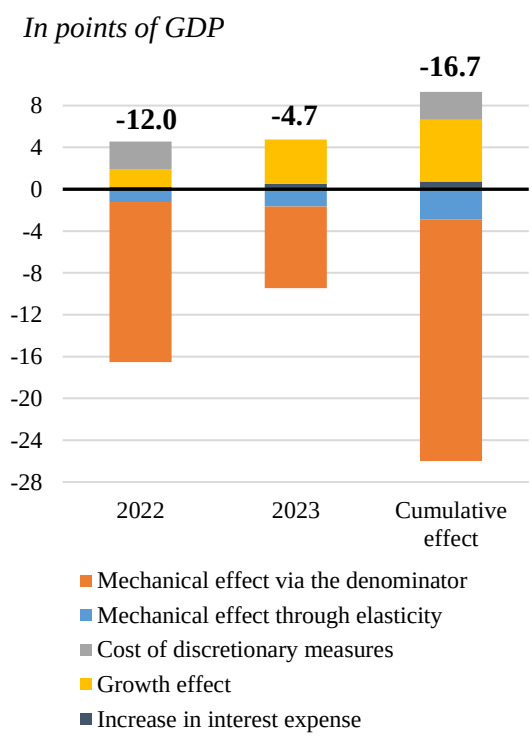
Spain



Portugal



Greece



Source: authors' calculation

Table 30: change in debt in GDP points between 2021 and 2023 and breakdown of inflation impact according to authors' estimates (in %)

	Germany	France	Italy	Spain	Portugal	Greece
Change in debt ratio	-5.4	-2.4	-9.8	-9.1	-25.4	-33.1
Total estimated inflation impact (A+B+C+D)	**-8.3**	**-9.5**	**-9.0**	**-9.0**	**-11.6**	**-16.7**
Mechanical effect (A)	-13.5	-14.0	-15.4	-14.6	-19.3	-26.0
... via the effect of the rising deflator on the denominator	*-8.0*	*-9.5*	*-12.7*	*-11.5*	*-14.3*	*-23.1*
... via revenue and expenditure elasticities	*-5.5*	*-4.5*	*-2.7*	*-3.1*	*-5.0*	*-2.9*
Cost of discretionary measures (B)	2.8	2.2	3.5	3.2	3.7	2.7
Growth effect (C)	2.0	1.6	1.6	1.8	3.1	5.9
Increase in interest expenditure (D)	0.5	0.6	1.3	0.5	0.8	0.7

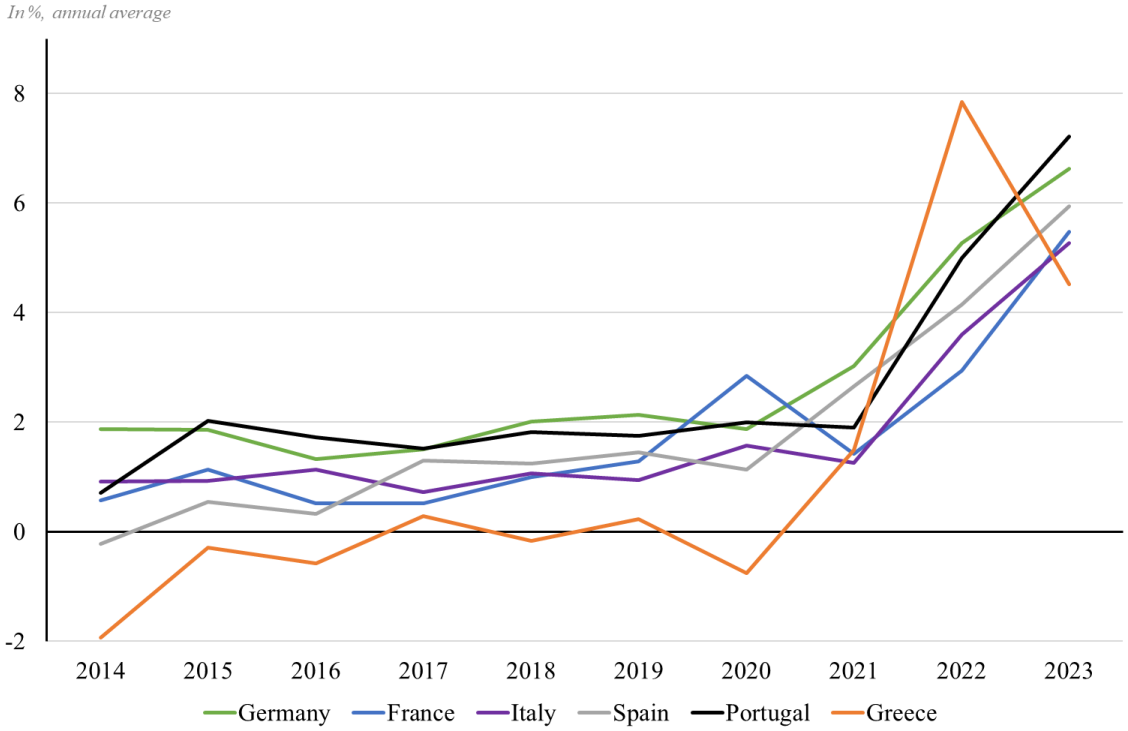
Source: authors' calculation

Between 2021 and 2023, public debt ratios fell in all the countries examined in this note. However, this trend is less marked in France.

Inflation is estimated to have significantly reduced public debt ratios in all countries. In France, it would have contributed to a 9.5-point drop in the public debt ratio in 2022 and 2023 (-2.5 points in 2022 and -7.0 points in 2023), compared with a 8.3-point decline in Germany, 9.0 points in Italy and Spain, 11.6 points in Portugal and 16.7 points in Greece.

In France, the more restrained rise in the deflator (see Figure 15), resulting from targeted measures on energy prices, has limited the positive effect of inflation on the denominator.

Figure 15: GDP deflator



Source: Eurostat

For all countries, inflation has reduced the debt ratio, but its impact is not always fully reflected in the evolution of the debt ratio, due in particular to the underlying level of the deficit.

Table 31: change in public debt ratio between 2021 and 2023 and estimated effect of inflation (in %)

	Change in public debt ratio	Estimated effect of inflation	Impact of other factors
Germany	-5.4	-8.3	2.9
France	-2.4	-9.5	7.1
Italy	-9.8	-9.0	-0.8
Spain	-9.1	-9.0	-0.1
Portugal	-25.4	-11.6	-13.8
Greece	-33.1	-16.7	-16.4

Sources: Eurostat, authors' calculation

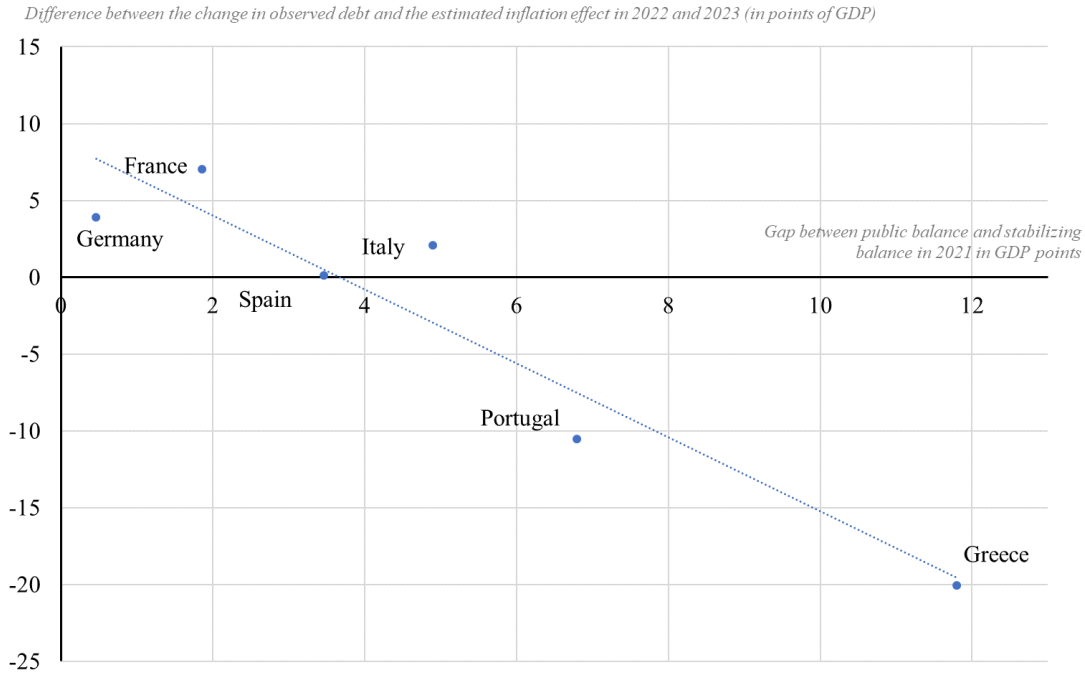
Some countries (Portugal, Greece) have managed to reduce their public debt ratio by more than the estimated "inflation" effect (table 31), while others (Germany, France) have managed to reduce their public debt ratio by less than the estimated "inflation" effect. These differences are well correlated with the initial deviation (in 2021) from the debt-stabilising balance (see table 32 and Figure 16). The very large deviation of the general government balance from the debt-stabilising balance observed in Greece and Portugal had a positive effect on the debt ratio, which was not the case in France. As a result, France benefited less in both years from the inflationary shock and the windfall it represented in reducing its debt ratio.

Table 32: general government balance, debt-stabilizing balance and deviation from stabilising balance in 2021 (in GDP points)

	Debt-stabilising balance	General government balance	Gap between general government balance and stabilizing balance
Germany	-4.1	-3.6	0.5
France	-8.5	-6.6	1.9
Italy	-13.7	-8.7	5.0
Spain	-10.2	-6.7	3.5
Portugal	-9.7	-2.9	6.8
Greece	-18.8	-7.0	11.8

Sources: Eurostat, authors' calculation

Figure 16: difference between the change in the public debt ratio observed between 2021 and 2023 and the estimated inflation impact as a function of the gap in 2021 between the general government balance and the debt-stabilizing balance



Sources: Eurostat, authors' calculations

All in all, the sharp rise in inflation in the eurozone led to a fall in the public debt ratio in all eurozone countries, and particularly in the 6 countries examined here. However, the reduction was particularly small in France and very large in Greece and Portugal. These differences can be explained not only by a lower inflation rate in France, but also to a large extent by differences in the ex-ante control of public finances, as measured by the initial difference between the actual balance and the debt-stabilizing balance. In a context where inflation has already fallen sharply and is set to return to levels close to 2%, efforts to curb public finances are now the key to future reductions in France's debt ratio.

Appendix 1

Weight of public revenue in GDP and share of these revenues evolving with consumer prices, wages and value-added prices

1 – Germany							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	10.9	78%	78%				
Current income and wealth tax	13.6			65%	84%	0%	20%
Capital tax	0.2						
Social contributions	17.2			95%	95%	2%	2%
Property income	0.4		45%				55%
Other revenues	4.7	80%	80%				

2 – France							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	16.7	55%	62%	11%	11%		2%
Current income and wealth tax	13.5			33%	73%	11%	60%
Capital tax	0.7						
Social contributions	16.9			90%	90%	6%	6%
Property income	0.6		16%				84%
Other revenues	5.0	69%	69%				

3 – Italy							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	14.5	54%	54%				
Current income and wealth tax	15.2			0%	102%	0%	61%
Capital tax	0.1						
Social contributions	13.7			82%	82%	14%	14%
Property income	0.9		24%				76%
Other revenues	4.5	58%	58%				

4 – Spain							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	12.1	61%	61%				
Current income and wealth tax	12.4			0%	130%	0%	51%
Capital tax	0.4						
Social contributions	13.6			76%	76%	6%	6%
Property income	4.6		40%				60%
Other revenues	4.6	53%	53%				

5 – Portugal							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	15.1	63%	63%				
Current income and wealth tax	10.7			0%	130%	0%	61%
Capital tax	0.0						
Social contributions	12.4			100%	100%		
Property income	0.7		16%				84%
Other revenues	5.4	64%	64%				

6 – Greece							
	Weight in GDP points in 2022	Consumer prices		Wages		Added value price	
		The first year	From the second year	The first year	From the second year	The first year	From the second year
Taxes on production and imports (including VAT)	19.1	50%	50%				
Current income and wealth tax	9.4		3%	0%	94%	0%	70%
Capital tax	0.1						
Social contributions	14.0			86%	86%		
Property income	0.4		44%				56%
Other revenues	7.2	43%	43%				

Appendix 2: revenue elasticities in the eurozone countries studied in 2022 and 2023

Germany			
		2022	**2023**
Increase in consumer prices	current year	26%	26%
	following year	26%	26%
Increase in wages	current year	54%	54%
	following year	59%	60%
Increase in value-added prices	current year	1%	1%
	following year	7%	7%
Total	**current year**	**80%**	**81%**
	following year	**92%**	**92%**
Italy			
		2022	**2023**
Increase in consumer prices	current year	21%	22%
	following year	22%	23%
Increase in wages	current year	23%	23%
	following year	55%	53%
Increase in value-added prices	current year	4%	4%
	following year	24%	23%
Total	**current year**	**48%**	**49%**
	following year	**101%**	**99%**
Portugal			
		2022	**2023**
Increase in consumer prices	current year	29%	30%
	following year	30%	31%
Increase in wages	current year	28%	27%
	following year	59%	58%
	current year	0%	0%

France			
		2022	**2023**
Increase in consumer prices	current year	24%	23%
	following year	26%	26%
Increase in wages	current year	40%	40%
	following year	50%	51%
Increase in value-added prices	current year	5%	5%
	following year	19%	19%
Total	**current year**	**68%**	**69%**
	following year	**95%**	**95%**
Spain			
		2022	**2023**
Increase in consumer prices	current year	23%	22%
	following year	27%	25%
Increase in wages	current year	24%	24%
	following year	62%	64%
Increase in value-added prices	current year	2%	2%
	following year	23%	23%
Total	**current year**	**49%**	**48%**
	following year	**112%**	**112%**
Greece			
		2022	**2023**
Increase in consumer prices	current year	25%	25%
	following year	26%	26%
Increase in wages	current year	24%	23%
	following year	42%	42%
	current year	0%	0%

Increase in value-added prices	following year	16%	16%
Total	**current year**	**57%**	**58%**
	following year	**105%**	**104%**

Increase in value-added prices	following year	14%	15%
Total	**current year**	**49%**	**48%**
	following year	**81%**	**83%**

Source: authors' calculations.
Note for the reader: a 1% increase in private wages in France in 2022 translates into a 0.5% increase in public revenue with the 2022 revenue structure.

Appendix 3: comparison of COFOG and European Commission data for 2022 in €bn

	Social benefits other than social transfers in kind		Social transfers in kind of market products	
	COFOG	Ameco	COFOG	Ameco
Germany	619.1	619.1	354.9	354.9
France	512.9	512.9	167.7	167.7
Italy	406.9	406.9	49.4	49.4
Spain	229.2	229.2	37.9	37.9
Portugal	40.1	40.1	4.7	4.7
Greece	37.2	37.2	6.1	6.1

Sources: Eurostat. European Commission.

Appendix 4

		Public wages	Public pensions
Germany	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	No automaticity	No automaticity
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	Yes, full automatic. For pensions, annual adjustments depend mainly on nominal wage growth of the insured.
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward-looking (FL) or mixed.'	NA	Statutory pensions are automatically adjusted on a backward-looking basis (t-1). The adjustment is determined by three factors: (i) rate of change in the average employee's earnings subject to compulsory contributions, (ii) change in the contribution rate and (iii) changes in the ratio of pension recipients to contribution payers ("sustainability factor"). The adjustment formula is set out in book six of the Social Security Code. Annual adjustment takes place on 1 July, formally enshrined in a government directive that has to (and generally will) be agreed by the upper house ("Bundesrat"). In contrast, pensions for civil servants follow civil servants' wages without any delay.

		Public wages	Public pensions
France	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	No automaticity	Yes, partially automatic Basic pensions are automatically indexed: - to inflation on 1 January (since 2018) if inflation is positive, but they are constant in the case of deflation, - exceptions can be decided: in 2019, the pension revaluation was set at 0.3% (instead of 1.6%) and in 2020 pensions above €2,000 were increased by only 0.3% (vs 1% for low pensions). Complementary pension revaluations depend on pension regimes and are not automatically indexed.
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	No automaticity
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward-looking (FL) or mixed.'	NA	Consumer price index, excluding tobacco (BL) for basic pensions.

		Public wages	Public pensions
Italy	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	Yes, partially automatic For public wages, expectations about inflation are taken into account during the bargaining process involving contract renewals. The agreed compensation per employee is based on the resources set aside by the Government (which has typically determined an increase in average wage higher than inflation). If, however, inflation turns out to be higher than the increase in public wage over the three-year contract period, the difference is necessarily compensated during the following three-year period.	Yes, fully automatic For pension indexation, most pensions (those below a specified threshold) are fully indexed; those pensions higher than a specified threshold are instead subject to partial indexation. However, at the aggregate level the effective indexation rate is close to 100% of the previous-year inflation.
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	No automaticity
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward- looking (FL) or mixed.'	Mixed The benchmark is the HICP net of energy.	Mainly BL As regards pension indexation, the relevant index is the consumer price index for white and blue collar workers, computed by Istat. The index excludes only tobacco products.

		Public wages	Public pensions
Spain	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	No automaticity There is no automatic price indexation for public wages, although the evolution of the ICP is carefully considered when the Government and unions negotiate public wage increases.	Yes, fully automatic Before 2014, pensions were indexed to ICP-inflation. They increased with forecast inflation for the year and then if actual inflation (at November of year t) was higher, pensioners received a compensation in January of year t+1. If actual inflation was lower, there was typically no compensating reduction. The indexation system was replaced by a system not automatically linked to inflation from 2014 until 2021. A new pension reform was approved in 2021, with application starting in 2022, establishing a fully automatic indexation to previous year prices.
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	No automaticity
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward- looking (FL) or mixed.'		12-month average of annual ICP growth up to November of year t-1 (BL). From 2022 onwards, pension increase for year t is statutorily set equal to the 12-month average of annual ICP growth up to November of year t-1, if this is positive, and zero, otherwise.

		Public wages	Public pensions
Portugal	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	No automaticity	Yes, partially automatic
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	Yes, partially automatic
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward- looking (FL) or mixed.'	NA	Pension indexation is determined by a backward-looking formula which links it to real GDP growth and inflation and differentiates across pension cohorts. The main benchmark is the average inflation in the previous 12 months, adjusted up or downwards depending on average real GDP growth over the previous eight quarters. The adjustment factor is such that it implies larger increases for lower pensions. Moreover, in recent years, the government has decided to implement additional extraordinary increases for the lowest pensions.

		Public wages	Public pensions
Greece	*'Does your country have an automatic price indexation system for public sector wages and pensions?'*	No automaticity For public wages, a nominal freeze is currently in effect.	Fully automatic indexing For public pensions, a nominal freeze is in effect until 2022. The automatic pension indexation formula applies as of 2023.
	'Does your country have an automatic indexation system based on other nominal variables or real indicator?'	No automaticity	Yes, fully automatic
	'If yes to the above questions, what is the reference indicator used for indexation? What are the main features? Summarise if mainly backward-looking (BL), forward- looking (FL) or mixed.'		Minimum of [(0.5*GDP growth in t-1 + 0.5*CPI growth in t-1) ; CPI growth in t-1]. For public pensions, a nominal freeze is in effect until 2022. The automatic pension indexation formula applies as of 2023. It is backward-looking.

Source: ECB

Appendix 5: sources of the assumptions used to calculate the inflation elasticities of public spending (excluding interest expenditure)

Category of expenditure	**Assumptions**
Intermediate consumption	Conventional assumption: 50% of the consumer price index for the year
GFCF	Conventional assumption: 50% based on the consumer price index for the year and 50% based on value added prices for the year.
Employee remuneration	Checherita-Westphal C. (2022), « *Public wage and pension indexation in the euro area: an overview* », Occasional Paper Series, N° 299, ECB, Agust See Appendix 4
Pensions	Checherita-Westphal C. (2022), « *Public wage and pension indexation in the euro area: an overview* », Occasional Paper Series, N° 299, ECB, Agust See Appendix 4
Other social benefits and transfers	K. Bańkowski, C. Checherita-Westphal, J. Jesionek, P. Muggenthaler, *The effects of high inflation on public finances in the euro area*, Based on the analysis by the Eurosystem members of the Working Group on Public Finance, N° 332

Appendix 6

	National accounting	**Cash accounting**
	Established entitlements: recognition at the time of the operative event	Cash accounting: accounting at the time of collection/disbursement
Accrued coupons	Recognition of accrued but not yet due coupons as interest expenditure	Recognition of accrued coupons at maturity for their full amount
Premiums on old issues of fungible Treasury bonds (rising when interest rates fall)	Spread until redemption of bonds	No recognition of issue premiums
Discounts on old issues of fungible Treasury bonds (increasing as interest rates rise)	Spread until redemption of bonds	No recognition of discounts on issue
Indexation charge: calculation from year n of the impact of inflation in year n on the capital and interest due until the capital is repaid in full.	Recognition as expenses	Exception to cash accounting: recognition of a provision for indexation charge
	Inflation used to calculate indexation charge: November to November	Inflation used to calculate indexation charge: May to May

Appendix 7

For countries holding index-linked securities, the estimated effect in 2022 is close to the revision of the general government interest burden between the *Draft Budgetary Plan* of October 2021, ahead of the inflationary shock, and that of October 2022 for the year 2022, which confirms the results obtained.

Revision of the debt burden (for the year 2022, between the *Draft Budgetary Plan* of October 2021 and that of October 2022) **in points of GDP**

	Germany	**France**	**Italy**	**Spain**
Review for 2022	0.2	0.7	1.2	0.2

Sources: Draft Budgetary Plan of October 2021 and that of October 2022

Appendix 8

The levels of inflation (i.e. the rise in the consumer price index (CPI)), wage growth (average wage per head) and the rise in the GDP deflator used in the calculations in the note are shown in the tables below.

Germany

	2022	2023
CPI	6.9	5.9
GDP deflator	5.3	6.6
Wage	4.7	6.7

Sources: Eurostat, Destatis

France

	2022	2023
CPI	5.2	4.9
GDP deflator	2.9	5.5
Wage	5.6	4.2

Sources: Eurostat, Insee

Italy

	2022	2023
CPI	8.1	5.7
GDP deflator	3.6	5.3
Wage	5.2	3.8

Sources: Eurostat, Istat

Spain

	2022	2023
CPI	8.4	3.5
GDP deflator	4.1	5.9
Wage	4.8	6.0

Sources: Eurostat, INE

Portugal

	2022	2023
CPI	7.8	4.3
GDP deflator	5.0	7.2
Wage	7.5	8.4

Sources: Eurostat, INE

Greece

	2022	2023
CPI	9.6	3.5
GDP deflator	7.8	4.5
Wage	5.0	7.1

Sources: Eurostat, Elstat