STUDY

Requested by the BUDG Committee

Recent inflation developments and the EU budget

Country-specific impacts and policy options

Policy Department for Budgetary Affairs
Directorate-General for Internal Policies
PE 767.094 - November 2024

EN

Recent inflation developments and the EU budget

Country-specific impacts and policy options

Abstract

The recent high inflation affects EU Member States differently. It is therefore important to quantify country-specific inflation impacts in regard to the implementation of the EU budget. This in-depth study focuses on country-specific inflation effects regarding research expenditures, Cohesion Policy, the Common Agricultural Policy, and NextGenerationEU. Moreover, policy options and recommendations at EU level to prevent adverse effects of future inflation shocks on the EU budget are identified and discussed.

This document was provided at the request of the BUDG Committee.

This document was requested by the European Parliament's Committee on Budgets.

AUTHORS

Meryem GÖKTEN, The Vienna Institute for International Economic Studies (wiiw)
Atanas PEKANOV, Austrian Institute of Economic Research (WIFO)
Marcus SCHEIBLECKER, Austrian Institute of Economic Research (WIFO)
Margit SCHRATZENSTALLER, Austrian Institute of Economic Research (WIFO)
Franz SINABELL, Austrian Institute of Economic Research (WIFO)

Internal Review, Anna BURTON, Austrian Institute of Economic Research (WIFO)
Internal Review, Jürgen JANGER, Austrian Institute of Economic Research (WIFO)
Internal Review, Anna RENHART, Austrian Institute of Economic Research (WIFO)

ADMINISTRATORS RESPONSIBLE

Francisco PADILLA OLIVARES and András SCHWARCZ

EDITORIAL ASSISTANT

Adrienn BORKA

LINGUISTIC VERSIONS

Original: EN

ABOUT THE EDITOR

Policy departments provide in-house and external expertise to support EP committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU internal policies.

To contact the Policy Department or to subscribe for updates, please write to:
Policy Department for Budgetary Affairs
European Parliament
B-1047 Brussels
Email: Poldep-Budg@ep.europa.eu

Manuscript completed in November 2024

This document is available on the internet at:
http://www.europarl.europa.eu/supporting-analyses

CONTENTS

LIST OF ABBREVIATIONS

AMECO	Annual Macro-Economic Database of the European Commission
AWU	Annual Work Unit
BAR	Brexit Adjustment Reserve
CAP	Common Agricultural Policy
CF	Cohesion Fund
CFP	Common Fisheries Policy
COICOP	Classification of Individual Consumption by Purpose
CPI	Consumer Price Index
DG	Directorate-General
DP	Direct Payments
EAFRD	European Agricultural Fund for Rural Development
EAGF	European Agricultural Guarantee Fund
EIC	European Innovation Council
EMFAF	European Maritime, Fisheries and Aquaculture Fund
ERDF	European Regional Development Fund
EU-SILC	EU statistics on income and living conditions
ERC	European Research Council
ESF+	European Social Fund Plus
ETS	Emissions Trading System
EU	European Union
FADN	Farm accountancy data network
FEAD	Fund for European Aid to the Most Deprived

FP7	7th Framework Programme
GFCF	Gross Fixed Capital Formation
GNI	Gross National Income
H2020	Horizon 2020
HICP	Harmonised Index of Consumer Prices
IMF	International Monetary Fund
ITER	International Thermonuclear Experimental Reactor
JTF	Just Transition Fund
LCI	Labour Cost Index
MFF	Multiannual Financial Framework
NGEU	NextGenerationEU
PA	Partnership Agreement
PMEF	Performance Monitoring and Evaluation Framework
PPP	Purchasing Power Parity
R&I	Research and Innovation
RRF	Recovery and Resilience Facility
RRP	Recovery and Resilience Plan
SME	Small and Medium-Sized Enterprise
YEI	Youth Employment Initiative

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

After having reached very high levels during the last few years, inflation in the EU has recently begun to subside. Inflation affects EU Member States differently, in terms of both the overall level and the drivers of inflation. In this context, it is important to not only identify the impact of inflation as a whole on EU finances as it was the case with the first part of the overall study in Schratzenstaller et al. (2023), but also to quantify country-specific inflation impacts in regard to the implementation of the EU budget. This study therefore focuses on country-specific inflation effects regarding three main MFF programmes: research expenditures, which are programmed at 7% of the total MFF volume (Section 2); the Cohesion Policy, representing 31% (Section 3); and the Common Agricultural Policy (CAP), which makes up for another 31% of overall MFF allocations (Section 4). Moreover, the impact of inflation on the EU's COVID-19 recovery programme NextGenerationEU (NGEU) is quantified. For each of the programmes examined, the country-specific inflation impacts across EU Member States are analysed in detail. Furthermore, programme-specific as well as horizontal policy options and recommendations at EU level to prevent adverse effects of future inflation shocks on the EU budget are identified and presented.

Horizon Europe

Horizon Europe is the key component of the Research and Innovation cluster, representing over 90% of its funding under Heading 1 "Single Market, Innovation and Digital." There are significant regional disparities in engagement levels across Member States when measured per capita, both in terms of applications submitted and funding received. Smaller Member States like Cyprus, Luxembourg, and Estonia have higher engagement levels per capita, while larger ones like Germany, France, and Italy lag behind. The "Widening Participation & Strengthening the European Research Area" pillar of Horizon Europe aims to enhance research and innovation performance in countries with historically lower participation rates. While Southern European Widening countries outperform even non-Widening countries, their Eastern counterparts continue to have the lowest engagement levels under Horizon Europe.

Inflation has had a substantial impact on Horizon Europe projects, particularly through increased labour costs, leading to project expenses that exceed the planned 2% annual adjustment foreseen in the ongoing MFF. This has led to a decrease in the number of funded projects over time, despite an increase in the EU contribution per grant. Our projections indicate that inflation has caused average project costs to increase by 10% due to labour alone and by 15% when other research-related expenses are included. The cost per participating institution has risen most sharply in Widening countries, with the exception of Cyprus and Malta.

Additionally, the insufficient cost adjustment creates challenges for researchers and institutions, leading to potential underpayment and difficulties in attracting talent, especially in regions where inflation exceeds wage growth. Policy recommendations include revising the 2% inflation adjustment rule and introducing flexible funding mechanisms tailored to individual countries.

Cohesion Policy

The Inflation effects regarding EU Cohesion Policy are explored by comparing between countries and with previous programming periods. Already in the first three years, accumulated inflation in the EU was on average 19.5%, which is considerably higher than the overall accumulated inflation for the whole period 2007-2013 (16.7%). The inflation shock of 2022 and 2023 should be considered as a price level change, which permanently raises the prices in these years and the years to follow. This change therefore increases the overall costs of projects and expenditures going further, accumulating to even higher accumulated inflation for the whole period 2021 – 2027. We therefore compute the expected accumulated inflation for the period 2021 – 2027. These projections result in an EU wide inflation of 31.1%, which is considerably higher than in the period 2007 – 2013 (16.7%) and more than five times higher than in the 2014 – 2020 period (6.4%). The standard deviation of 11.9% is also higher than in previous periods and highlights a significant increase in inflation variability across the countries. Given these forecasts, Hungary will exhibit the highest inflation at 60.7%, followed by Poland (57.4%), Romania (54.9%), and Estonia (52.8%). Conversely, the lowest accumulated inflation will be in Finland (22.5%) and Denmark (23.1%). Furthermore, we note that it is exactly the Member States with the highest accumulated real value losses that also have some of the highest shares of Cohesion Funding in relation to the size of their economies – such as Bulgaria, Croatia, Hungary, Poland, Romania, thereby making this problem especially crucial for them.

The significant real value losses accruing to Cohesion Policy due to the inflation shocks of 2022-2023 requires serious reflection on possible solutions for the future. Policy options discussed include a re-thinking of the 2% deflator, since we see the need for the European Commission to reconsider the annual inflation rate assumption and adapt budget allocations accordingly given the unexpected inflation shocks in 2022 and 2023 and whenever necessary in the future to abandon the one-size-fits-all adjustment baseline assumption of 2%. Moreover, the current implementation of projects under MFF 2021–2027 should be sped up, and administrative and technical capacity should be provided to Member States, either through DG Reform or the Technical Capacity Instrument, for a faster implementation of MFF 2021-2027 projects, as avoiding further delays is essential to limit any further accumulation of inflation due to slow project implementation.

Common Agricultural Policy

Payments for agriculture and rural development are significant expenditures of the EU. Their share in the EU budget has been declining during the last decades, which is more or less in line with the decline of the number of persons employed in agriculture at a rate close to 1.5% per year during the last decade. Common Agricultural Policy (CAP) payments come from two funds: the EAGF, which finances mainly direct payments that are allocated according to the size of farms with different amounts per hectare across Member States (77%), and the EAFRD, which finances rural development and agri-environmental programmes (23%).

The substantial price changes in recent years raise the question of what role inflation plays for the agricultural sector. Dramatic price changes within short periods are not uncommon in markets for agricultural outputs and inputs. Some of these price changes are positive for income (when output prices increase significantly), and some of them are negative (when output prices remain constant or fall and input prices surge).

The observation of different Member States during the same phase of price changes shows that each Member State is affected in distinct ways. It is instructive to look not only at the average EU prices of outputs and inputs, since this perspective hides the fact that each country is affected differently by changes in prices of outputs and inputs. Markets are volatile and impact the profitability of different activities in distinct ways. Because each Member State has a unique production profile, the effects of price changes on farm income are challenging to predict.

One important observation is that subsidies (among them EU subsidies) are stabilizing farm incomes, i.e. they reduce its volatility. Because they are predictable and relatively stable, the subsidies smooth the flow of revenues. The stabilising effect depends on the share of subsidies relative to factor incomes: the higher the share of subsidies is the more stable are farm incomes. When prices of outputs and inputs are more volatile, higher subsidies could therefore mitigate the risk of income volatility.

However, such a mitigation option is not targeted, and other instruments reduce volatility more efficiently.

A closer look at the mechanisms shows that EU Member States are very heterogeneous. The products provided by the agricultural sector are different, the production conditions are different, and farm structures are not the same. When the value of inputs is set in relation to the value of subsidies, the data shows great discrepancies across EU Member States. The range is from a small percentage (e.g. The Netherlands) to almost 50% (e.g. Finland). Depending on the country profile, the share of subsidies relative to expenditures of inputs increased in many (particularly in many EU-15 Member States) but not in all EU Member States.

The fact that inflation rates differ among Member States has significant implications. The real value of EU transfers from the EAGF and EAFRD to Member States deviates compared with the allocation as decided in the MFF. Member States with lower inflation rates obtain higher values from EU funds compared to the other ones. There is an inflation-induced reallocation of transfers that was not anticipated when decisions about country shares of CAP funds were made. Member States that are more successful in keeping inflation low are therefore benefiting more from EU transfers.

Given that income changes at sector level, its volatility and shares of inputs to subsidies at farm level are very heterogeneous, it is not easy to justify a uniform or country-specific rate inflation adjustment to farm subsidies across the two funds. It is therefore advisable to direct targeted funds towards increasing farm productivity, as more productive farms are better able to cope with market-related shocks. Productive farmers benefit from a higher level of competitiveness, and, in such a scenario, consumers benefit from ever lower prices in real terms, as they have done during the most recent decades. Agricultural policy should develop policy instruments that are better suited than the current set of instruments in mitigating price-induced income risks. Furthermore, such policy should also take care of the persons affected by market driven income losses that need to exit the sector. For this group, it would be valuable to institute a program of rural development focused on generating productive jobs outside agriculture.

Recovery and Resilience Facility (RRF)

The bout of inflation setting in in 2021 triggered an increase in prices for investment products, which reduced the firepower of RRF national projects. Within the EU, prices for gross fixed capital formation increased in 2021 by 4.2% and by 8.1% in 2022. In subsequent years, inflation pressure abated. According to our calculations, the additional price increase of investment products in excess to the planned increase of 2% per year reduced the purchasing power of the RRF in the EU by EUR 20.9 billion, which equates to 7.6% of total expenditures. Relative losses were largest in Bulgaria (22.4%), Hungary (22.1%), and Romania (21.9%), and lowest in Italy (1.7%), Sweden (3.1%), Greece, and Denmark (both 3.9%). To alleviate the adverse effects of inflation on RRF projects, a different kind of price indexation could be applied in order to take into account uniform or sector-specific cost factors and the identification of cost increases by the national ministries at early stages of the project. The additional funding for covering increased costs can either come from Member States, auxiliary funds like RePowerEU, or a mixture of EU and national financing.

Horizontal conclusions and recommendations

In order to make the EU budget more resilient towards inflationary developments, several forward-looking horizontal conclusions and recommendations can be derived from the recent inflationary shocks.

First, the current 2% deflator could be replaced by adequate indicators to adjust EU expenditures to inflation. Reflections on how to make the current fixed deflator more flexible should, however, bear in mind that, despite its deficiencies, it is simple, practical, and allows national ministries and the Commission to anticipate how much will be spent in each programme in the long run (i.e. over the whole MFF period). Therefore, replacing the fixed deflator by more realistic deflators should be reserved for situations where inflation significantly deviates from the standard 2% rate, rather than permanently accommodating to any deviations of actual inflation rates. Moreover, the adjustment mechanism should be asymmetric in the sense that it should accommodate for inflation exceeding the 2% deflator, but not for inflation below.

A second important point relates to strengthening the provision of administrative and technical assistance for faster implementation of MFF programmes. Periods of heightened inflation, such as the 2022-2023 period, are normally periods of heightened economic uncertainty. This uncertainty often results in more general delays in the implementation of programmes and specific projects. With projects and funding experiencing delays and shifting implementation to later during the MFF period, the accumulated inflation, and therefore real value losses, will be even higher. Future EU budgets should embed the necessary administrative and technical assistance, either through DG Reform or the Technical Capacity Instrument, to ensure that this challenge is limited, as minimising delays in the implementation of MFF programmes will also minimise the accumulated real value losses from inflation.

Third, special instruments could be implemented to mitigate adverse effects of inflation on MFF expenditure. One possible option to cushion MFF programmes against adverse inflationary effects would be to increase margins. However, as margins are not earmarked, nothing prevents co-decision authorities to use them for other purposes. Therefore, rather than increasing margins, a specific earmarked reserve above the MFF ceilings could be created for the purpose of protecting the various MFF programmes against significant inflationary developments. In addition, a permanent special instrument should be established over and above MFF ceilings in order to cover over-runs of funding costs incurred by EU borrowings (particularly within NGEU, but also regarding other existing and future EU debt operations).

Fourth, the resilience of the revenue system against inflation should be strengthened. To this end, two specific recommendations are suggested. First, to avoid the devaluation of revenues from the plastic-based own resources and the erosion of its steering potential, the call rate should be inflation-adjusted automatically. In addition, the introduction of the adjusted first basket of new own resources should be sped up as these can be expected to be rather resilient against inflationary developments.

1. INTRODUCTION

Inflation has reached very high levels during the last few years in the EU: the price level in the EU, starting from 2.9% in 2021, increased by 9.2% in 2022 and 6.4% in 2023, to subside to 2.3% in 2024 (average of January until August 2024). The most recent Commission forecast projects inflation to be at 2.7% in 2024 and at 2.2% in 2025 (European Commission, 2024a). The International Monetary Fund (IMF) forecast also projects a medium-term decline from 2024 to 2027, with 2.7% (2024), 2.4% (2025), 2.1% (2026), and 2.1% (2027). At the same time, EU Member States are affected by inflation in different ways, in terms of both the overall level and the drivers of inflation. Within this context, it is important to not only identify the impact of inflation as a whole on EU finances, as done in the first part of the overall study in Schratzenstaller et al. (2023), but also to quantify country-specific inflation impacts in regard to the implementation of the EU budget.

This study therefore focuses on country-specific inflation effects in relation to three main MFF programmes: research expenditures which are programmed at 7% of the total MFF volume (Chapter 2), the Cohesion Policy representing 31% (Chapter 3), and the Common Agricultural Policy (CAP) which makes up for another 31% of overall MFF allocations (Chapter 4). Moreover, the impact of inflation on the EU's COVID-19 recovery programme NextGenerationEU (NGEU) (Chapter 5) is quantified. For each of the programmes regarded, the country-specific inflation impacts across EU Member States are analysed in detail. Furthermore, programme-specific and horizontal policy options and recommendations at EU level to prevent adverse effects of future inflation shocks on the EU budget are identified and presented.

2. IMPACT OF INFLATION ON THE RESEARCH PROGRAMMES

This Section explores the components of the Research and Innovation cluster within the current Multiannual Financial Framework and examines how the funding is impacted by inflation, including the specific channels through which these effects occur. Our primary focus is on the Horizon Europe program, which is the EU's largest framework for research and innovation. Section 2.1. provides an overview of the Horizon Europe Framework. Section 2.2. details project funding instruments and EU funding developments, while Section 2.3. analyses the impact of inflation on project costs. Finally, Section 2.4. concludes with policy recommendations.

2.1 Horizon Europe

The Research and Innovation cluster comprises the largest portion of Heading 1 "Single Market, Innovation and Digital", accounting for 62.3% of funds under this heading. This cluster primarily encompasses Horizon Europe, the Euratom Research and Training Program, and the International Thermonuclear Experimental Reactor (ITER), with Horizon Europe accounting for more than 90% of the total funding share (European Commission, 2020).

Horizon Europe was established under Regulation 2021/695 and is the European Union's 9th framework programme for research and innovation. The total budget for Horizon Europe is set at EUR 95.5 billion. This amount incorporates EUR 5.4 billion from the Next Generation EU instrument that is specifically aimed at facilitating green and digital recovery efforts in response to the COVID crisis (European Commission, 2021).

The Horizon Europe Regulation (EU) 2021/695 (European Parliament, 2021) establishes participation rules for the Framework Programme for Research and Innovation. Most Horizon Europe calls are open to participants from non-Member States and non-associated countries.[1] Horizon Europe is organised into four primary thematic pillars, each dedicated to a specific research field. The pillar "Global Challenges and European Industrial Competitiveness" has been allocated the largest budget of EUR 53.5 billion and represents approximately half of Horizon Europe's total funding. "Excellent Science" receives EUR 25.0 billion, while "Innovative Europe" receives EUR 13.6 billion. Lastly, "Widening Participation & Strengthening the European Research Area" receives EUR 3.4 billion to enhance collaboration and inclusivity in research activities across Europe.

The "Widening Participation & Strengthening the European Research Area" pillar seeks to address the innovation gap by aiming to foster a more integrated and cohesive European research and innovation ecosystem within the European Union. While all organisations eligible under Horizon Europe can participate in Widening actions, only organisations based in Widening countries are eligible to serve as coordinators. Widening countries, identified by their historically low participation rates in FP7 and H2020 projects, encompass 15 Member States (Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia), as well as all outermost regions and associated countries with similar characteristics.

Table A1 in the Annex provides an overview of the budget allocations within each thematic pillar of Horizon Europe, including specific areas of focus and corresponding budget amounts. Funding through Horizon Europe is mostly through grants. The selection of projects to fund is done mainly through open calls for proposals. There is no fixed distribution by country or region (European Commission, 2021). As of May 15, 2024, Horizon Europe has received over 335,000 applications, encompassing over 63 thousand eligible proposals. The majority of applications originated from higher education institutions (45.7%), followed by private for-profit organisations (24.3%) and research organisations (23.1%). SMEs accounted for 18.6% of eligible applications. 82.4% of these applications came from Member States, and 79.4% of successful applications were also from EU Member States.

Since its inception, Horizon Europe projects have incurred a total cost of EUR 39.9 billion, with the EU contribution amounting to EUR 32.3 billion. The pillar with the highest cost was Global Challenges and European Industrial Competitiveness (Pillar 1), totalling EUR 25.9 billion in project costs and receiving an EU contribution of EUR 19.7 billion (equivalent to 36.8% of Pillar 1's initial budget of EUR 55.3 billion).[2] Subsequently, Excellent Science (Pillar 2) projects amounted to EUR 8.4 billion in costs, with an EU contribution of EUR 8.3 billion (33.1% of its initial budget of EUR 25 billion). Innovative Europe (Pillar 3) projects had a combined cost of EUR 5.2 billion, with an EU contribution of EUR 3.6 billion (26.5% of its initial budget of EUR 13.6 billion).

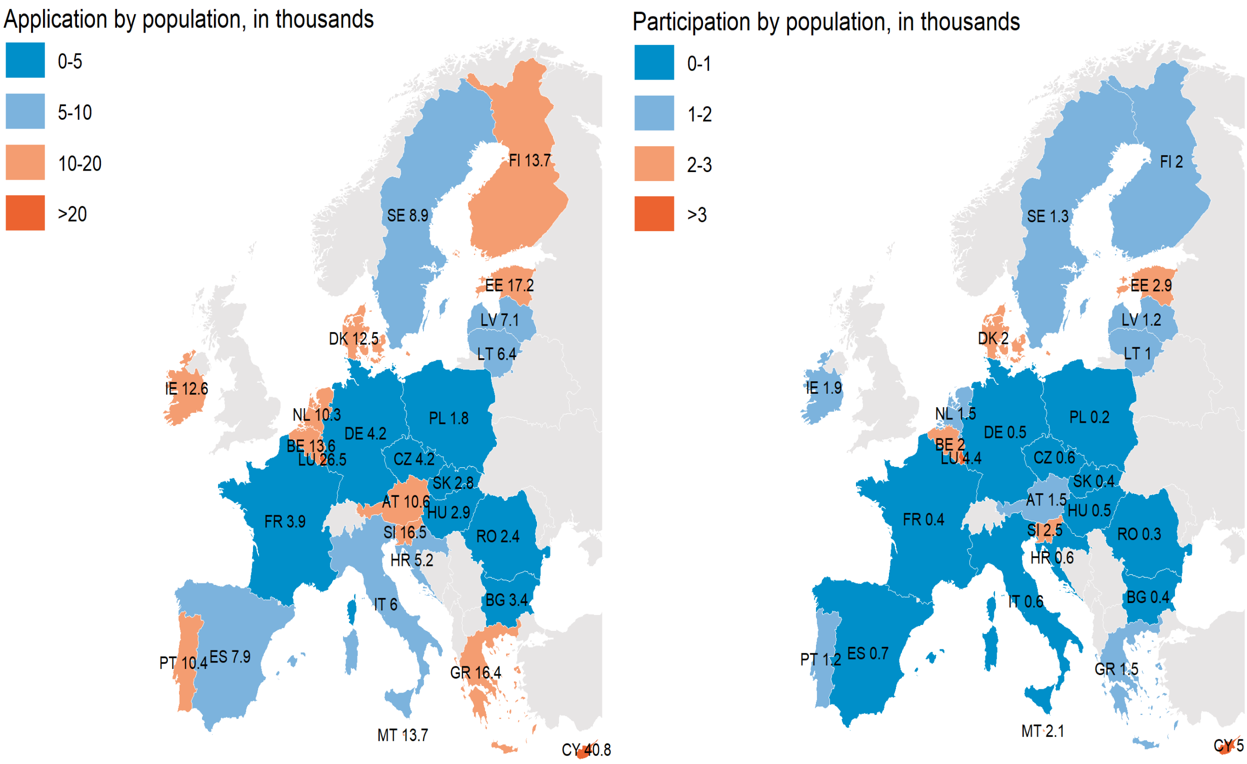
Widening Participation (Pillar 4) projects both incurred and received an EU contribution of EUR 1 billion (30.8% of its initial budget of EUR 3.4 billion). 92% of the contribution is allocated to EU Member States, while 7% is allocated to Associated countries, and 1% is allocated to Non-Associated-Third Countries.

---

1 Associated countries include Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Georgia, Iceland, Israel, Kosovo, Moldova, Montenegro, New Zealand (from 2023), North Macedonia, Norway, Serbia, Tunisia, Turkey, Ukraine, and the United Kingdom (entire Programme except the EIC fund from 2024 onwards). Negotiations or imminent associations include Canada (from 2024), Morocco, and Switzerland (ERC Work Programme 2024 calls from March 18, 2024).

2 For a detailed structure and budget of the Horizon Europe, see Table A1 in the Annex on Research Programmes.

Figure 1: Horizon Europe Application & Participation by population, 2021-2024



Source: Horizon Dashboard, Eurostat, own calculations.

Notes: Participation and applications by population are calculated as ratio of eligible proposals and retained applications, respectively, to the population (in thousand) in a given country. Eligible proposals are proposals that fulfil grant requirements and excludes ineligible, duplicate, withdrawn, or unassessed proposals. Retained applications indicate the applications that are selected for funding.

There are significant regional differences in Horizon Europe application and participation rates, which can largely be attributed to differences in population size and the size of the scientific community across Member States. Member States with larger populations, such as Germany, Italy, Spain, and France show higher levels of engagement, as reflected in their application and participation levels. Germany leads with 10.3% of all applications and 9.6% of all participating institutions. In contrast, most of the Widening countries, such as Latvia, Lithuania, Estonia, and Romania, demonstrate lower engagement levels, with both application and participation often falling below 1% of the EU27 (Figure A1 in Annex). Regarding engagement relative to population size, smaller Member States are leading. For instance, Cyprus has the highest number of applications with 40.8 applications per 1000 people, followed by Luxembourg with 13.5, and Estonia with 17.2. In contrast, the largest EU Member States have lower engagement levels relative to population size: Italy has 6 applications per 1000 people, Germany has 4.2, and France has 3.9. This pattern is consistent for participation rates as well, with Cyprus, Luxembourg and Estonia leading. Overall, Southern European Widening countries, such as Cyprus, Portugal and Greece, outperform both other Widening countries and non-Widening countries in per capita engagement levels. However, the lower engagement in the remaining Widening countries indicate that the issue extends beyond population size. Eastern European Member States, particularly Bulgaria, Poland, Romania, and Slovakia, have the lowest engagement levels.

Table 1: H2020 and Horizon Europe Funding Overview, EU-27

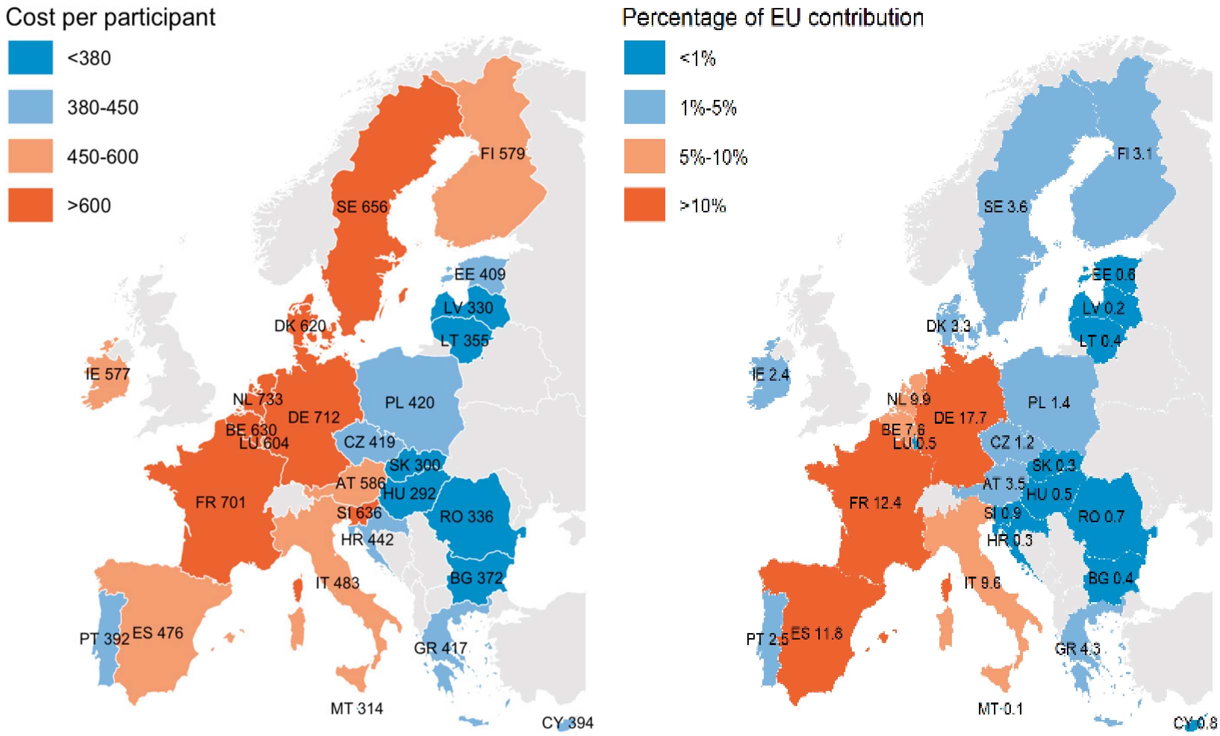
Programme	Year	Signed grants	EU Contribution, in EUR billion	Average EU Contribution per grant, in EUR million
H2020	2014	4,479	7.6	1.7
H2020	2015	4,506	7.4	1.6
H2020	2016	4,764	8.8	1.8
H2020	2017	4,438	8.6	1.9
H2020	2018	4,915	9.3	1.9
H2020	2019	5,195	10.4	2.0
H2020	2020	4,132	8.7	2.1
H2020	2021	128	1.0	7.9
Horizon Europe	2021	3,773	8.5	2.3
Horizon Europe	2022	5,179	14.7	2.8
Horizon Europe	2023	4,209	10.0	2.4

Source: Horizon Dashboard, own calculations. Data retrieved: 16/10/2024.

Table 1 provides an overview of the funding from the Horizon 2020 and Horizon Europe programs in EU-27. Over the years, the number of grants and contributions varied, with Horizon 2020 reaching its peak in 2019 at 5195 grants signed and a contribution of EUR 10.4 billion. In 2021, Horizon 2020 was phased out and replaced by Horizon Europe. Starting in 2021, the average contribution amount per grant increased significantly, reaching a peak in 2022 with an average of EUR 2.9 million per grant. However, in 2023, both number of grants signed, and the total EU contribution amount saw a slight decline. Overall, the average contribution per grant has increased since 2014. This increase may be attributed to several factors, including rising projects costs due to inflation, expanded projects scopes, and increased funding for research areas that require specialized equipment or software. Consequently, interpreting the average figures in isolation and drawing conclusion about the factors driving the costs can be difficult.

Figure 2 illustrates the cost per participating institution and the percentage of EU contribution across Member States as of May 15, 2024. Non-Widening Member States have higher costs per institution, exceeding EUR 450,000, whereas Widening countries demonstrate lower costs per institution, at just under EUR 380,000. Regarding the EU contribution share, Germany, France, and Spain emerge as the largest recipients, each receiving more than 10% of the total EU-27 contribution. In contrast, most of the Widening countries receive the least, with less than 1% of the total EU-27 contribution.

Figure 2: Horizon Europe Cost per Participating Institution & EU Contribution Share, 2021-2024



Source: Horizon Dashboard, own calculations.

Notes: The cost per participating institution is calculated as the total cost divided by the number of participating institutions, expressed in thousand EUR. The EU contribution share represents the country's EU contribution divided by the EU-27 total, expressed as a percentage. Groups for both variables are based on quantiles.

2.2 The Impact of Inflation on EU Contributions

Horizon Europe offers three different methods for calculating personnel expenses, which represent the largest segment of an average project budget. The European Commission states that personnel costs make up two-thirds of an average project budget. The first method is the daily rate per reporting period, where a daily rate is calculated based on actual personnel costs incurred during the specific reporting period. Beneficiaries must record and report the time worked on the project within this period. The second method is the daily rate per financial year, which calculates a daily rate based on the annual personnel costs for the entire financial year. This rate remains fixed for the entire year. The third and newest method, introduced by DG R&I on January 15, 2024, is the unit cost method. This optional method can be used following approval of requests submitted. It fixes a daily rate in advance for each beneficiary and allows updates every two years for new grants, but ongoing grant agreements cannot be amended.

The first two methods of calculation, although complicated and prone to errors, allow for a larger degree of flexibility for beneficiaries, particularly in times of fluctuating prices. This is confirmed by interviews conducted with research institutions that frequently participate in Horizon Europe. As institutions that have participated in European Union research funding schemes for decades, interviewees indicated that they are comfortable with these calculations. In fact, they prefer Horizon Europe projects over other lump sum funding options. They emphasise that as long as they can justify their daily rates for personnel costs, they have not encountered any issues with the budget of Horizon projects.

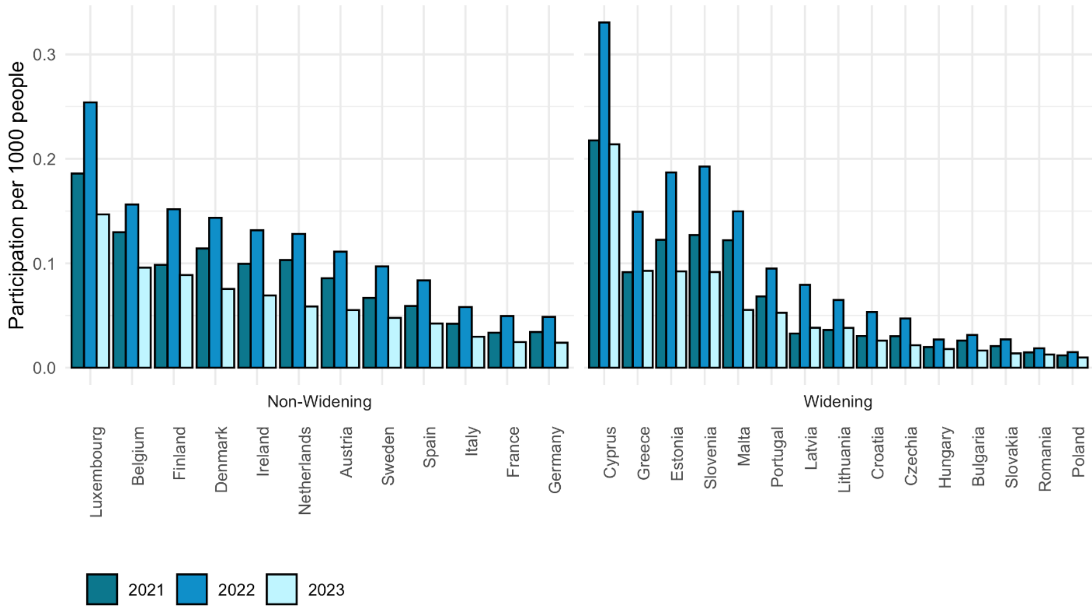
Unforeseen inflationary pressures have amplified costs for Horizon Europe projects, exceeding the anticipated adjustment by the European Commission. The current MFF assumes a 2% annual inflation rate to adjust expenditures and offset the potential losses in purchasing power from 2021 to 2027. The impact of higher-than-expected inflation has exceeded the anticipated 2% adjustment, resulting in significant losses in purchasing power for institutions engaged in Horizon Europe projects. Direct costs for personnel, travel, and equipment in Horizon Europe projects have surged due to increased prices of goods and services, wages, and transportation. Similarly, subcontracting fees, consumables, and supplies costs have risen, alongside indirect expenses like office rent and utilities.

However, within the framework of Horizon Europe's conventional funding instruments, inflationary pressures present challenges to the allocation of the overall budget, rather than impacting project costs directly, as indicated by our interviews. Without corresponding adjustments, high inflation may result in fewer projects being funded as a result less research conducted. While we observe an overall increase in the average EU contribution per grant over the years, it is difficult to determine the specific drivers behind this increase based on average figures. The rise may be attributed to expanded projects scopes and rising ambitions for research outputs under European research programmes, or it could reflect rising project costs due to higher inflation. In the latter case, the increased EU contribution might primarily serve to offset rising costs rather than to enhance research output. In this case, although nominal funding per grant might rise, inflation erodes the real value of EU contribution, leading to a decrease in the number of projects funded and as a result reduced research output. Furthermore, the introduction of new funding instruments under Horizon Europe, such as pre-specified lump sums in calls or proposals, may not only restrict the number of calls and funding opportunities but also lead to the underfunding of projects in high inflationary environments.

The risk of exacerbating low engagement levels is more evident in Widening countries, where participation rates are already low. Among EU Member States, only 15% of the total EU contribution went to projects from Widening countries, while 20% of institutions originated from Widening countries. Under the Pillar "Widening Participation & Strengthening the European Research Area," the majority of participants are still from non-Widening countries, comprising 53%, whereas 47% are from Widening countries. In this pillar, EU contribution was evenly distributed, with 50.6% allocated to Widening countries and 49.4% to non-Widening countries. Although the primary goal of the Pillar is to enhance the research and innovation performance of Widening countries, no specific targets have been set regarding to participation or EU contribution. The Pillar's main strategy is to boost the performance of these countries through "Teaming" and "Twinning" initiatives which focus on increasing collaboration between their research institutions and leading EU counterparts (European Commission, 2024b). This also explains the high participation of non-Widening countries under the Pillar.

As shown in Figure 3, participation per 1000 people has declined in 2023 across all Member States. Among Widening countries, there is significant heterogeneity in engagement. Southern European Member States, Slovenia, and Estonia exhibit better engagement levels compared to most non-Widening countries. Eastern European Member States continue to exhibit persistently low engagement levels and have not yet achieved participation rates comparable to other Member States since the implementation of Widening Participation & Strengthening the European Research Area.

Figure 3: Horizon Europe participation per 1,000 people, 2021-2022



Source: Horizon Dashboard, Eurostat, own calculations.

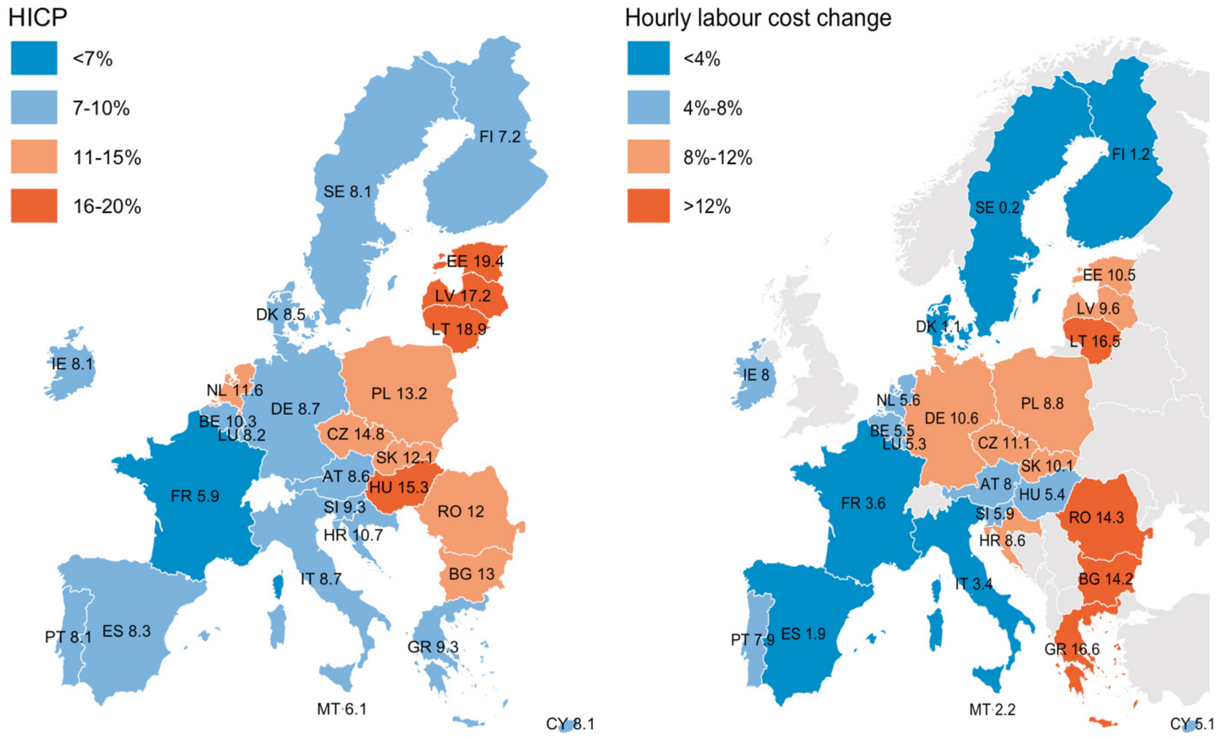
2.3 The Impact of Inflation on Project Costs

Institutions receiving Horizon Europe funding incur various costs, including direct costs such as salaries for researchers, travel expenses, equipment purchases, and consumables directly linked to the project. They also face indirect costs covering general administrative expenses like office rent and utilities, which are often reimbursed at a flat rate of 25% of eligible direct costs. According to our interviews, the main impact of inflation has been felt in wages of researchers, particularly in countries where labour costs have increased significantly due to automatic price indexation of private sector wages.

The majority of Member States saw a peak in inflation in 2022, except for Hungary, where the peak occurred in 2023. Between 2020 and 2023, escalating labour expenses driven by inflationary pressures have impacted various sectors, including those crucial for research and innovation. The professional, scientific, and technical services sector experienced a significant increase in labour costs, with wages rising by approximately 6.8% in 2022 in the EU-27, which is higher than the economy-wide average increase. The overall economy in the EU saw a labour cost increase of 5.6% in 2022.

Figure 4 illustrates the annual average Harmonised Index of Consumer Prices (HICP) alongside the change in annual average hourly labour costs (LCI) within the professional, scientific, and technical services sector (M) across EU Member States in 2022. The Baltic States and Hungary experienced the highest inflation rates, ranging between 15-20%. In contrast, France and Malta recorded lower rates, with HICP below 7%, but still surpassing the 2% inflation assumption in the current MFF. As expected, there is a correlation between high inflation and increase in labour costs. In 2022, Lithuania and Estonia experienced significant labour cost increases, exceeding 12%, coinciding with their relatively high inflation rates. In contrast, countries with relatively lower inflation rates observed smaller increases in labour costs (France with below 4%). However, there are exceptions; for instance, Germany and Greece, despite having moderate inflation rates compared to other EU states (between 7-10%), saw relatively high increases in labour costs, ranging between 10-17%. Despite this, it is important to note that in most of the Member States, wage increases failed to keep pace with inflation. In certain Member States, the labour cost increase resulted in minimal changes, remaining below 2%, such as in Sweden, Finland, and Spain.

Figure 4: Inflation and Annual Labour Cost Change in Professional Services, 2022



Source: Eurostat, own calculations.

Notes: HICP stands for the Harmonised Index of Consumer Prices. The Labour Cost Index (LCI) measures annual average hourly labour costs in EUR, including employee compensation plus taxes minus subsidies. The annual change is calculated as the difference from the previous year.

To determine potential cost increases in an average Horizon Europe project across Member States, we developed a cost projection model. The model quantifies how much of the increased project budgets are driven by inflationary developments, highlights regional heterogeneities, and illustrates the extent to which the increased costs could be offset by 2% MFF deflator. The model incorporates wage (Labour cost index, LCI) increases, inflation, and research area-specific price increases and calculates the percentage cost increase per institution. Our projections are based on a hypothetical project advertised in 2021 and commencing in 2022, with an assumed average project duration of three years. We calculate cost increases under three different scenarios:

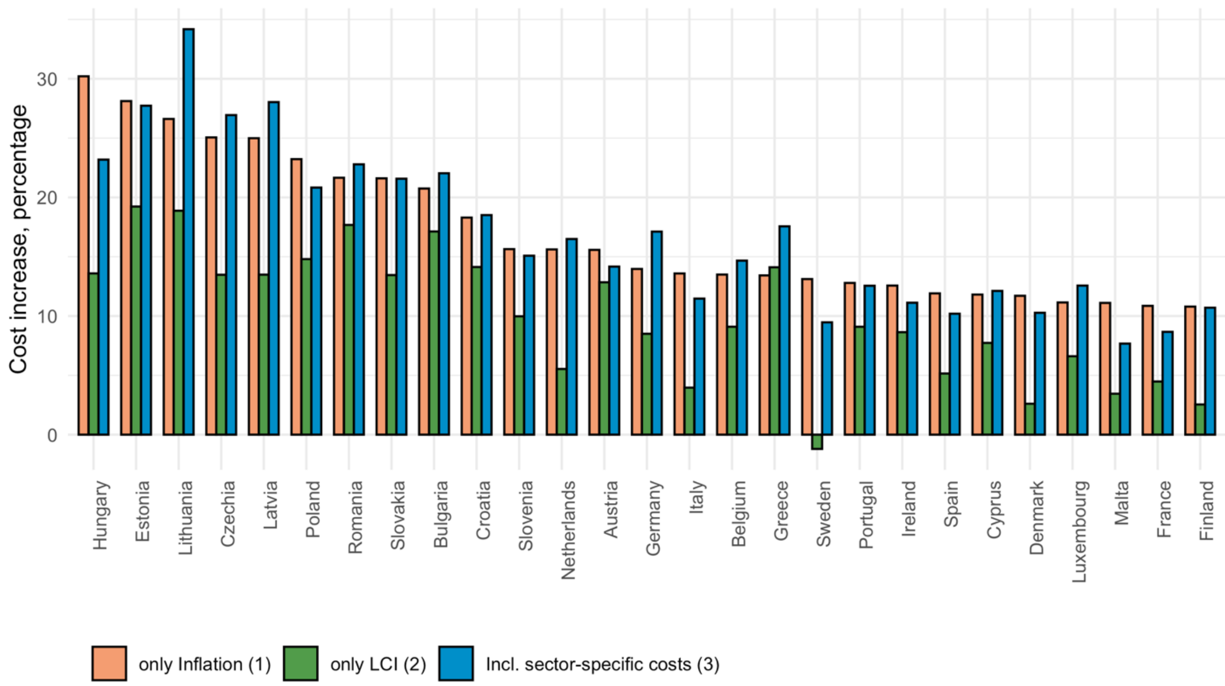
- **Only inflation:** In our base case, we allocate the project costs evenly over three years, applying a 2% annual increase in line with the MFF deflator and the Eurozone's medium-term inflation target. Under the "Only inflation" scenario, project costs rise, instead of 2% deflator, due to realized local consumer price inflation. Therefore, we adjust the total project cost each year based on actual local HICP and calculate the difference from the base scenario.
- **Only LCI:** We factor in sector-specific labour cost increases, where 70% of the project cost fluctuates with labour cost increases, while the remaining 30% remains constant. Our interviews show that some institutions faced cost increases solely due to rising wages (particularly in countries with automatic wage indexation). To account for these cases, we include this scenario, where only wages increase, while non-wage costs remain constant over time.

- **Including research-specific cost:** We assume 70% of the cost increase to labour cost increases, 20% to overall inflation, and 10% to research-specific cost increases (e.g., price increases in medical products, software, and information processing equipment).

First, we aggregate Horizon Europe project cost and participation data by year, country, and thematic pillar. We then calculate the average project cost per institution for each of the 15 thematic pillars (see Table A1) and country in 2021. The initial cost per institution is assumed to be evenly distributed over the three-year project duration. In the first scenario, we assume project cost increases annually, for 2022 and 2023 based on realized local inflation (HICP), and, for 2024, we use each country's projected inflation rate from the European Commission's most recent Economic Forecast (Spring 2024). For the labour cost increase (LCI) scenario, we assume 70% project costs rise each year with sector-specific LCI change, while 30% remains constant. For the increase in wages, we use the annual hourly labour cost index of the professional, scientific, and technical services sector. In the scenario that includes research-specific costs, we assume 70% of costs increase with LCI, 20% with inflation (HICP), and 10% with research-specific cost index. For the specific cost component, we use 4-digit COICOP HICP indices and match them to the 15 thematic pillars of Horizon Europe. Similar to the first scenario, we assume costs for 2024 will increase according to the local projected inflation rate across all components – wages, administrative, and research specific. To provide a comprehensive country-level analysis, we aggregate the projected data by country, weighted by the EU contribution by pillar. The average projected costs per institution are then calculated for the total project period.

Figure 5 illustrates the project cost increases for Horizon Europe projects across EU Member States under three scenarios.

Figure 5: Projection results



Source: Horizon Dashboard, Eurostat, own calculations.

Hungary, Estonia, and Lithuania stand out with the highest project cost increases under the only inflation scenario, particularly in Hungary, where inflation alone could drive the cost up over 30%. In contrast, countries such as France, Malta and Finland show more modest increases. Overall, in a majority of the Member States, estimations under the only LC (Labour Cost) scenario lead the lowest cost estimates, indicating that the wages in most Member States have not kept pace with inflation. Countries, like Lithuania, Czechia, Latvia, Germany, and Greece experience significantly larger cost increases when research-specific costs are included, in comparison to only inflation scenario, indicating that they may have been facing higher project expenses in research fields requiring specialized equipment or software. Across the board, the most significant cost increases are predominantly seen in Widening countries, with the exception of Cyprus and Malta, whereas non-Widening countries exhibit more moderate rises in project cost per institution.

2.4 Implications

Our analysis reveals that inflation significantly impacts research projects across Member States, with project costs rising on average by 10% when considering labour cost increases alone. Our projections incorporating labour costs and research-specific costs showing 15% rise in project costs. While average project costs have increased over the years under European Union research funding, identifying the sources of this increase is difficult. Year-to-year comparisons of average cost increases are complicated by the unique nature of each project and the rising ambitions set for each funding round. Consequently, higher costs may be driven by various factors, including project scope, number of researchers involved in a project, and the type of research conducted. In the absence of survey data, approximating costs can shed some light on these factors and indicate whether funding is being directed towards conducting more research or compensating for increasing costs due to inflation. Our results indicate that, even with more conservative estimates, the increased funding in the recent years may have primarily been allocated to compensating for rising project costs.

Our estimations and interviews show that the primary burden of inflation is reflected in higher personnel costs. The fixed deflator of 2% used for adjusting MFF expenditure ceilings was significantly below the actual inflation rate in 2022 and continues to be so. Research institutions, as per interviews, express a preference for Horizon Europe's flexible funding mechanisms over lump sum options and appreciate the new simplified application procedures. However, they highlight challenges arising from increased complexity in project implementation due to new reporting commitments. In addition to the challenges posed by inflation, factors such as limited experience in managing large Horizon projects and difficulties with financial reporting further hinder engagement from Widening countries. Consequently, unexpectedly high inflation does not directly impact existing project funding, but instead erodes the purchasing power of Horizon Europe and thereby reduces the real research output achievable within the remaining budget. Inadequate inflation adjustment can therefore lead to fewer projects. This situation is especially problematic for institutions in Widening countries, where funding and participation rates already lag behind their non-Widening counterparts.

A key limitation of the analysis presented in this section is the lack of comprehensive data. While staffing costs are frequently highlighted by our interview subjects and prior research as the primary driver of cost increases, determining a research-specific inflation rate requires detailed institute-level data on the prices of other inputs, such as various supplies and equipment used in research. Moreover, as Horizon projects become increasingly larger and complex, it becomes challenging to compare costs across different projects and ascertain whether cost increases stem from project complexity or price escalations.

2.5 Policy Recommendations

Enhance the flexibility of adjustment rule: A flexible adjustment rule, rather than the fixed 2%, is necessary to protect Horizon Europe's purchasing power. Without it, fewer projects will be financed, and real value added of research will decline. Given the varying inflation rates across Member States, a one-size-fits-all EU-wide assumption is inadequate. A flexible rule that accounts for inflation differences across Member States would help preserve fair research funding in line with local inflation rates. This rule could consist of an ex-ante adjustment component based on an inflation forecast and an ex-post component based on realized inflation. The ex-post component would be triggered in the event of unexpected inflation shocks, particularly when the ex-ante component fails to address these shocks effectively.

- *The ex-ante flexible component* could utilize the European Commission's Economic Forecast to analyse inflation trends in each Member States, allowing for the establishment of annual funding targets that reflect these trends. Additionally, the adjustment rule could set an inflation forecast threshold, triggering ex-ante adjustments, if inflation developments signal significant erosion of Horizon Europe's purchasing power in the medium term.
- *The ex-post adjustment component* could start with a baseline inflation rate of 2%, in line with the ECB's medium term inflation target, and could set a critical inflation threshold, which triggers adjustments when exceeded. For every 0.5% increase beyond this threshold, funding allocations could increase proportionally. Additionally, implementing a maximum cap on funding increases would safeguard against excessive fluctuations while still ensuring adequate support.

Enhance flexibility in funding: Introduce more flexible funding instruments that can adapt to changing economic conditions if necessary. This could involve implementing country-specific dynamic budget adjustments to accommodate fluctuations in inflation and exchange rates, if necessary. Potential measures might include (1) establishing contingency fund, and (2) introducing country-specific variable funding rates that adjust based on economic indicators to support institutions and researchers in maintaining project viability.

Monitor and adjust the new ex-ante funding instruments: Regular revisions and adjustment of funding instruments like the unit cost method are key to ensure they remain effective under varying economic conditions. This includes allowing for periodic updates to unit costs to reflect real-world changes in salaries and operational costs. It is essential to ensure that the simplification of financial reporting requirements does not come at the expense of research institutions.

3. IMPACT OF INFLATION ON COHESION POLICY PROGRAMMES

This section explores Cohesion Policy in the EU in the current programming period 2021 – 2027. We examine how the funding is impacted by inflation by examining individual funds and comparing between countries and between time periods. Section 3.1 briefly presents Cohesion Funding for the 2021 – 2027 period. Section 3.2 explores the accumulated inflation so far in the period 2021 – 2027, the forecasted inflation, and comparisons with previous periods. Section 3.3 analyses the impact of inflation and the real losses it imposes by comparing it with a baseline case of inflation at the 2% inflation target. Section 3.4 concludes with policy recommendations.

3.1 Cohesion Policy throughout 2021-2027

The Cohesion Policy of the European Union (EU), as outlined in Article 174 of the Treaty on the Functioning of the EU, aims to promote economic and social convergence by reducing disparities in the development levels of various regions. This policy targets key areas to help the EU address challenges and remain resilient and competitive globally. The budget for Cohesion Policy accounts for about 30% of the current Multiannual Financial Framework of the EU, while it has decreased from 36% and 34% in the previous two programming periods, respectively. EU Cohesion Policy Funding for the period 2021 – 2027 available for programming in the Member States amounts to EUR 374 billion, which, combined with national co-financing, totals EUR 529 billion.[3] It consists of the European Regional Development Fund (ERDF) (EUR 214 billion), the European Social Fund Plus (ESF+) (EUR 95 billion), the Cohesion Fund (CF) (EUR 39 billion), the Just Transition Fund (JTF) (EUR 20 billion), and the European Maritime, Fisheries and Aquaculture Fund (EMFAF) (EUR 6 billion).

For the 2021-2027 period, the Cohesion Policy has five main objectives:

- A smarter Europe through innovation, digitalization, economic transformation, and support for SMEs.
- A greener and low-carbon Europe by implementing the Paris Agreement and investing in energy transition, renewable energy sources, and climate change mitigation.
- A more connected Europe through the construction of strategic transport and digital networks.
- A more social Europe by implementing the European Pillar of Social Rights and supporting quality employment, education, skills, social inclusion, and equal access to healthcare.
- A Europe closer to citizens by supporting local development strategies and sustainable urban development.

To achieve the goals above, Cohesion Policy is implemented through the EU's Structural and Cohesion Funds:

- The European Regional Development Fund (ERDF) aims to reduce disparities in the economic development levels of European regions and to decrease the disparities in the development between regions. The ERDF's EU budget of EUR 214.2 billion for the 2021 – 2027 period is directed towards investments in all five Cohesion Policy objectives, with a focus on "A Smarter Europe" and "A Greener Europe." The ERDF also funds Interreg programs for cross-border and transnational cooperation between Member States, including with non-EU countries.

---

3 See https://cohesiondata.ec.europa.eu/cohesion_overview/21-27 (refresh date: 25/9/2024).

- The European Social Fund Plus (ESF+) invests in people with a focus on improving employment and education opportunities and policies aimed at addressing the situation of the most vulnerable individuals at risk of poverty. ESF+ supports employment, combating poverty, and promotes education, skills, and lifelong learning, including through the development of policies for active, comprehensive, and sustainable inclusion. The ESF+ budget 2021-2027 from the EU amounts to EUR 95.1 billion and embeds priorities supported during the previous period under the Youth Employment Initiative (YEI) and the Fund for European Aid to the Most Deprived (FEAD).

- The Cohesion Fund (CF) aims to reduce economic and social disparities, as well as to promote sustainable development by ensuring financial support for infrastructure projects in the area of environment and trans-European transport networks. The CF's funding is directed towards investments falling under the objectives of "A Greener Europe" and "A Connected Europe." The CF is intended for 15 Member States whose Gross National Income (GNI) per capita is less than 90% of the EU average—Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, and Slovenia. For the current period, it provides for EUR 39.0 billion from the EU budget.

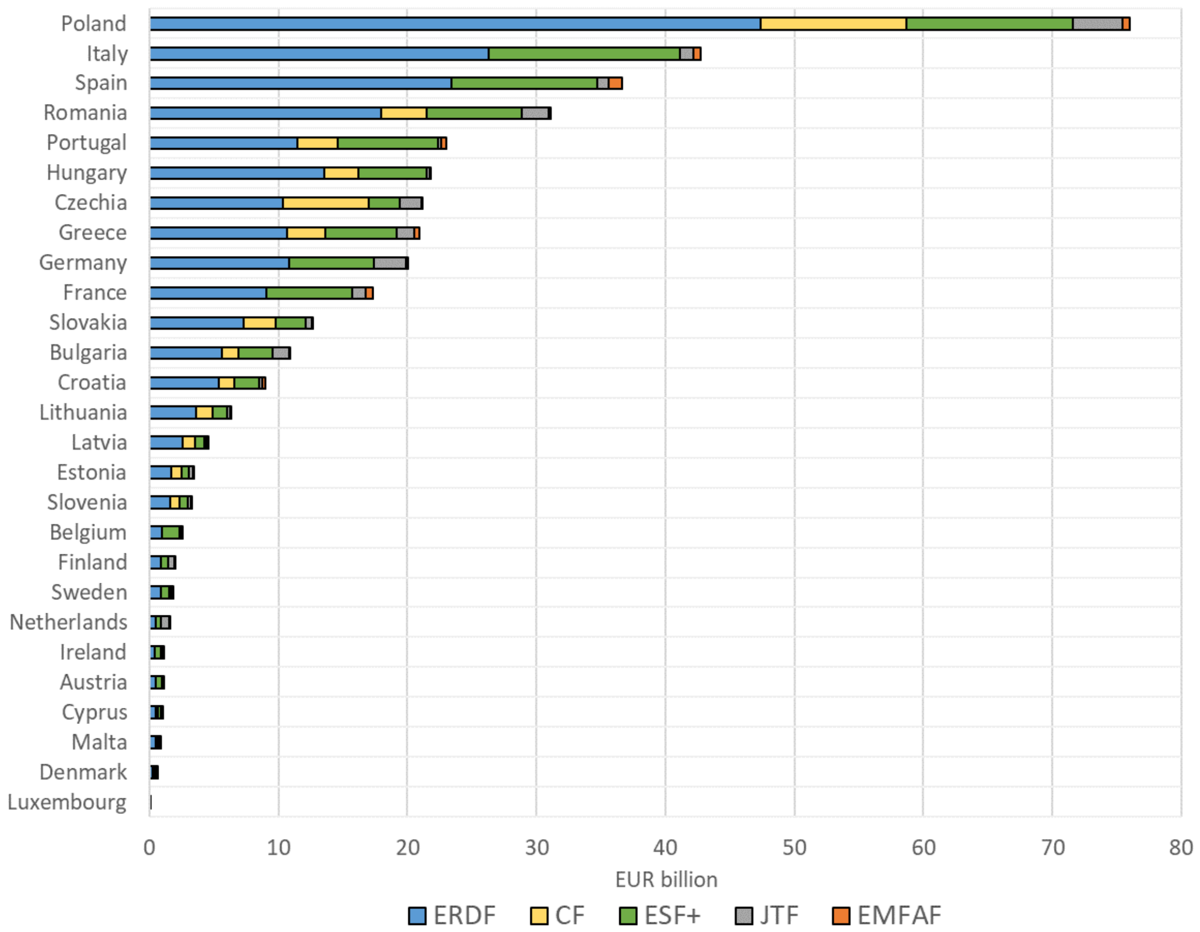
- The Just Transition Fund (JTF) is a new financing instrument for the 2021-2027 period with an MFF budget of EUR 19.7 billion. Its aim is to support the territories most affected by the transition towards climate neutrality. Specifically, the JTF aids regions with a notable share of carbon-intensive industries (such as steel, cement, or chemicals) or fossil fuels (such as coal, peat, and oil shale) to mitigate the socio-economic impacts of their transformation.

- The European Maritime, Fisheries and Aquaculture Fund (EMFAF) will run from 2021 to 2027 and will support the EU Common Fisheries Policy (CFP), the EU maritime policy, and the international ocean governance agenda of the EU. It has an overall budget of overall EUR 6.1 billion and will provide support for developing innovative projects ensuring the sustainable use of aquatic and maritime resources sustainably.

This comprehensive approach of the Cohesion Policy funds aims to ensure balanced and sustainable development across the EU and foster economic growth, social inclusion, and environmental sustainability.

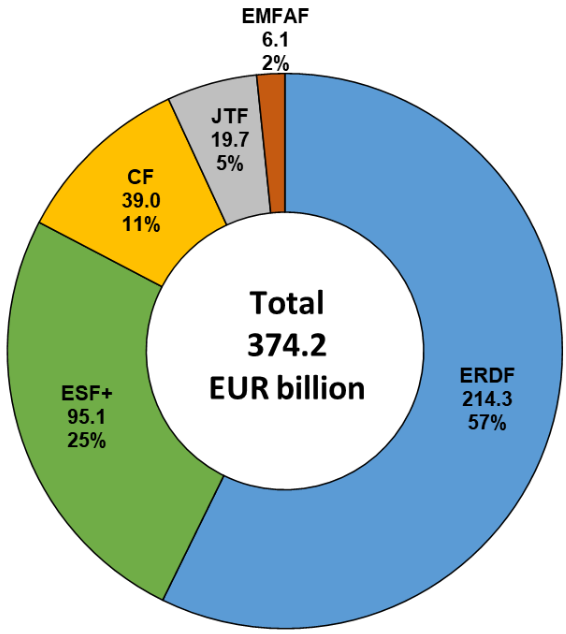
Figure 6 illustrates the overall funding that Member States will receive from Cohesion Funds in the actual period 2021 – 2027 in nominal terms.

Figure 6: Country EU allocations by fund in adopted Partnership Agreements



Source: Cohesion Data, Open Data on selected EU Budget programmes, European Commission.

Figure 7: Cohesion Policy budget by Fund



Source: European Commission, EC Cohesion Open Data Platform (refresh date: 22/10/2024).

3.2 Inflation throughout 2021-2027 and previous periods

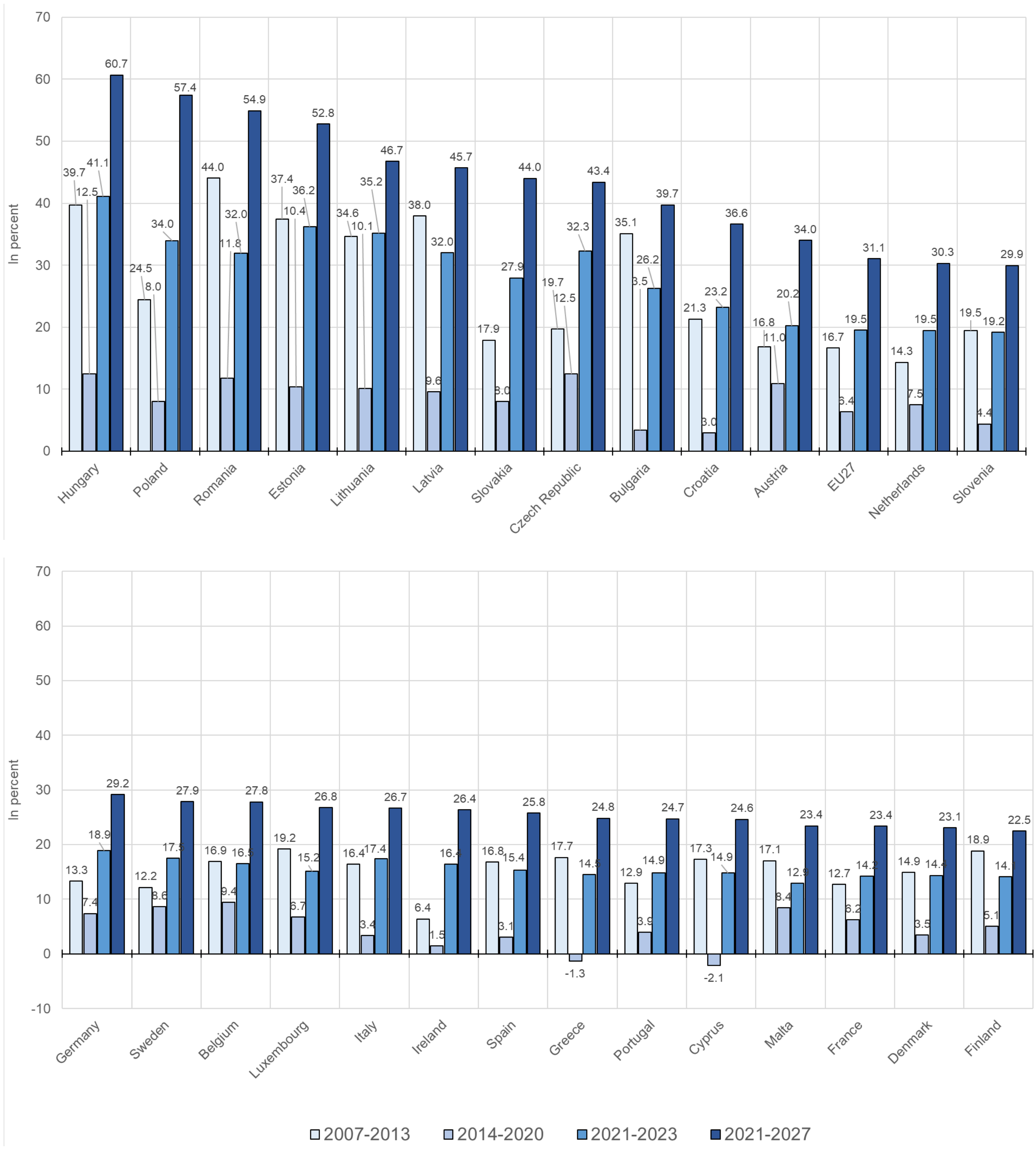
We firstly briefly present the data regarding the accumulated inflation rates across EU Member States in the last three programming periods: 2007-2013, 2014-2020, and 2021 – 2027. For the first two periods, we use the available HICP inflation data from the IMF, while for the 2021 – 2027 we use the available data so far combined with the current IMF forecast for the years 2024 – 2027. Since the IMF provides the longest available inflation forecast up until 2027, we can impute this throughout the whole MFF. We calculate the overall expected accumulated inflation over the period given this input data and forecast. Figure 8 illustrates the accumulated inflation through the three periods in all EU Member States.

For the period 2007-2013, inflation varied significantly among Member States. The EU-wide accumulated inflation for this period was 16.7%, with a standard deviation of 9.9%, thereby indicating considerable variability in inflation rates across the EU. Romania experienced the highest accumulated inflation at 44.0%, followed closely by Hungary (39.7%), Latvia (38.0%), Estonia (37.4%), and Bulgaria (35.1%). The lowest inflation rates were recorded in Ireland at 6.4%, Sweden (12.2%), France (12.7%), and Portugal at 12.9%. Driven by their lower GDP levels and faster convergence in the pre- and after EU accession period, the deviation in inflation was mostly driven by new EU Member States from Central and Central Eastern Europe.

Moving to the period 2014 – 2020, the overall inflation rates decreased substantially. The EU-27 inflation rate for this period was significantly lower at 6.4%, with a standard deviation of 4.0%, reflecting both the lower levels of inflation compared to the previous period and the reduction of inflation pressure in new Member States. The highest inflation was observed in the Czech Republic at 12.5% and Hungary at 12.5%, and the lowest was in Cyprus, which experienced deflation at -2.1% throughout the period.

In the current period 2021 – 2027, inflation surged considerably since the start of the inflation bout in 2022 and is considerably higher than in any of the previous periods. In only the first three years, the accumulated inflation in the EU is on average 19.5%, which is considerably higher than even the overall accumulated inflation for the whole period of 2007-2013 (16.7%). In 14 individual Member States, the accumulated inflation for 2021 – 2023 is already higher than the overall accumulated inflation throughout 2007 – 2013. This surge shows the magnitude of the inflation shock in comparison to previous periods and suggests challenges of new scale for the EU budget and Cohesion Funding.

Figure 8: Accumulated inflation throughout the EU MFF periods 2007-2013, 2014-2020 and 2021-2027



Source: IMF WEO (CPI, all items), Macrobond, own calculations.

Furthermore, the inflation shock of 2022 and 2023 should be considered as a price level change with a permanent effect that is not expected to be reversed through price decreases in the next years: it permanently raises the prices in 2022 and 2023 and the years to follow. It therefore will increase the overall costs of projects and expenditures going forward and, given the further inflation expected in the next years, add up to even higher accumulated inflation for the whole period 2021 – 2027. In the following sections (see Figure 8 as well as Table A2 in the annex), we compute the expected accumulated inflation for the whole period, given the already realised inflation and the expected inflation for the next years given by the latest round of IMF inflation forecasts. For the period 2021 –

2027, this results in an EU wide inflation of 31.1%, which is considerably higher than inflation in the period 2007 – 2013 (16.7%) and more than 5 times higher than in the 2014 – 2020 period (6.4%.). The standard deviation of 11.9% is also higher, highlighting a significant increase in inflation variability across the countries. Given these forecasts, Hungary will exhibit the highest inflation at 60.7%, followed by Poland (57.4%), Romania (54.9%) and Estonia (52.8%). Conversely, the lowest accumulated inflation will be in Finland (22.5%) and Denmark (23.1%).

3.3 Impact of Inflation on Cohesion Policy

As identified in the previous section, the inflation bout of 2022 and 2023 has led to a persistent and long-term effect of higher inflation for the MFF period 2021 – 2027. Unforeseen inflation will therefore amplify the costs for projects under all Cohesion Funding programmes. Currently, the MFF has embedded a maximum adjustment for expenditures to compensate possible losses up to 2% annual inflation rate for such cases. Any inflation above the 2% maximum, as already accumulated throughout the current period, can therefore result in losses to the envisioned outcomes of the Cohesion Funding programmes. In this section, we calculate each Member State's expected losses as the difference between the expected accumulated inflation throughout the period and the accumulated inflation if in each year the inflation had been at the standard adjustment level of 2%.

First, it needs to be noted that inflation at the 2% deflator in each year in the period 2021 – 2027 would have resulted in a total accumulated inflation of 14.9% over the period. Thus, all the EU Member States are already predicted to have significantly higher accumulated inflation over the period, even those with the lowest accumulated inflation such as Finland (22.5%), Denmark (23.1%), and France (23.4%), where this rate would still constitute a real loss in expenditures of around 8%. These are, however, Member States with relatively small shares in overall Cohesion Funding. In some of the biggest recipient countries, inflation is multiple times higher, e.g., in Romania (54.9%), Poland (57.4%), and Hungary (60.7%). This contrast points to the significant divergence in the real effect of the inflation shocks on Cohesion Funding across different Member States.

To estimate this effect, we compute the absolute nominal losses in current prices for each Member State as the difference between the expected accumulated inflation throughout the period and the accumulated inflation if in each year inflation had been maximum at 2%. We therefore estimate two scenarios – a "what if" scenario where inflation was at the maximum of 2% and a scenario with the real realised and expected inflation throughout 2021 – 2027. As a starting value for the respective country Cohesion Funding allocation, reported in Table 2, we use the European Commission Cohesion Open Data Platform. Total Cohesion Funding allocations there are reported in current prices. Since different programmes were adopted at different points in time between 2020 and 2022, we make the assumptions that all prices refer to 2020 prices. We then calculate the difference between the two scenarios and report it as the real value loss and compute this value loss as a share of the initial allocation.

We calculate the expected inflation to be accumulated for each Member States and for each fund given the initial planning for disbursement of funds in each year according to the Partnership Agreements (PAs). Given this implementation timeline, a certain amount of the costs of the projects falls into each year up until 2027. For this share of the project costs, the accumulated inflation up until this period is calculated and used to estimate the cost increases and the losses in comparison to a case of a stable 2% inflation in each year. This approach does not take into account the fact that some costs might still be incurred even after the end of the programming period 2021 – 2027 due to the n+3 rule, as it is uncertain how to estimate the share of these costs for each country separately. For this part of the study, the HICP inflation rate is used throughout. Further assessments are feasible with sub-measures of inflation (core inflation, PPP inflation, wage inflation), as done in Schratzenstaller et al. (2023), but only as far as forecasts of such sub-measures of inflation are available up until 2027, which is not always the case.

It is important to note that this estimation is a conservative scenario based on an initial plan. It is already clear in 2024 that the absorption of funds is currently much slower in most Member States. Therefore, expenditures will be backlogged and delayed in time. By being incurred at a later period than initially expected, they will incur higher nominal costs and therefore result in even higher real losses than expected. Currently, there is no realistic way to estimate this backlog, so we use the initial planning given by Member State PAs for our estimation and note that actual incurred accumulated inflation will be even higher.

3.4 Results

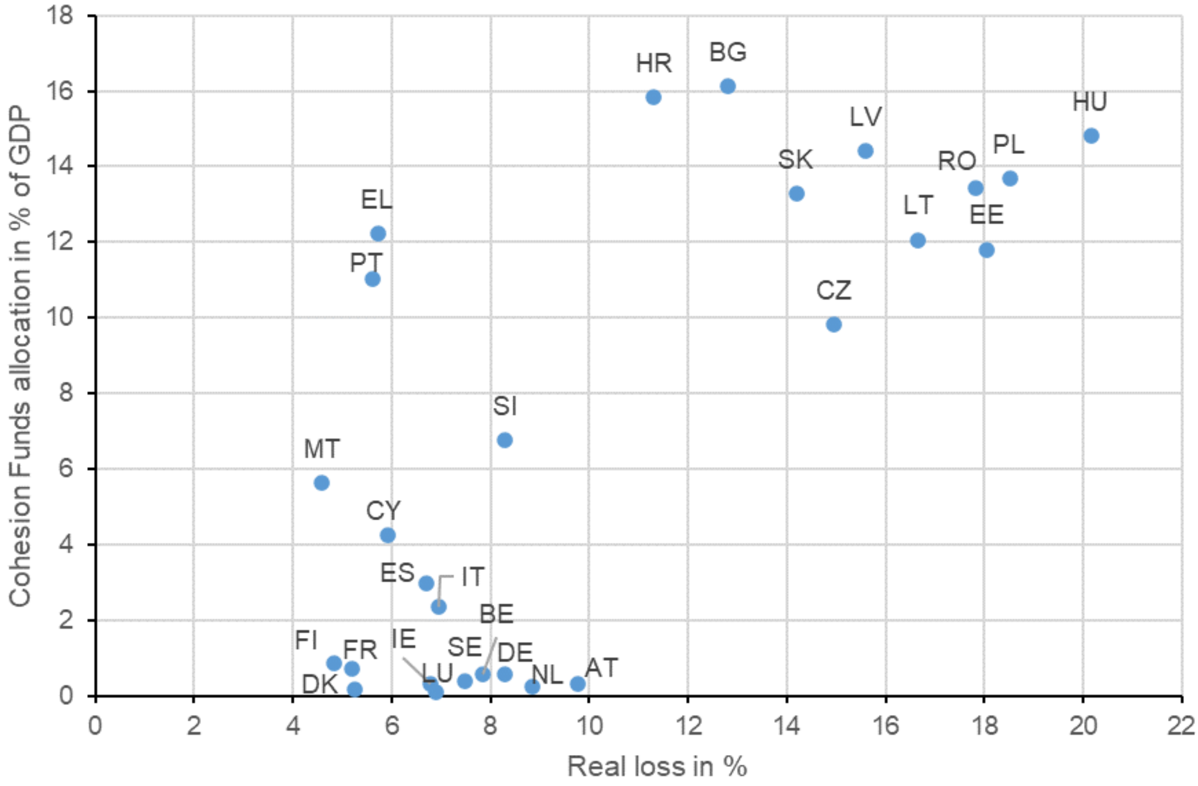
Our main results are reported in Table 2 below. We compare the real value of total Cohesion Funding for each country under a deflator of 2% in each year with the real value of the same funding under the realised inflation so far and the forecast inflation for the years up to 2027. The difference between these two is reported as the loss in real value between the actual situation and the situation under an assumed 2% inflation in each year. The total real losses accumulated throughout the whole MFF2021-2027 are estimated at EUR 47.4 billion, which is around 12.2% of the total Cohesion Funding.

Looking at individual Member States, the biggest real value losses as percentage of their total Cohesion Funding are expected to happen for Hungary (20.2%), Poland (18.5%) and Estonia (18.1%), followed by the other new Member States from Central and Eastern Europe. In all Central and Eastern European Member States, the accumulated real value losses are estimated to be above 10%.

Furthermore, it is critical to underline that the relevance of Cohesion Funding for individual Member States is very different; for some Member States the level of Cohesion Funding is considerable, while for others, it is rather low. The last column of the table therefore compares the initial Cohesion Funding allocation per Member State to its nominal GDP in 2021. It is important to note that we are comparing the whole MFF allocation to the GDP for one year and that, since 2021 inflation has had diverging effects in different Member States, this comparison can be slightly different in terms of proportions in later years (2023 and onwards). Still, as illustrated in Figure 9, the Member States with the highest accumulated real value losses also have some of the highest shares of Cohesion Funding in relation to the size of their economies. For example, Hungary (14.8%), Poland (13.7%), and Romania (13.4%), with Bulgaria (16.1%) and Croatia (15.8%) have the highest shares overall and Cohesion Funding has the greatest significance for these countries.

The real losses in absolute terms differ slightly from those in relation to the Cohesion Funding Allocation. Due to the size of its economy, the considerable share of its Cohesion Funding and the high inflation, Poland is set to incur the highest real value losses in absolute terms at EUR 14.6 billion. It is then followed by Romania (EUR 5.8 billion), Hungary (EUR 4.6 billion), the Czech Republic (EUR 3.5 billion), Italy (EUR 3.0 billion), and Spain (EUR 2.4 billion).

Figure 9: Real loss in percent of initial allocation and Cohesion Funds allocation as a share of GDP



Source: Own calculations. Cohesion Funds 21-27 allocation are values in current prices from the lates adopted programmes as reported at the EU Cohesion Open Data Portal: https://cohesiondata.ec.europa.eu/cohesion_overview/21-27# . We take these values as 2020 baseline and make all further inflation adjustments based on that assumption.

Notes: We estimate two scenarios – a "what if" scenario of maximum 2% and a scenario with the realised and forecasted inflation. The difference between the two is then reported as the real value loss due to the inflation shock and then also computed as a share of the initial allocation.

Table 2: Cohesion Funding in nominal values and deflated in real value throughout the MFF 2021 – 2027

Member States	Cohesion Funds 2021-27 in EUR million (in current prices)	Value at 2% Inflation in EUR million (in 2020 prices)	Value at Actual Inflation in EUR million (in 2020 prices)	Real Loss in EUR million	Loss in %	Cohesion Funds as a share of GDP in %
Hungary	22,791	21,004	16,410	4,594	20.16	14.80
Poland	78,890	72,738	58,134	14,603	18.51	13.69
Estonia	3,680	3,404	2,740	664	18.05	11.81
Romania	32,450	29,910	24,126	5,784	17.82	13.43
Lithuania	6,813	6,289	5,154	1,135	16.66	12.06
Latvia	4,804	4,431	3,682	750	15.60	14.41
Czechia	23,407	21,639	18,139	3,500	14.95	9.82
Slovakia	13,314	12,274	10,385	1,890	14.19	13.28
Bulgaria	11,454	10,584	9,116	1,468	12.82	16.12
Croatia	9,258	8,545	7,499	1,046	11.30	15.84
Austria	1,287	1,190	1,065	126	9.76	0.32
Netherlands	1,922	1,786	1,616	170	8.86	0.22
Germany	20,936	19,374	17,635	1,739	8.30	0.58
Slovenia	3,538	3,271	2,978	293	8.29	6.77
Belgium	2,877	2,660	2,434	225	7.83	0.57
Sweden	2,081	1,924	1,769	156	7.48	0.38
Italy	43,128	39,832	36,827	3,004	6.97	2.37
Luxembourg	68	63	58	5	6.88	0.09
Ireland	1,283	1,186	1,098	87	6.80	0.30
Spain	36,257	33,486	31,059	2,427	6.69	2.97
Cyprus	1,061	981	918	63	5.93	4.26
Greece	22,211	20,510	19,239	1,271	5.72	12.24
Portugal	23,803	21,977	20,639	1,338	5.62	11.02
Denmark	608	563	531	32	5.24	0.18
France	17,883	16,527	15,599	928	5.19	0.71
Finland	2,121	1,967	1,864	103	4.84	0.85
Malta	861	795	756	40	4.60	5.63

Source: Own calculations. Cohesion Funds 2021-2027 allocations are values in current prices from the latest adopted programmes as reported at the EU Cohesion Open Data Portal: https://cohesiondata.ec.europa.eu/cohesion_overview/21-27#. We take these values as 2020 baseline and make all further inflation adjustments based on that assumption.

Notes: We estimate two scenarios – a "what if" scenario of maximum 2% and a scenario with the realised and forecasted inflation 2020-2027. The difference between the two is then reported as the real value loss due to the inflation shock and then also computed as a share of the initial allocation.

3.5 Policy Recommendations

Our preliminary results above show that the surprising inflation bout of 2022 and 2023 will result in considerable changes in the real value of Cohesion Funding programmes in comparison to a scenario where inflation would have been at the 2% deflator in line with the inflation target. Since the MFF has only embedded a fixed deflator of 2% for adjusting expenditure ceilings, each period of inflation rates exceeding this deflator results in real value losses as estimated above. These losses would then have repercussions of fewer projects and therefore diminished achievement of the goals planned under Cohesion Policy programmes in the MFF 2021 – 2027 period.

It is important to note, however, that the problem here is very different than the problem addressed in Schratzenstaller et al. (2023), where we explored the effects of inflation on projects already planned under the MFF 2014-2020 and more specifically on projects under National Recovery and Resilience Plans. With both types of projects – those with an already chosen contractor under MFF 2014-2020 or under National Recovery and Resilience Plans – the problem is that the individual costs of a given project have already been pre-set before the inflation shock. The completion of the project therefore becomes unfeasible after the price increase either because the respective costs and expenditures have increased, or due to the unwillingness of the contractor to fulfil the project under the initial conditions. This problem then results in the risk that many projects do not get initiated or completed at all.

The problem that results from our calculations above on the MFF 2021 – 2027 is not one of infeasibility of already planned projects, but rather of a change in the overall real value of funds disbursed to Member States. It will thereby mostly result in fewer projects being completed and fewer of the initial goals and priorities being achieved.

This is, however, associated with important policy implications, which should be considered in the future:

Re-thinking the 2% deflator: Similar to Chapter 2 on research programmes in this study, we also see the need for the European Commission to reconsider the annual inflation rate assumption and adapt budget allocations accordingly given the unexpected inflation shocks in 2022 and 2023. Especially given the fact that Member States from Central and Eastern Europe are among the biggest losers in real value both in relative and absolute terms, and that Cohesion Funding is particularly aimed at them to support European cohesion and speed up convergence, the adjustment cannot be one-size-fits-all and should at least partly aim for accommodating for these huge losses. While the 2% adjustment to inflation is in line with the ECB inflation target of 2% over the medium-term, specific time periods and shocks have shown in recent years that periods of sustained inflation above the 2% inflation target are possible and realistic. On average, in such periods there are specific driving factors of inflation with especially heightened inflation rates (e.g. energy prices, commodity prices, construction materials), which may be order of magnitude higher than 2% inflation. A possible re-thinking may enable sector-specific or activity-specific maximum adjustments for Cohesion Funding Programmes which have a strong concentration of specific activities or expenditures (e.g. related to energy prices, commodity prices, construction materials, wage expenditures). In this way, the more general 2% adjustment can be kept, but certain further exceptions can be introduced for programmes which can be particularly sensitive to energy price, construction price or wage shocks. This will enable a limited possibility for higher buffers for unexpected inflation to be embedded in future EU budget to be used to compensate situation such as the one documented in this study throughout 2022-2023.

Expedite the current implementation of projects under MFF 2021 – 2027: As discussed above, our estimates are only conservative estimates of the real value losses from the inflation shocks given the initial planned allocation from the MFF 2021 – 2027. In reality, the real value losses could be much higher if there is considerable delay in the implementation of MFF 2021-2027 projects. With projects and funding getting delayed and implemented later during the MFF period, the accumulated inflation and therefore real value losses will be even higher, given that inflation in many Member States is forecasted to continue to be above the inflation target even in 2024 and part of 2025.

Provide administrative and technical assistance to Member States for a faster implementation of MFF 2021 – 2027 projects: At least part of the delay in the implementation of MFF 2021 – 2027 Cohesion projects can be attributed to Member States focusing on their National Recovery and Resilience Plans projects under NextGenerationEU (NGEU), which is both a new and more complex instrument, as well as an instrument with a short deadline for implementation of projects (by mid-2026). However, Member States should focus on minimising such delays in the implementation of Cohesion Policy programmes, since these delays further accumulate real value losses from inflation. The provision of administrative and technical capacity, either through DG Reform or the Technical Capacity Instrument, should therefore be considered to address this issue.

4. IMPACT OF INFLATION ON THE COMMON AGRICULTURAL POLICY

4.1 Section overview and Member States' profiles

The Common Agricultural Policy (CAP) is financing a broad range of operations in all EU Member States. Since 2023, each Member State's CAP expenditures are allocated according to national CAP Strategic Plans (European Commission, 2023a, 2023b). Member States planned their actions towards 10 CAP specific objectives for 2023-2027 in their CAP Strategic Plan. The newly introduced performance monitoring and evaluation framework (PMEF) establishes a list of indicators to help assessing the attainment of the CAP 2023-2027 policy objectives.[4]

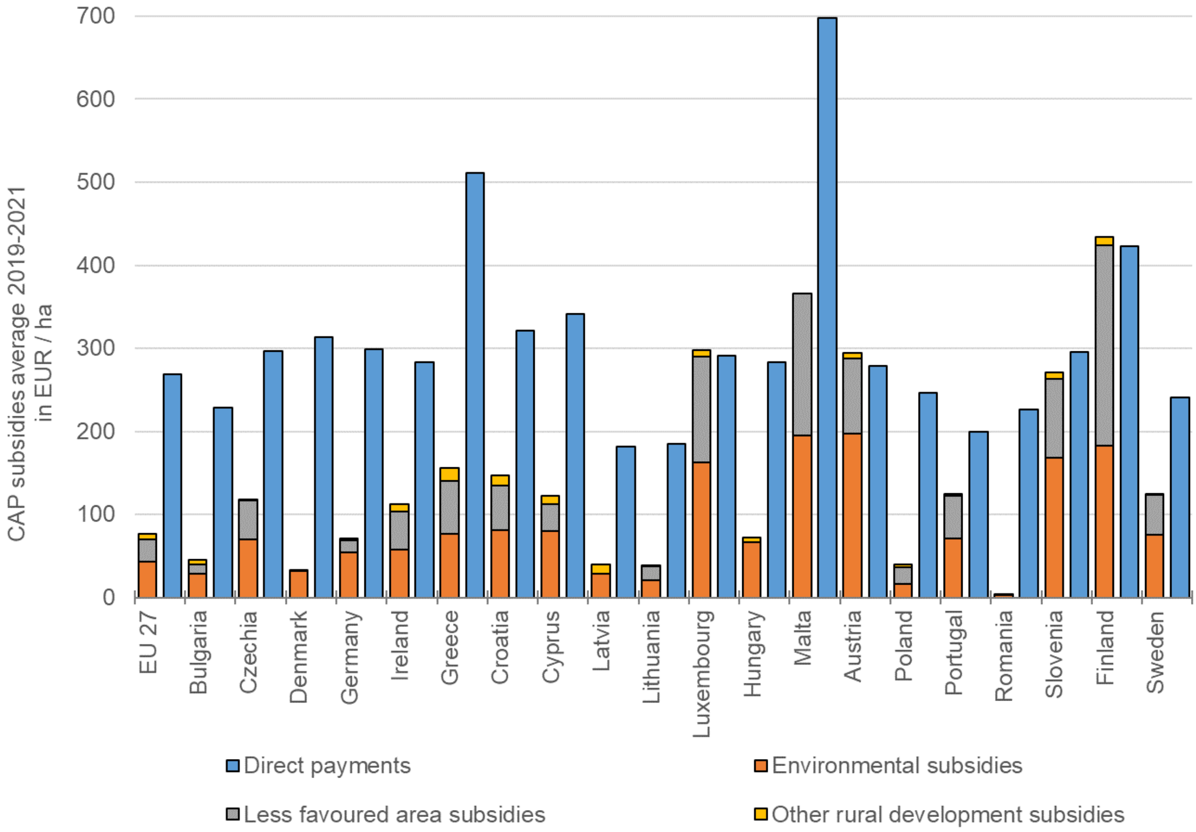
Payments are financed through the European Agricultural Guarantee Fund (EAGF) and the European Agricultural Fund for Rural Development (EAFRD). Whereas the first fund financed direct payments that are mainly paid per hectare or head of livestock, grants from the second fund are used for many very heterogeneous purposes. The largest expenditure – direct payments (DP) to agricultural producers – is financed solely by the EU. Rural development programmes (which include agri-environmental payments and payments for farms operating in areas with natural or other area-specific constraints) are co-financed by Member States. The country profiles of the allocation of CAP payments per hectare are presented in Figure 10. Because Member States have chosen distinct approaches to allocate funds across different instruments, inflation affects CAP payments in each of them in different ways.

Agricultural producers are affected by inflation via several channels:

- Agriculture is land intensive: the payments for land rents are affected by the prices of land which have been soaring in many countries during the phase of low interest rates and low inflation until 2022;
- Agriculture is energy intensive: fuels and fertilizer are among the biggest expenditures and changes of energy prices directly affects the prices of these inputs;
- Agriculture is capital intensive: rising interest rates negatively affects the profitability of farming;
- Agriculture employs many people, but there are marked differenced across countries (see Table 3), and the secondary effects of high inflation are increasing wages, which have to be financed out of the value added of the farm sector.

[4] Further details on the CAP Strategic Plans, including financial allocation across interventions and indicators on the performance of the operations, are available on the following data portal: https://agridata.ec.europa.eu/extensions/DataPortal/pmef_indicators.html (retrieved: 03/06/2024).

Figure 10: Country profiles of CAP payments by category in EUR/ha averages 2019-2021



Source: FADN Public Database.

CAP strategic plans are different across countries because the agricultural sectors are different. Table 3 and Figure 10 show economic variables of the average of all farms represented in the FADN in all Member States which highlight the heterogeneity among them. Depending on the structural elements of the farms, the agricultural sector in each Member State is affected in different ways. Based on FADN data, it would also be possible to show the heterogeneity within each Member State as well. Farms specialised in different activities in the Member States are affected in different ways, which can be revealed by FADN data.

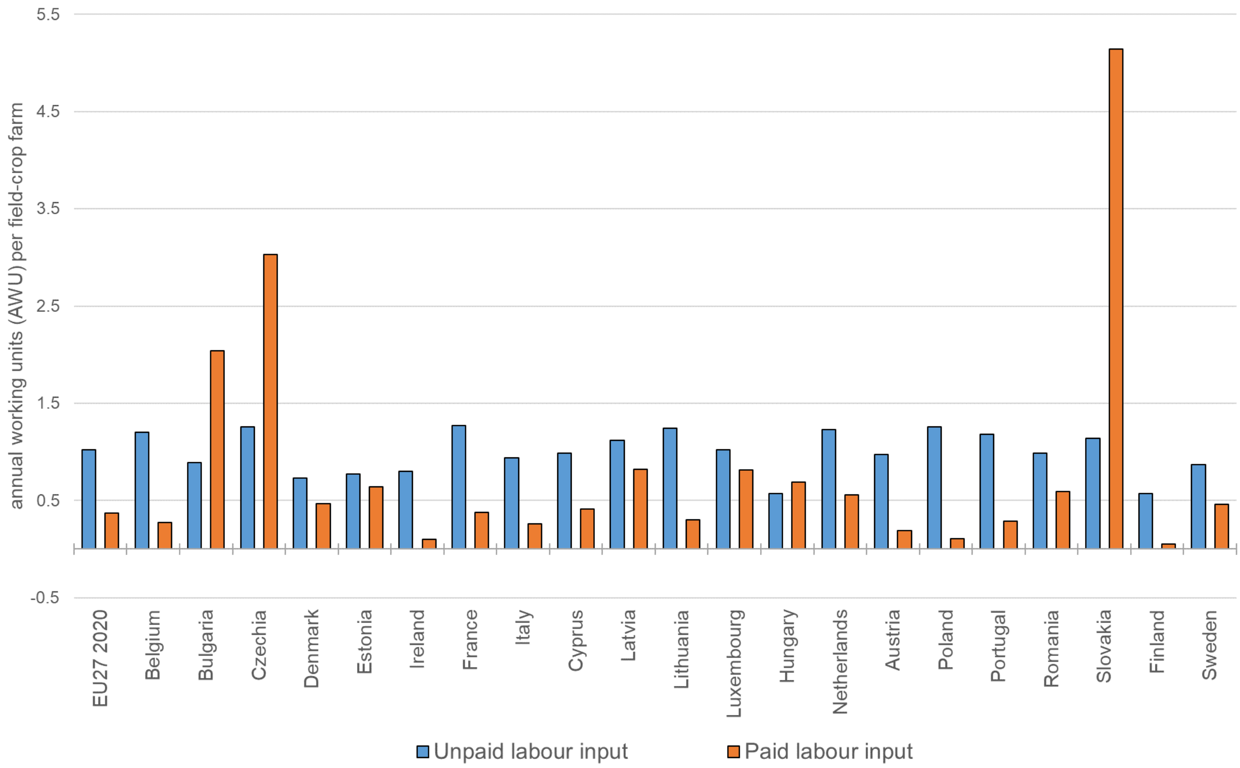
Table 3: Farm economic variables in EU Member States (average values 2019/2021)

Member States	Share of rented land	Interest paid EUR/ha	Depre-ciation EUR/ha	Rent EUR/ha	Energy EUR/ha	Fertilizer EUR/ha	Gross Farm Income EUR/ha	Gross Margin EUR/ha
EU-27	0.57	34	278	119	156	127	1367	1006
Belgium	0.71	92	635	242	288	173	2528	2105
Bulgaria	0.86	14	138	209	95	100	846	545
Czechia	0.73	25	210	99	157	102	901	430
Denmark	0.38	280	403	251	142	128	2085	1747
Germany	0.66	51	385	236	222	135	1478	1049
Estonia	0.65	23	148	46	93	87	507	272
Ireland	0.20	26	150	70	79	133	874	509
Greece	0.57	0	329	117	235	149	1816	1163
Spain	0.41	6	119	61	109	112	1424	1143
France	0.85	34	370	160	130	140	1228	900
Croatia	0.45	9	259	40	114	136	1237	717
Italy	0.56	7	250	103	217	153	2302	1837
Cyprus	0.74	11	268	130	364	140	1965	1593
Latvia	0.47	22	179	27	110	102	575	345
Lithuania	0.49	12	184	41	78	131	628	394
Luxembourg	0.54	64	756	153	141	107	1721	907
Hungary	0.59	10	168	95	166	106	1080	717
Malta	0.78	105	1249	99	1426	356	7177	6114
Netherlands	0.43	511	1527	481	799	194	6650	6100
Austria	0.39	40	676	111	182	76	2065	1328
Poland	0.30	17	252	31	141	159	1012	716
Portugal	0.17	3	156	26	96	60	1075	756
Romania	0.70	6	100	75	88	86	783	562
Slovenia	0.36	31	849	39	257	86	1642	1008
Slovakia	0.90	21	194	73	125	94	726	414
Finland	0.38	56	444	105	220	114	1134	288
Sweden	0.57	60	266	141	186	115	940	558

Source: FADN Public Database, variables SE030, SE380, SE360, SE375, SE345, SE295, SE025, SE410; data retrieved: 03/06/2024.

Notes: Gross Farm income includes subsidies, whereas gross margin does not include subsidies (it is equivalent to revenues excluding subsidies minus intermediate inputs). Interests paid (SE380) in Greece were only a few Euros and are therefore “0” per hectare.

Figure 11: Unpaid and paid labour in field crop farms across EU Member States



Source: FADN Public Database, variables SE020 and SE015; data retrieved: 03/06/2024.

Note: Not all Member States are shown due to missing data on unpaid labour.

Farm households and households in rural regions are affected by consumer price inflation in similar ways as other households are. Their coping strategies are different because local labour markets and earning opportunities are in many cases less flexible than those in urban areas. Households in rural areas are more constrained in finding employment and earning incomes in other sectors if incomes from farming are no longer sustaining the livelihood of a farm household. Since CAP aims at achieving or maintaining a fair standard of living for the agricultural community, it is important to consider how inflation affects it.

Accounting for high inflation levels therefore requires taking into consideration the different instruments and their specific characteristics:

- the types of different instruments (such as hectare payments, investment payments, etc.), because inflation has different implications for each of them;
- the mix of instruments and the allocation of the two funds in each Member State, because the CAP strategic plans of Member States are heterogeneous;
- the rate of structural change, which is different in each Member State, because it affects the real incomes per farmer in different ways.

The main economic function of direct payments is to stabilise incomes (Severini et al., 2016) by offering a stable flow of cash. However, there are notable differences among Member States:

- In some Member States, the share of direct payments is relatively small compared to revenues from the market. In these cases, the payments which are relatively stable over time have almost no stabilizing effect on net value added or farm profits.

- In other Member States where direct payments are relatively high in relation to market revenues, they mitigate market volatility and contribute significantly to income stability. This risk mitigating effect needs to be considered in the context of inflation analyses.
- In some Member States, a relatively big share of direct payments is still linked to the production of specific crops or livestock. Such non-decoupled payments are diminishing farm profitability because market price signals are influencing production decisions to a lesser extent (Kazukauskas, et al., 2014; Mennig and Sauer, 2023) and, during phases of inflation, the policy incentives may have even stronger adverse effects.

Programmes financed from the EAFRD are very heterogeneous:

- Among these programmes there are transfers for farmers in areas with natural or other area specific restrictions, which have a similar effect as direct payments have because the annual payments typically are the same over the years.
- Agri-environmental payments are based on the costs of additional efforts or on opportunity costs. If price and costs relationships change due to price changes, the profitability of taking part in an agri-environmental programme changes as well. In many cases, contracts are concluded for the whole programming period, so farms may end up trapped in unprofitable situations. Organic farms were in such a situation during the phase of output price surges. Prices for organic products increased to a lesser extent than conventionally produced ones, while prices of inputs such as fuel increased in the same way.
- Investment support is granted in most cases as a subsidy that depends on the total costs of investment. During the time it takes until a project is approved, the investment costs may be much higher than anticipated. Investments that seemed profitable when a project was planned may turn into an economic burden. In agriculture, many investments (such as plantations, livestock production units) have very long depreciation periods, and the time it takes to get net-earnings is delayed further when investments become more costly. Furthermore, Member States have planned unit amounts (e.g. an average expected cost per operation). Therefore, the anticipated expenditures will likely not be feasible given the increase of investment costs. Cap Strategic Plans will have to be readjusted in light of inflation. CPI will not be the adequate measure to do it because the construction cost index will be more suitable in many cases.

4.2 Impacts of inflation on prices of agricultural inputs and outputs in EU Member States

In this section, an overview is presented on how the different channels of inflation affect the agricultural sector in each Member State. The results are based on the Economic Accounts of Agriculture (EAA). This statistic offers several advantages when compared to other statistics. The most important advantage is that it provides results with very short time lags. Other statistics such as FADN (Farm Accountancy Data Network) or EU-SILC (EU statistics on income and living conditions) are available only up to 2022 and are therefore not well suited to show the effects of lower farm output prices when many input prices have stayed at elevated levels.

The EAA statistics are used to observe farm incomes across Member States and their changes over time. The most frequently used variable is "Indicator A", which is the index of the real income of factors in agriculture per Annual Work Unit (AWU).

It turns out that the factor incomes in 2022 were significantly higher in most EU Member States than in the previous year. Rising prices for most agricultural products in 2022 compared to 2021 were the main reason for that outcome. Furthermore, half of the Member States factor incomes in 2023 were even higher than in 2022 (among them were all countries that had lower factor incomes in 2022 compared to 2021).

Table 4 shows how the prices of inputs for agricultural production changed over the period from 2020 to 2023. The index value 98.5 for EU-27 in the year 2020 indicates that in this year agricultural inputs were 1.5% cheaper than in 2019. This was the effect of COVID lockdowns and the sluggish demand. When the economic conditions recovered in 2021, prices of inputs increased significantly in all EU Member States. In 2022, prices increased even further, in some Member States by more than 50%. In 2023, prices for inputs in the EU were 1.4% lower than in 2022, which means that they stabilised at a high level. In six Member States, prices of inputs increased in 2023 to even higher levels than in 2022.

Table 5 shows how the output prices of the agricultural industry changed over the same period. The index value 99.15 for EU-27 in the year 2020 indicates that, in this year, agricultural inputs were 0.85% cheaper than in 2019. This was the effect of COVID lockdowns and lower demand for certain products which depressed also prices. When the economic conditions recovered in 2021, output prices increased significantly in all EU Member States. In 2022, prices increased even further, in some Member States by almost a third. In 2023, output prices in the EU were 0.43 % higher than in 2022, indicating a period of stabilization. However, only nine Member States saw output prices increase beyond 2022 levels, while, in two-thirds of Member States, output prices declined.

Table 4: Price index of agricultural inputs (index t-1 = 100) in EU Member States

Member States	Index t-1 = 100			
	2020	2021	2022	2023
EU-27	98.5	108.8	128.4	98.6
Belgium	100.8	112.7	126.9	93.9
Bulgaria	98.1	111.4	132.6	94.9
Czech Republic	99.2	106.1	124.4	98.2
Denmark	99.1	107.9	123.3	98.9
Germany	101.2	110.7	137.2	97.9
Estonia	98.5	107.5	127.0	95.4
Ireland	99.0	104.5	128.2	98.2
Greece	97.7	109.7	123.7	101.2
Spain	96.8	113.3	130.6	94.4
France	98.5	102.7	122.1	103.5
Croatia	97.1	120.0	128.4	90.6
Italy	99.2	109.1	124.9	98.1
Cyprus	100.7	111.7	120.4	103.9
Latvia	99.0	104.1	140.1	90.1
Lithuania	93.6	120.1	158.8	84.5
Luxembourg	99.0	108.7	123.8	100.3
Hungary	101.8	116.5	144.0	101.7
Malta	100.9	108.5	112.9	101.4
Netherlands	99.3	110.4	124.7	97.4
Austria	95.7	109.8	127.2	97.3
Poland	99.4	110.6	141.1	97.0
Portugal	98.8	105.4	127.7	108.8
Romania	100.3	112.6	125.9	98.9
Slovenia	98.5	114.5	126.0	96.4
Slovakia	102.3	100.8	125.8	99.3
Finland	92.7	114.4	133.7	92.1
Sweden	96.5	107.7	120.4	96.5

Source: Economic Accounts of Agriculture, Eurostat (aact_eaa05__custom_11971930).

Table 4 and Table 5 show index values that refer to the previous year and are convenient to compare annual changes. Longer-term changes can be derived from the data when index values are calculated over the observation period that starts in 2019 with an index value of 100. Over this period prices of inputs increased by 36% in EU-27. The range is from 21% (Sweden) to 74% (Hungary). Output prices increased to a lower extent by 31% in EU-27. The range was 22% (Czech Republic) to 82% (Romania). When price changes of 2023 are compared to 2021, the situation is that over these two years input prices surged by 87% whereas output prices increased by 71% in EU-27. Comparing the development of output prices to input prices is useful for many purposes, but the wellbeing of the sector is tracked in a better way when other factors are also considered. One consequence of changing prices from 2021 to 2023, in combination with other factors (such as changing harvest levels), was a declining agricultural income in the majority of EU Member States, as shown in Figure 12. Given that in the minority of Member States with increasing incomes are large agricultural producers, the EU-average increased by 6% between 2021 (the year before the large price surge) and 2023.

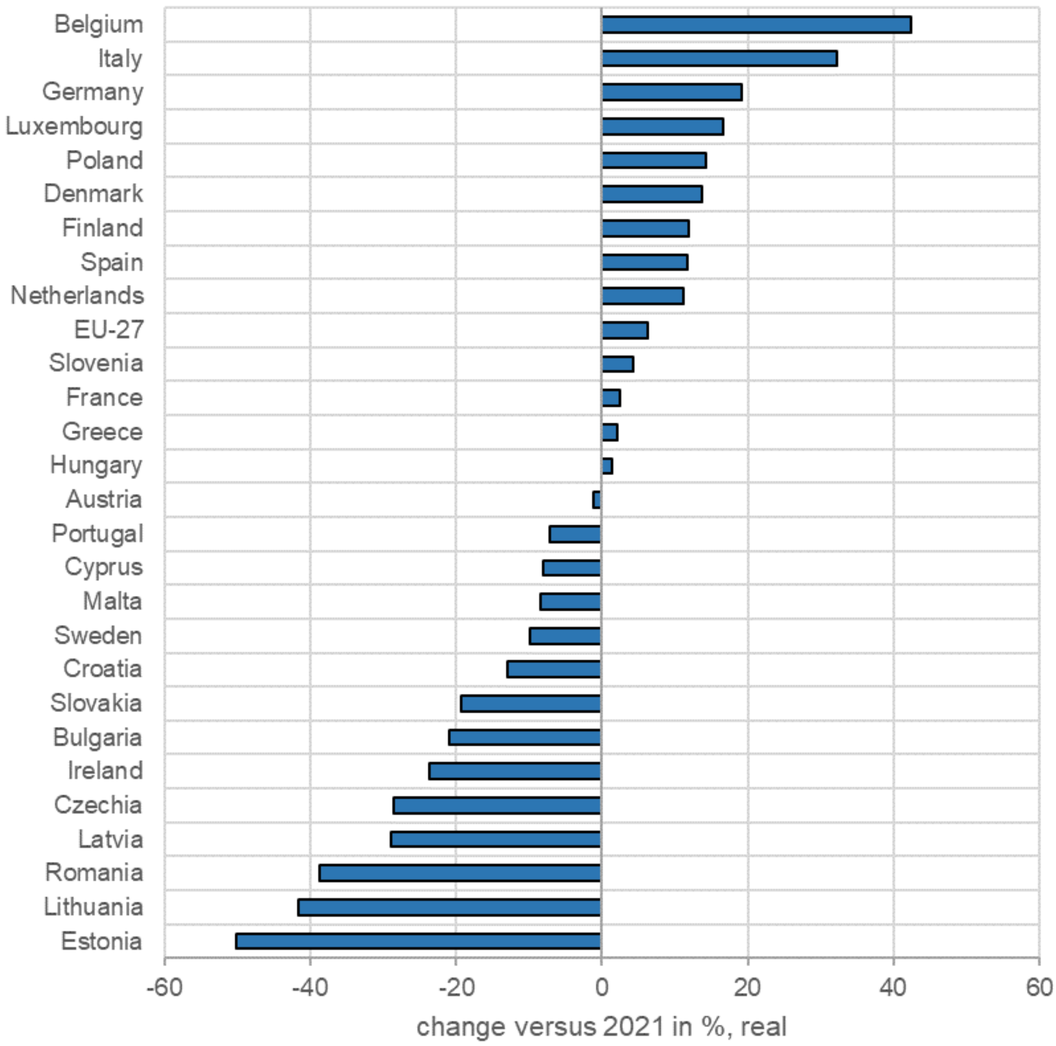
Table 5: Price index of the output of the agricultural industry (index t-1 = 100) in EU Member States

Member States	Index t-1 = 100			
	2020	2021	2022	2023
EU-27	99.15	107.37	122.49	100.43
Belgium	102.49	101.98	120.37	99.51
Bulgaria	107.39	115.91	129.81	85.28
Czech Republic	100.44	110.59	116.62	92.27
Denmark	103.83	101.92	119.95	101.44
Germany	94.42	99.37	131.40	98.57
Estonia	99.77	119.27	134.70	87.37
Ireland	103.07	110.17	126.42	90.52
Greece	99.73	110.25	113.62	116.26
Spain	98.57	108.75	120.28	113.06
France	101.27	109.59	117.10	96.12
Croatia	100.48	117.33	123.43	94.55
Italy	100.50	106.41	117.28	102.81
Cyprus	98.93	100.02	110.35	107.09
Latvia	101.08	113.26	130.33	87.63
Lithuania	98.51	112.42	131.46	81.82
Luxembourg	98.42	105.72	125.82	96.87
Hungary	107.16	117.01	142.69	85.16
Malta	98.54	103.35	110.34	110.20
Netherlands	97.15	107.26	121.09	102.67
Austria	100.08	110.97	121.97	98.98
Poland	97.59	112.18	141.63	97.12
Portugal	100.30	104.77	118.66	114.76
Romania	106.97	111.64	125.34	99.88
Slovenia	98.52	111.16	121.58	97.47
Slovakia	100.48	108.91	133.43	85.59
Finland	96.75	102.83	118.68	101.78
Sweden	102.43	112.19	116.29	99.89

Source: Economic Accounts of Agriculture, Eurostat (aact_eaa05__custom_13032299).

In 2022, rising agricultural output prices led to increased farm incomes in most EU Member States, as the higher cost of inputs did not fully offset revenues. However, evaluating the economic consequences solely based on the relationship between input and output price changes is insufficient. Other important factors (such as weather conditions, production volumes, subsidies, taxes, and shifts in labour supply) must also be considered to fully assess farm income trends.

Figure 12: Change of Indicator A (Index of real factor income in agriculture per annual work unit) in 2023 compared to 2021



Source: Eurostat [aact_eaa06__custom_13743245], own calculations.

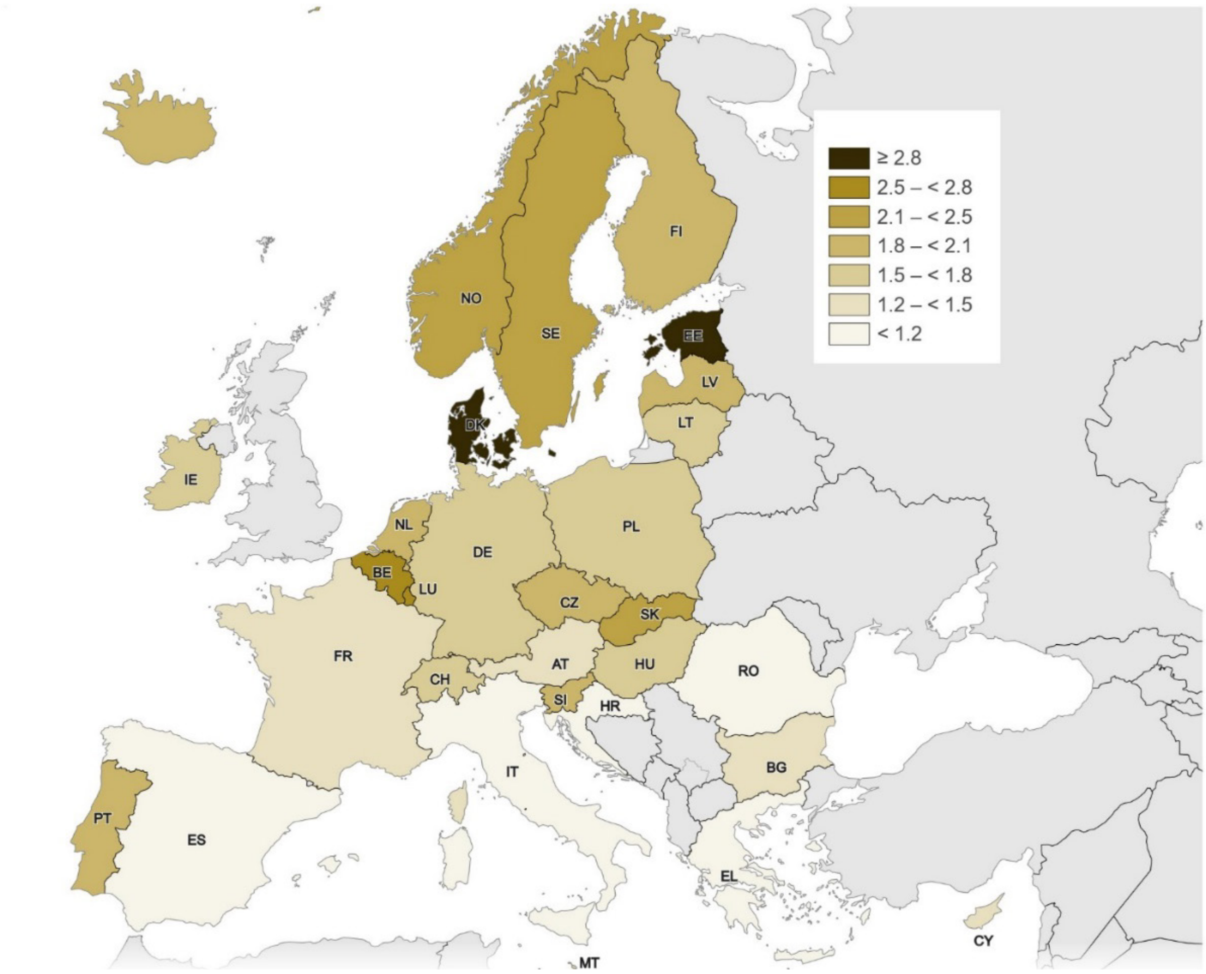
4.3 CAP subsidies and other subsidies in relation to intermediate costs of average farms in EU Member States

The purposes of CAP payments are manyfold. These purposes can be put in relation to inflationary pressure by calculating their share relative to the costs of intermediates such as fertilizer and fuels and comparing these shares over periods. Such a calculation is shown in Table 6 by using FADN data for countries where data from 2022 is available.

The data show that the share of CAP subsidies (the sum of direct payments and rural development subsidies) was 23% of the costs of intermediates in the reference period 2019 to 2021. This means almost a quarter of expenditures for intermediate inputs could be financed by CAP subsidies. This share declined by 4 percentage points to 19% in the year 2022 for the average of those countries in the sample, which is equivalent to less than a fifth of expenditures. The main reason was the inflation of intermediate input costs. Farmers responded by scaling back the respective purchases, but input savings may lead to restricted outputs. In all countries for which data were available – except Portugal – farmers relying on CAP subsidies for purchases were able to buy fewer intermediate inputs in 2022 than in previous years. Furthermore, the table shows the shares of non-CAP subsidies as well. In some Member States, national programmes were put in place to compensate farmers for the cost increases. The impact of these payments is evident when the figures in the last column are equal to or higher than those in the preceding column, which occurred in eight Member States.

The consequences of rising prices of intermediate inputs are different in each Member States. Figure 13 shows that in most northern Member States, the agricultural sector is more input intensive than in the south. Rising prices have more pronounced consequences when the input costs are high in comparison to the gross value added.

Figure 13: Intermediate inputs relative to agricultural gross value added in EU Member States 2021



Source: Economic Accounts of Agriculture Eurostat (aaact_eaa01).

Table 6: The relation of CAP subsidies and other subsidies relative to the costs of intermediates in 2022 and the average period 2019/2021

	Direct payments and rural development subsidies relative to costs of intermediate inputs		Other subsidies relative to costs of intermediate inputs	
	average 2019/21	2022	average 2019/21	2022
Average	0.23	0.19	0.03	0.04
Belgium	0.11	0.08	0.03	0.02
Bulgaria	0.45	0.37	0.05	0.06
Czechia	0.32	0.25	0.08	0.06
Denmark	0.12	0.10	0.01	0.01
Estonia	0.30	0.24	0.03	0.04
Ireland	0.30	0.23	0.02	0.01
France	0.20	0.18	0.03	0.04
Italy	0.30	0.25	0.01	0.01
Cyprus	0.15	0.14	0.02	0.01
Latvia	0.28	0.25	0.07	0.05
Lithuania	0.36	0.26	0.12	0.08
Luxembourg	0.30	0.27	0.13	0.10
Hungary	0.29	0.24	0.05	0.09
Netherlands	0.05	0.03	0.02	0.01
Austria	0.31	0.25	0.08	0.12
Poland	0.25	0.18	0.07	0.06
Portugal	0.44	0.46	0.04	0.12
Romania	0.36	0.28	0.01	0.01
Slovakia	0.27	0.24	0.03	0.03
Finland	0.48	0.42	0.04	0.03
Sweden	0.22	0.16	0.01	0.03

Source: Own calculations based on FADN (variables SE624, SE606, SE409, SE605, SE275).

4.4 CAP subsidies and expected inflation in EU Member States

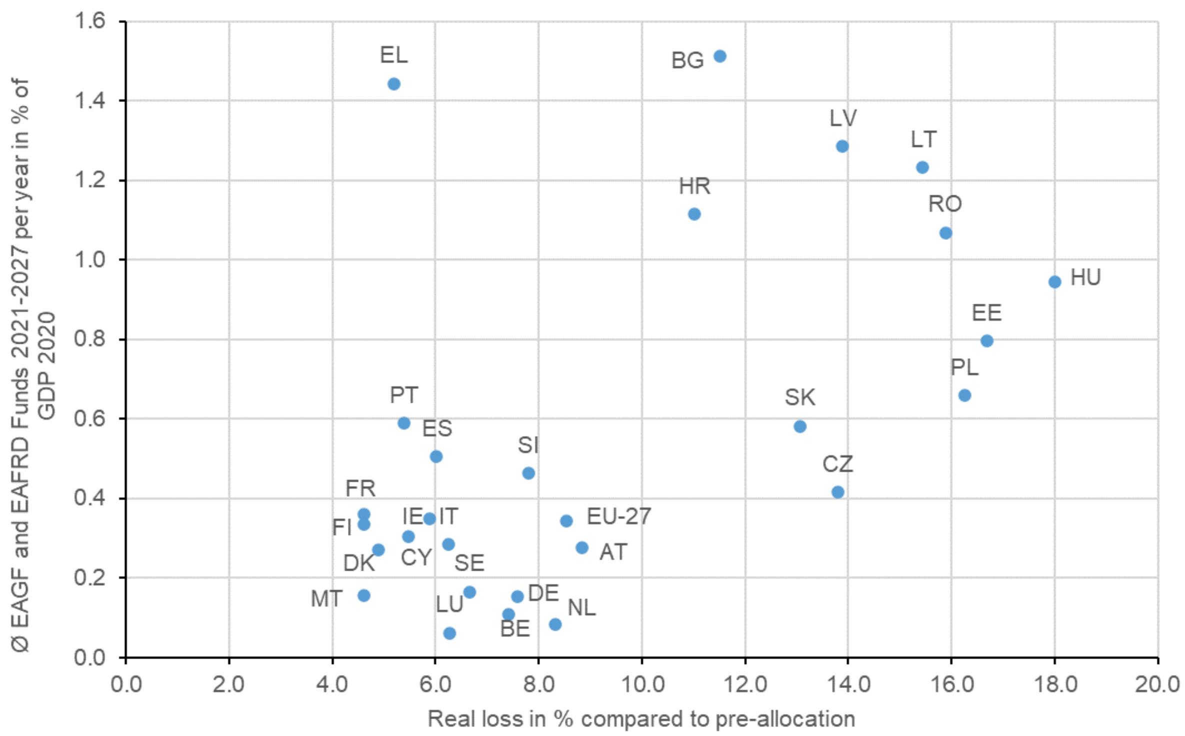
In Chapter 3 of this report, the role of inflation expectations at the time of deciding about the current MFF and their real value compared to observed and expected inflation was dealt with in depth. A key finding of this chapter is that inflation as observed until 2024 and as expected until 2027 is far higher than the default rate of 2%. Furthermore, the analysis showed that Member States are affected differently. The real value of allocation of funds is therefore skewed towards those Member States that faced lower rates of inflation.

A similar calculation is provided in Table 7 which compares the allocation of the EAGF and EAFRD among Member States as decided in the MFF and the expected real value given the inflation surge in many EU Member States. In line with Table 2, there are considerable divergences between the anticipated and the (likely) realised real term values.

Figure 14 relates the discounted loss in real value of CAP payments to the annual CAP payments as share of the GDP of Member States in 2020. Like in the context of the Cohesion Funds, most Member States with high CAP payments relative to GDP have been hit worst by high inflation, with the notable exception of Greece.

The next section deals with how these deviations are to be analysed in the context of the EU objective Article 3a (1) TEU which states that the EU aims to establish " the principle of an open economy with free competition". While not explicitly focused on global competitiveness, it sets the foundation for a strong internal market that can compete internationally.

Figure 14: Real loss in % of initial allocation and CAP funds as a share of GDP



Source: See Table 7.

Notes: We estimate two scenarios – a "what if" scenario of 2% and a scenario with the realised (2020-2023) and forecasted (2024-2027) inflation. The difference between the two is reported as the real value loss due to the inflation shock and computed as a share of the initial allocation. Annual real payments are set in relation to the observed GDP of Member States in 2020.

Table 7: Allocation of funds to EAGF and EAFRD based on MFF's pre-allocation in 'current prices' versus their value in prices 2020 given a 2% inflation and observed (2020-2023) and expected inflation (2024-2027)

Member States	EAGF Funds pre-allocation 20-26 in prices 2020 in EUR million	EAFRD Funds pre-allocation 21-27 in prices 2020 in EUR million	EAGF Funds 20-26 as expected in prices 2020 in EUR million	EAFRD Funds 21-27 as expected in prices 2020 in EUR million	Loss in %
Hungary	8,419	2,789	6,979	2,211	18.0
Estonia	1,274	589	1,071	481	16.7
Poland	20,431	8,829	17,301	7,206	16.2
Romania	13,181	6,468	11,214	5,315	15.9
Lithuania	3,820	1,308	3,252	1,083	15.4
Latvia	2,268	786	1,964	665	13.9
Czechia	5,690	1,734	4,938	1,461	13.8
Slovakia	2,683	1,733	2,357	1,482	13.1
Bulgaria	5,516	1,888	4,908	1,642	11.5
Croatia	2,457	1,989	2,204	1,751	11.0
Austria	4,570	3,478	4,199	3,138	8.8
Netherlands	4,738	490	4,351	443	8.3
Slovenia	904	737	840	674	7.8
Germany	32,731	7,307	30,331	6,671	7.6
Belgium	3,270	554	3,034	506	7.4
Sweden	4,533	1,417	4,244	1,310	6.7
Luxemburg	217	82	204	76	6.3
Italy	26,354	9,029	24,780	8,391	6.3
Spain	35,288	7,227	33,229	6,728	6.0
Ireland	7,831	2,084	7,388	1,945	5.9
Cyprus	345	159	327	149	5.5
Portugal	5,152	3,616	4,894	3,403	5.4
Greece	14,118	3,726	13,415	3,504	5.2
Denmark	5,695	508	5,420	479	4.9
France	51,695	9,762	49,377	9,246	4.6
Malta	30	134	29	127	4.6
Finland	3,429	2,371	3,281	2,252	4.6
Other	7,783	203	7,140	184	8
Total	274,422	82,325	252,875	73,427	8.5

Source: Breakdown of European Agricultural Guarantee Fund per Member State (current prices) and MFF 2021-2027 and Breakdown of European Agricultural Fund for Rural Development per Member State (MFF only, current prices); see https://commission.europa.eu/strategy-and-policy/eu-budget/long-term-eu-budget/2021-2027/spending/budget-pre-allocations_en (retrieved: 18/10/2024) and applying observed and expected inflation like in Table 2.

4.5 Summary, conclusions and policy recommendations

In the previous sections, the different channels were identified that contribute to increasing costs in the agricultural sector of the EU. The presentation shows that the agricultural sectors in the EU Member States are very heterogeneous. Even greater heterogeneity will be visible if the exposure towards inflation is shown for different types of farms within Member States. FADN data is an indispensable source for such evaluations because they provide not only data on production types but also on sub-national regions and farm sizes for many countries.

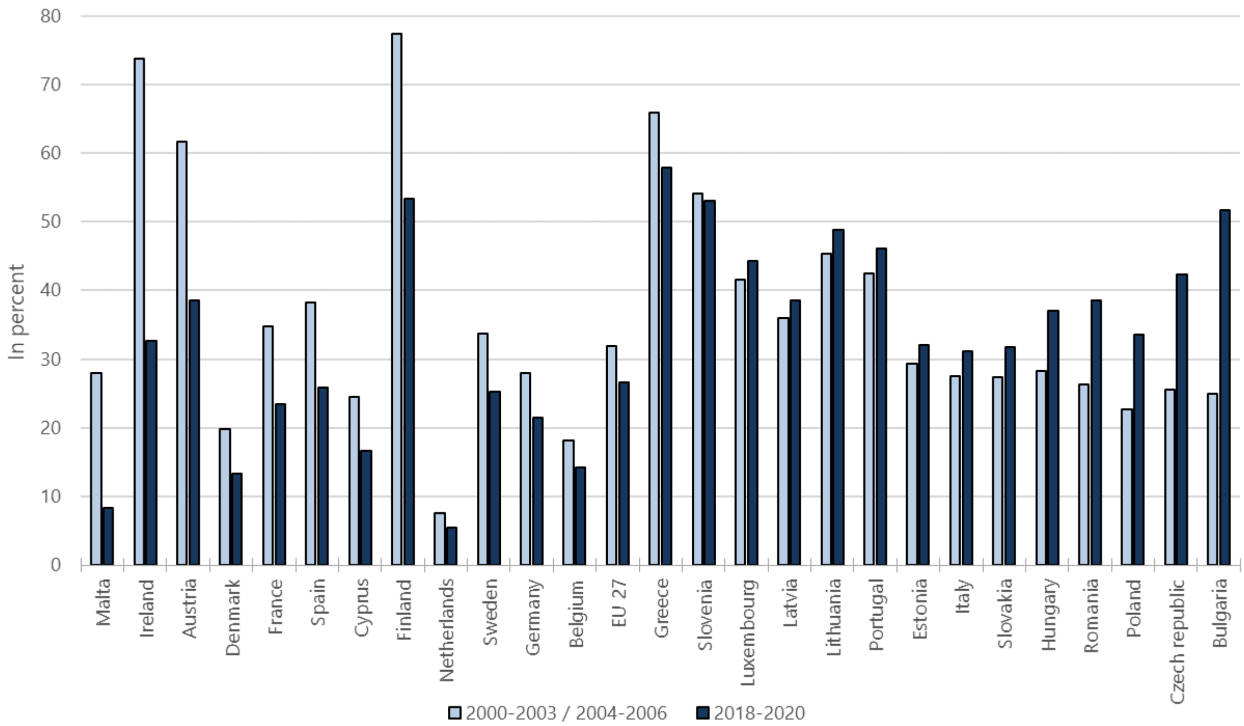
One of the most important results of the sections above is that the farms who used CAP subsidies to finance farm intermediate inputs could buy less of them in 2022 compared to the years before because EU support levels were very similar as in the previous years, but input prices increased significantly.

The FADN data based on single farm observations can be used to show longer-term changes. Figure 15 compares two periods of three-year averages: 2000-2002 versus 2018-2020 for EU-15 Member States and the shorter period starting in 2004 for Member State which entered the EU later. The figure shows several relevant aspects:

- The amount of subsidies is very high relative to the costs of intermediate inputs in many countries, such as in Ireland, Finland, Greece and Austria. For the Netherlands, this is not the case.
- For most of the Member States, the share of subsidies relative to the costs of intermediate inputs declined during the observation period. Many of them are EU-15 Member States. Those which entered the EU in 2004 are in a different situation. Due to phasing in of more support, the share of subsidies relative to costs of intermediate inputs increased.

The agricultural sector has undergone significant structural changes during the last decades. Agricultural support measures have various objectives, yet, when considered from a farm perspective, they can be viewed as means to finance inputs needed to run a farm or to compensate for extra costs to achieve environmentally beneficial outcomes. This is certainly not encompassing of all aspects of support measures, since such measures are highly differentiated when it comes to payments to address societal concerns.

Figure 15: Subsidies as share of expenditures for Intermediate inputs in EU Member States – a comparison of two three-year averages

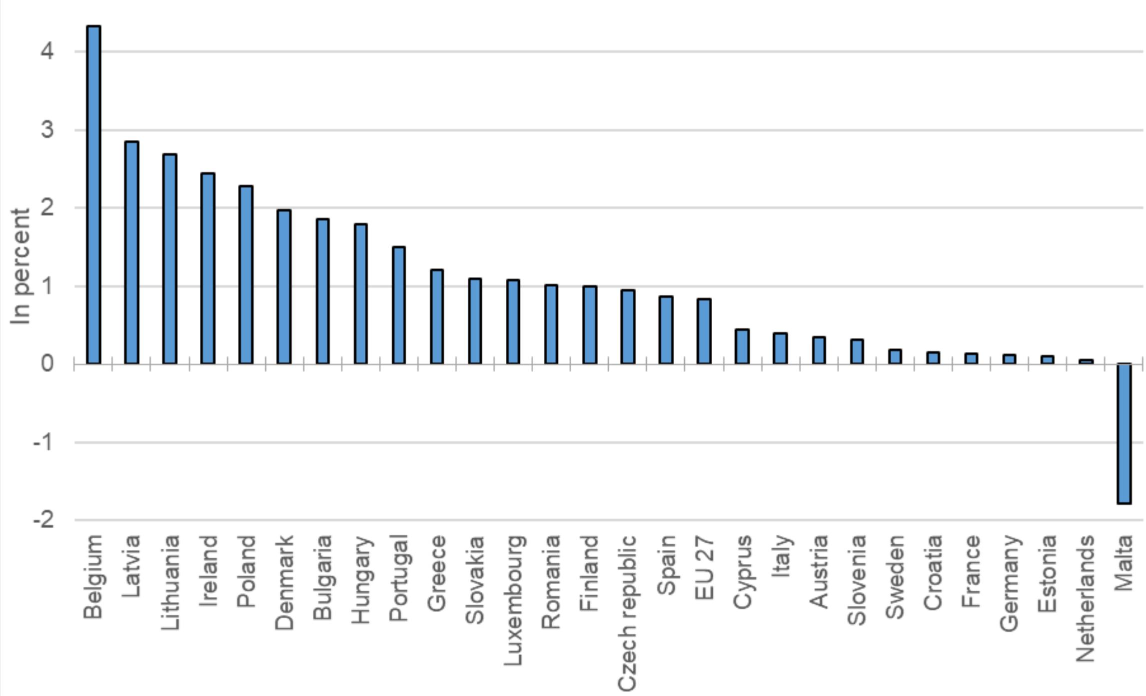


Source: FADN (variables Total subsidies SE409+SE605 and SE275 Total intermediate consumption).

Nevertheless, it was argued in this section that setting subsidies in relation to the cost of production is a useful proxy to identify economic harm due to surging prices for agricultural producers. The data in the previous section shows great heterogeneity among Member States in the EU. Increasing support levels by a single uniform percentage rate across the board would improve the income situation in many Member States. However, in others, it would be challenging to justify, since the market delivered good economic outcomes. Therefore, one should be cautious applying an over-simplistic solution to a multi-faceted problem.

In order to avoid the blurring of the picture and the conclusion that nothing can be or should be done, it is useful to refer to the general objectives of the CAP. Making the farm sector more productive serves two goals. First, this would support the development of a vibrant and prosperous agricultural sector that contributes to general welfare by ensuring "that supplies reach consumers at reasonable prices" (Art. 39 TFEU). Second, CAP aims to ensure a fair standard of living for the agricultural community. The objective is to address societal concerns not directly related to product market outcomes. Combatting problems after the surge of input prices is therefore an opportunity to consider options that are would serve both the general objectives of the CAP and account for the heterogeneity among Member States.

Figure 16: Average annual change in total factor productivity in EU Member States in 2012-2020



Source: Context indicator Total Factor Productivity (https://agridata.ec.europa.eu/extensions/ IndicatorsSectorial/AgriculturalProductivity.html).

It is important not to overlook the differences between various fields of policy within the EU and their specific objectives. Cohesion funds aim foremost at reducing disparities between regions (Art. 130a TEU), as they strive to reduce economic, social, and territorial imbalances between different regions within the EU. This intention includes supporting less developed regions in catching up to more prosperous ones. Furthermore, the cohesion funds also promote sustainable development. They support investments in areas such as renewable energy, energy efficiency, transport infrastructure, and environmental protection. Such interventions contribute to the EU's overall goal of achieving sustainable development and combating climate change. In addition, they aim at boosting employment and economic growth. By investing in infrastructure, innovation, and skills development, cohesion funds aim to create jobs and stimulate economic growth in all regions, particularly those lagging. These objectives and relevant interventions are complementary to the CAP objectives and agricultural policy measures.

Agricultural policy is a sectoral policy and therefore is focused on a specific sector that is exposed to international competition. Cohesion polices are focused on infrastructure, local needs and at facilitating firms to catch up to attain at least an average level of the EU to narrow the well-being gap between EU Member States. Their focus is on catching up. Agricultural policy has other objectives. One such objective is striving to foster a competitive agricultural sector that contributes to the well-being of those who work in agriculture and to make food affordable to consumers. Whereas cohesion policies aim at territorial balance, agricultural policies aim at global goals such as benefiting consumers and fighting hunger. Because agriculture produces mainly commodities that are traded internationally, the ambition of the EU CAP is also to attain international competitiveness. Maintaining the fabric of the rural economy is important as well.

The EU is the largest exporter of agricultural commodities and food and beverage products. Compared to the relevance of the agricultural sector in the economies of Member States, the export shares of these products are significant (9% of total EU exports of goods in 2023, which was 0.6 percentage points lower than 2020).[5] The maintenance of international competitiveness in the agricultural sector is an important objective. This implies that changes in inflation have to be considered not only in national contexts, but also in the context of international developments.

As the nominal effective exchange rate of the Euro shows, products which are exported from the Euro area have become more expensive for those who buy them since mid-2022.[6] To maintain the favourable position of agricultural food trade, which is mainly due to their high quality and their high standards of food-safety, it is therefore important to strengthen the EU's agricultural policy objective towards improving competitiveness. This is the first general objective of the current agricultural policy (see Art. 6 of Regulation (EU) 2021/2115). Adjusting the level of support for all interventions to compensate for higher inflation could be counterproductive. Therefore, a targeted approach that supports the attainment of the general objective to strengthen competitiveness is recommended.

Inflation rates vary between EU Member States. In effect, these rates are the result of specific national structural peculiarities and national fiscal policies, which are at the discretion of national policy makers. The agricultural sectors of all EU Member States are exposed to prices that are determined in the internal market which is exposed to the world market forces. Depending on its specific structure and share of local, national and international demand, agricultural producers either maintain their competitiveness or leave the sector (as 1.5% of the agricultural workforce per year did between 2010 and 2020).[7]

In this context, we propose the following recommendations that go beyond measures directly protecting the purchasing power of the CAP funds.

Direct targeted funds towards increasing farm productivity: Given that income changes at sector level and shares of inputs to subsidies at farm level are very heterogeneous, it is difficult to justify a uniform inflation rate adjustment to farm subsidies for all countries and across various funds. It is therefore advisable to direct targeted funds towards increasing farm productivity, since more productive farms are better able to cope with market-related shocks. When farmers become more productive, they gain in competitiveness. Viewed from that perspective, an adjustment of premiums for agricultural producers (which means to increase them) is not advisable because it might signal incentives that are not coherent with the relative competitive position of EU agriculture in world markets.

Develop price risk or income risk instruments: Rapidly increasing input prices are a risk for the liquidity of any producer. Direct payments ("the basic income support for sustainability") are an instrument that stabilise revenue flows and therefore support the liquidity of any farmer who receives them. They are financed by the EAGF Funds and granted any year, and therefore they are not targeted towards absorbing income risks due to surging input prices. In other countries (such as Canada with its Business Risk Management programs or the U.S. with the Dairy Margin Coverage Program, for instance), there are price risk or income risk mitigation instruments in the agricultural policy toolkit. Similar instruments should be developed for the EU to be better prepared if similar phases of price volatility occur again.

Tailor inflation adjustment measures depending on their likely effect on the competitiveness of farms. The EAFRD finances programmes of rural development that offer a broad range of interventions.

5 Source: Eurostat, EU Trade since 1988 by HS2-4-6 and CN8 [ds-045409]; Agri-food Chapters 1-24.

6 See https://www.ecb.europa.eu/stats/balance_of_payments_and_external/eer/html/index.en.html (accessed: 14/10/2024).

7 Source: Eurostat, Agricultural Labor in annual working units [ef_lf_size__custom_13427073].

Agri-environmental programmes are among them as well as investment aid schemes and support for training. Competitiveness is unlikely to be negatively affected by adjusting premiums for inflation for such interventions. Making training more affordable for farmers may even be a precondition to strengthen their capacity to handle price risks. In the context of agricultural policy, it is therefore advisable to tailor inflation adjustment measures depending on their likely effect on the competitiveness of farms.

Address the needs of individuals who may need to exit the sector: Furthermore, in order to accommodate the needs for a balanced territorial adjustment of sectors, agricultural policy should also address the needs of individuals who may need to exit the sector. A rural development program focused on creating productive jobs outside of agriculture would be highly valuable for these individuals.

5. IMPACT OF INFLATION ON NGEU

5.1 Impact of higher interest rates

The largest part of NGEU initiatives is financed by issuing EU bonds.[8] These bonds were sold at market conditions that markedly deteriorated during the bout of inflation setting in in 2022. Consequently, the interest rates to be paid for lending money increased due to two reasons:

- Due to the higher inflation rate, investors request compensation for the loss of purchasing power that their credit will experience when it is due to be paid back after some years. The higher the inflation rate, the higher the interest rate requested by investors will be.
- To curb inflation, the ECB increased its key interest rates. This increase spills over to bank and bonds lending.

Since the second half of 2021,[9] the EU has sold the amounts of bonds on the market as given in Table 8.[10]

Table 8: Funding raised under the unified funding approach, in EUR billion

	H2 2021	H1 2022	H2 2022	H1 2023	H2 2023	H1 2024	H2 2024
Funding raised	71.0	50.0	49.8	78.2	37.7	75.0	65.0

Source: European Commission. H2 2024 according to European press release 09/07/2024.

For debtors holding contracts with fixed interest rates, such as in the case with bonds that are not inflation-linked, there are also some positive benefits from higher interest rates. Inflation reduces their debt burden in real terms to be repaid at the end of maturity. This benefit for debtors constitutes a loss for investors of the same amount. If inflation is expected to increase, creditors will demand a compensation of that loss by increasing the interest rate for which they are willing to contract.[11]

To illustrate this point: In its 7th syndicated transaction for 2024, the European Commission issued a 30-year bond with an intrinsic interest rate (yield) of 3.751%, which is fixed over the whole term. Without the recent hike in inflation rates, the yield rate would be much lower than this rate. Whether this higher interest rate results in higher costs is currently unclear and can be answered only after the 30-year term. If average inflation in the coming 30 years turns out to be higher than expected by market participants at the time of issuing, the loss in the real value of the debt burden would constitute an overall windfall gain for the EU at the end of maturity.

In short, the part of the higher interest rates that is due to the increased inflation should offset the losses of creditors from a reduced purchasing power of repayments. Such profits and losses cannot be forecasted; therefore, this study will not attempt to forecast them, as, in theory, they should even out.

Although in the long run no higher costs from increased interest rates due to higher inflation should come to fruition, in the short run, they could restrict the latitude of the MFF. The effects of higher MFF

8 Only EUR 17.3 billion came from revenues under the Emission Trading System and a further EUR1.6 billion from the Brexit Adjustment Reserve.

9 According to European Commission (2024e) the first two NGEU transactions took place in June 2021. These have been included in the number for the second half of 2022 as they were part of the same Funding Plan.

10 As no repayments have been scheduled to date, these amounts can be added up to give the outstanding amount at the end of each period.

11 In a hypothetical perfect market with perfect foresight of future inflation, losses and profits will even out, although these conditions are hardly met in real economic life.

expenditures, their consequences, and policy recommendations have been addressed in Schratzenstaller et al. (2023).

5.2 Purchasing power losses of NGEU and RRF

The centerpiece of NGEU is the Recovery and Resilience Facility (RRF), an instrument that offers grants and loans to support reforms and investments in the EU Member States. RRF funds are provided to Member States in line with their national Recovery and Resilience Plans (RRPs). The revisions of the RRPs and the addition of REPowerEU chapters in response to the war in Ukraine have impacted the disbursement schedule of RRF funds in 2023,[12] creating delays between actual and initially planned disbursements for 2023.

Under the RRF, up to EUR 338 billion of grants (in current prices) are intended to be financed through borrowing operations. Member States will also receive additional RRF grants of EUR 17.3 billion financed under the Emissions Trading System (ETS) and EUR 1.6 billion under the Brexit Adjustment Reserve (BAR), totaling to EUR 357 billion (see Table 9).

Table 9: NGEU Grants and Loans, in EUR billion

	Grants	Loans	Total
NGEU	421	386	807
RRF	357	291	648

Source: European Commission. Values at current prices.

Of the total available RRF loan envelope of EUR 385 billion (in current prices), close to EUR 291 billion has been committed by the end of 2023, following Member States' requests (European Commission, 2024c).

In addition, up to EUR 83.1 billion of NGEU funds are being used to reinforce several existing EU programmes, such as the Just Transition Fund, Horizon Europe, InvestEU, RescEU, and ReactEU.

These deviations from the originally planned amounts (more grants available through ETS and BAR and less loans requested than the total available envelope) result in a total RRF envelope of EUR 648 billion (in current prices) by the end of 2023. The previously mentioned amount of EUR 723 billion represented the maximum amount of RRF grants (EUR 338 billion) and RRF loans (EUR 385 billion) according to the RRF Regulation.

According to the European Commission (2024c), the RRF already disbursed EUR 225 billion at the end of 2023, which amounts to around 75% of the milestones and targets planned to be achieved by the end of 2023. All RRPs were updated in 2023 and 2024 according to the REPowerEU regulation, paying particular attention not only to the quality of the measures but also to their degree of maturity and their implementation horizon, given the temporary nature of the RRF.

This section calculates the losses in purchasing power of NGEU funds by Member States as well as those planned for the rest of 2024 and 2025. In the first years of the RRF, disbursements do not translate immediately into actual RRF-related Member States' expenditure. Expenditure for the implementation of RRF measures is slightly lower than the amount disbursed to them under the RRF. The term 'RRF-related expenditure' refers to the occurrence of all types of general government costs for the financing

[12] The amended RRF Regulation, integrating revisions related to REPowerEU, entered into force in March 2023. The amendments provide additional financial support for new scaled-up reforms and investments dedicated to diversifying energy supplies.

of measures supported by RRF non-repayable support. The data is included in the Commission's Spring 2024 Forecast (European Commission, 2024a), based on Member States' reporting in national accounts, which is recorded on an accrual basis, i.e. when the actual expenditure (or other costs) takes place and impacts economic activity.

The given numbers do not cover all types of inflation costs, but rather only those of purchasing power, as several projects had to be postponed or cancelled due to higher price increases as planned. In some cases, however, countries requested additional support to account for the effect of high inflation.[13] The revision of the RRF plans by countries were partly based on higher costs following price increases of projects.[14] This does not change our results as this additional money would not have been necessary in the low inflation scenario or could have been used for extending the project volumes.

In order to derive the loss of RRF purchasing power due to higher inflation, we apply deflators for gross fixed capital formation by country, according to the AMECO data base, to Member States' RRF expenditures at current prices as provided by the European Commission. Increases of the deflators of more than 2% are interpreted as additional loss from high inflation.

If, for example, the increase of the Member State's deflator of Gross Fixed Capital Formation in 2021 is higher than 2%, the excess percentage points applied to the 2021 value of the country's RRF expenditures represent the loss of purchasing power for that year. If, however, the deflator is less than 2% the loss from higher inflation is set to zero. The following year's expenditures include a price increase of around 4% as compared to 2020. If the accumulated price increase over 2021 and 2022 exceeds this percentage, the difference in percentage rates is used to calculate the loss of 2022. Otherwise, no loss is recorded.

According to these calculations, the pure loss of purchasing power of RRF funds due to the higher inflation rate between 2021 and 2025 sums up to EUR 20.9 billion in current prices, which accounts for 7.6% of the total expenditures from 2020 to 2023 and those planned for 2024 and 2025.

Table 10 shows annual losses in absolute values for all EU Member States as well as losses between 2021 and 2025 in percentages of their RRF expenditures for this time span.[15]

As it is forecasted that GFCF prices revert to around 2% in 2025, the losses in purchasing power only increase marginally between 2024 (9.3%) and 2025 (9.4%).

[13] For instance, Croatia has used additional loan support to cater for the effects of high inflation on its project on the public water supply network. Increased construction prices made part of the target on constructed or reconstructed kilometres of the public water supply network unattainable.

[14] European Commission (2024d) states that "The external factors related to the war in Ukraine, energy crisis, high inflation and supply chain disruptions impacted the implementation of the RRPs. Faced with cost increases, supply chain shortages, uncertainty and the need to divert administrative resources to tackle external emergencies, Member States found that they could not implement some of the measures as initially planned in their RRPs. This impacted the speed of implementation of the Facility and generated a need to introduce targeted revisions to the RRPs (under Article 21 of the RRF Regulation)".

[15] As the inflation rate started to increase in 2021, it is assumed that no losses incurred in 2020.

Table 10: RRF purchasing power losses in excess to 2% GFCF price increase

	2021	2022	2023	2024	2025	Total loss	Total loss
	in EUR million						in % of RRF expenditures 2021-2025
Belgium	6.83	65.12	72.92	131.01	94.03	369.91	**9.1%**
Cyprus	0.43	3.36	2.39	10.65	14.56	31.38	**4.1%**
Germany	174.62	402.72	376.14	693.66	529.61	2,176.74	**10.0%**
Estonia	0.03	3.41	14.37	41.35	25.73	84.88	**12.0%**
Greece	–	22.36	84.38	150.14	200.38	457.27	**3.9%**
Ireland	0.52	5.28	19.37	18.04	13.71	56.92	**7.4%**
Spain	67.80	414.61	877.49	1,764.97	1,733.94	4,858.81	**8.2%**
France	102.63	530.81	333.03	273.13	247.98	1,487.60	**3.9%**
Italy	42.18	539.93	298.23	98.42	44.74	1,023.50	**1.7%**
Latvia	–	0.68	20.26	84.31	102.23	207.48	**12.6%**
Lithuania	–	6.48	28.24	86.50	112.12	233.34	**14.1%**
Luxembourg	0.06	0.27	3.00	11.97	11.75	27.05	**15.2%**
Malta	0.01	0.53	2.44	7.68	9.55	20.22	**9.1%**
Netherlands	9.93	43.49	86.77	88.59	56.99	285.78	**6.4%**
Austria	5.41	61.63	86.34	40.08	21.39	214.85	**7.8%**
Portugal	2.59	55.61	138.30	318.54	446.98	962.03	**8.6%**
Slovenia	3.76	8.65	21.04	65.68	82.78	181.92	**14.0%**
Slovakia	0.01	3.41	78.46	205.63	217.24	504.75	**13.1%**
Finland	0.06	7.50	15.03	34.02	30.73	87.35	**5.5%**
Bulgaria	–	6.16	20.61	100.67	255.68	383.13	**22.4%**
Czechia	15.67	148.61	237.21	233.49	306.38	941.36	**15.8%**
Denmark	3.37	9.02	14.72	5.62	3.41	36.14	**3.9%**
Croatia	0.13	14.83	52.72	105.61	183.01	356.29	**10.4%**
Hungary	0.36	46.29	152.45	363.72	414.07	976.89	**22.1%**
Romania	–	8.78	97.46	754.49	853.02	1,713.75	**21.9%**
Poland	–	0.81	68.18	1,209.13	1,844.31	3,122.43	**15.3%**
Sweden	29.31	44.01	9.92	11.22	1.71	96.17	**3.1%**
EU-27	**465.73**	**2,454.37**	**3,211.47**	**6,908.34**	**7,858.02**	**20,897.92**	**7.6%**
EU-27 loss in % of RFF expenditures	**1.7%**	**6.1%**	**6.6%**	**9.3%**	**9.4%**	**7.6%**	

Source: Own calculations.

Relative cumulated losses are highest in the countries which made high relative RRF expenditures during times of high gross fixed capital formation (GFCF) inflation. For Bulgaria, the total relative loss of purchasing power accounts for 22.4%, followed by Hungary at 22.1% and Romania at 21.9%. The lowest percentages for such losses were found in Italy, with just 1.7%, and in Sweden (3.1%), Greece, and Denmark (both 3.9%).[16] For the EU as a whole, the largest increase of loss of purchasing power of RRF can be observed in 2022 with a jump from 1.7% in 2021 to 6.1%.

5.3 Policy recommendations

Different indexation methodologies can be applied for the whole economy, sector-wide or based on types of activities (construction works, maintenance, transport). Indexation can be made through a horizontal national methodology taking into account uniform or sector-specific cost factors or through the requests of separate entities and institutions for specific projects and their evaluation of accumulated inflation.

Another option for policymakers regarding the national RRP, where project implementation is still at its early phase or has not yet started, is to permit the contracting ministries or institutions to identify the necessary cost adjustments themselves. This can be done on a project-by-project basis by project beneficiaries, e.g. ministries and state-owned enterprises.

Find sources for additional funding to address the funding shortfall: In addition to the additional resources from RePowerEU, there would be the option of funding for indexation through additional national financing from the Member States' budgets. This option has the benefit of higher national ownership of the RRPs and therefore stronger commitment from national governments for its effective implementation. More national financing from the government budget will also increase the recognition of the RRF in Member States. However, apart from the higher financial burden to the Member States, this also entails a risk with regard to fulfilling EU fiscal rules.

Consider the adjustment of national RRPs: Finally, there have already been significant delays in the implementation of projects for the RRP. This means that Member States could adjust their national RRPs accordingly and evaluate if some projects have become unrealistic time wise or financially. This possibility could, however, decrease the ambitions of NRRPs for achieving the green and digital transition. Here, the trade-off will be between underachieving some of the stated ambitions and planned investments while also ensuring a higher absorption rate for the RRF, since projects which have become unrealistic will be dropped out, and space will be left for the funding of projects which are realistic under a revised costing.

[16] If it is assumed that a 2% loss per year is priced into each country's RRF expenditure as in the MMF, some countries could reap some gains from having a lower GFCF inflation than 2%. As the underlying study only investigates the negative effects of the last bout of inflation, these effects probably caused by other mechanism has not been taken in account here. Table 10 accounts only for losses in excess to 2%. Lower increases of GFCF prices are not regarded and hence marked with a "–" in the table .

6. CONCLUSIONS AND RECOMMENDATIONS

In addition to the programme-specific recommendations derived in the respective chapters above, several forward-looking horizontal conclusions and recommendations can be derived based on the experiences with the recent inflation shock to make the EU budget more resilient towards inflationary developments.[17]

Replace the current 2% deflator by adequate inflation indicators to adjust EU expenditures to inflation:

The EU's budget plans and funds are fixed in advance for a seven-year period assuming a deflator of 2%. Their volume is determined by expenditures and not by EU revenues, which are mainly based on Member States' contributions. This fixation has the advantage that EU expenditures feature a kind of economic stability which acts countercyclically over the business cycle, i.e. in times when tax revenues of Member States deteriorate due to an economic downturn, the demand created by EU expenditures stays unchanged and bolsters the business cycle.

While this expenditure orientation seems good for stabilising the business cycle in the EU (albeit to a limited extent given the small size of the EU budget), it has its shortcomings in times of unexpected inflation swings. The purchasing power of investment in important strategic areas, such as those included in the NGEU, is getting eroded by higher unexpected inflation. Likewise, the purchasing power of MFF expenditure is reduced. Even though EU Member States reap windfall tax revenues from higher inflation, there is no existing mechanism for channeling those increased tax revenues through the EU budget in order to stabilise the purchasing power of the agreed amounts.

The inflation shock of 2022-2023 bears important lessons for the future of the EU MFF. Given a more volatile and uncertain global economy, such inflation shocks cannot be excluded also for the future. The next MFF will therefore need to embed better mechanisms to react to such periods and to limit the amount through which planned investment and expenditures suffer from real value losses. One important consideration should be whether a general adjustment buffer for inflation of 2% is sufficient in such periods. A possible re-thinking may enable sector-specific or activity-specific maximum adjustments, for example for Cohesion Funding Programmes, as they have a strong concentration of specific activities or expenditures (e.g. related to energy prices, commodity prices, construction materials, wage expenditures). In this way, the more general 2% adjustment can be kept, but further exceptions can be introduced for programmes that may be particularly sensitive to energy price, construction price, or wage shocks. This will enable a limited possibility for higher buffers for unexpected inflation in future EU budgets to compensate programmes more susceptible to price volatility.

The assessment of excess inflation rates could be based either on the deviation on HICP inflation (i.e. consumer prices) or the deflator of GDP or Gross Fixed Capital Formation (GFCF) of the price increase as included in expenditures at the time the budget plans were agreed on. The assessment of such price increase margins could be undertaken once a year for each country and could be based on its actual inflation of a certain period (average over last 12 months, current months inflation rate or any official forecast) in case of the HICP. In the case of the GDP or GFCF deflators, which are published only with some delay after the reference period, provisional values (like forecasts or the one of the most recent quarter) could be used as the benchmark. The affordability of these margins calls for Member States'

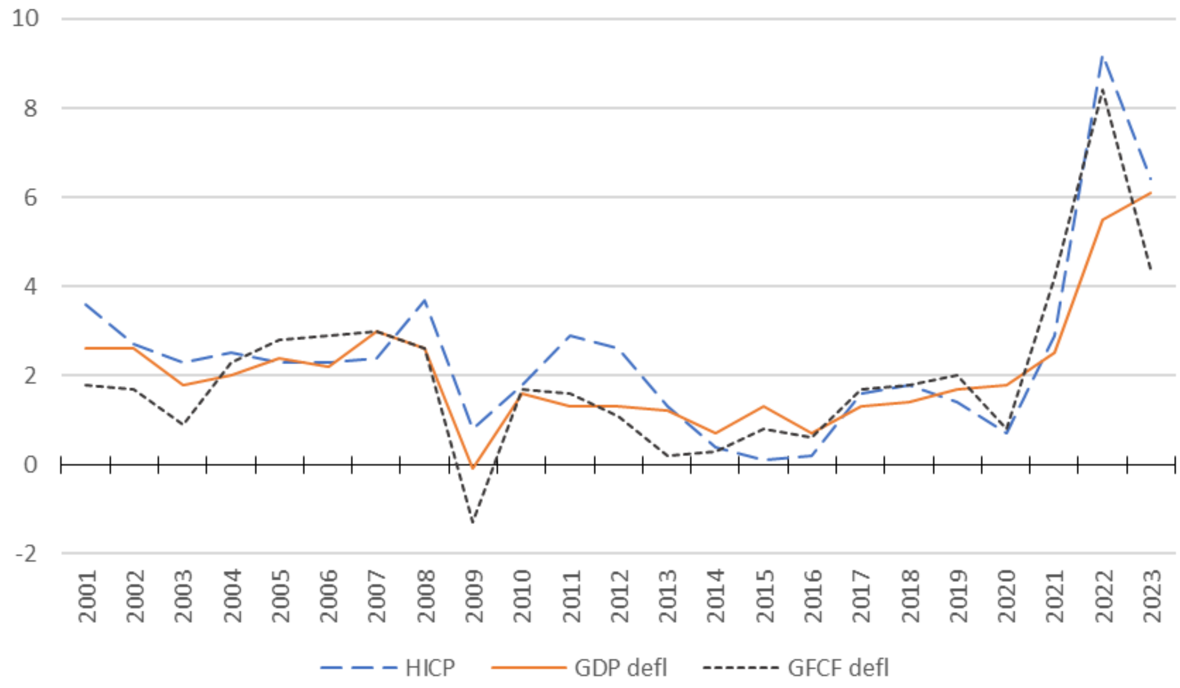
[17] These conclusions and recommendations expand and complement those sketched in Schratzenstaller et al. (2023). We are indebted to Eulalia Rubio for useful suggestions and comments.

budgets is guaranteed, as they earn windfall profits in tax receipts through inflation which is either increasing their VAT tax base (HICP) or their GNI-based own resources (GDP deflator).

These additional means could be used to increase the expenditures on a country specific basis according to its GFCF price deviations. As shown in the graph for the whole EU 27, all three price indices show a similar growth pattern since 2001 (apart from the GDP deflator in 2022 and 2023). As these price indices represent a weighted average over the whole EU, the total additional revenues for the EU budget should show a similar percentage increase.

The sum across all countries of the additional means necessary to maintain the purchasing power of the (investment) expenditures in each country could differ, however, from the amount of called margins, as the weighting scheme for country investments can differ from the ones represented in the EU price indices. This could be accepted, or a correction mechanism could be implemented. In any case (which indices are used, which observation period for prices changes, etc.), this system is superior to the current state, as at least some of the erosion of purchasing power is compensated and only windfall profits for countries' national budgets are used.

Figure 17: HICP inflation, GDP deflator and GFCF deflator for EU-27



Source: Eurostat.

Reflections on how to make the current fixed deflator more flexible should, however, bear in mind that despite its deficiencies, it is simple, practical, and allows national ministries and the Commission to anticipate how much will be spent in each programme in the long run (i.e. over the whole MFF period). Therefore, replacing the fixed deflator by more realistic deflators should be reserved for situations where inflation significantly deviates from the standard 2% rate instead of accommodating permanently to any deviations of actual inflation rates. Moreover, the adjustment mechanism should be asymmetric in the sense that it should accommodate for inflation exceeding the 2% deflator, but not for inflation below. Such an asymmetric adjustment mechanism can be justified by the argument that the main objective of a flexible deflator is to protect beneficiaries of funds from a loss of purchasing power, but also to keep it relatively simple and limit additional complexity.

Strengthen administrative and technical assistance:

Another important point relates to a strengthened provision of administrative and technical assistance for a faster implementation of MFF programmes. Periods of heightened inflation, such as the 2022-2023 periods, are normally periods of heightened economic uncertainty. This often results in more general delays in the implementation of programmes and specific projects. Such delays then lead to even further real value losses through the accumulated inflation. We demonstrate this above in our calculations and discussion on the Cohesion Funding programmes, whose adoption and implementation in this MFF was slower than usual due to the pandemic and the focus on the implementation of the NGEU instrument. With projects and funding experiencing delays and being implemented later during the MFF period, the accumulated inflation and therefore real value losses will be even higher. Future EU budgets should embed the necessary administrative and technical assistance, either through DG Reform or the Technical Capacity Instrument, to ensure that this challenge is limited, as minimising delays in the implementation of MFF programmes will also minimise the accumulated real value losses from inflation.

Implement special instruments to mitigate adverse effects of inflation on MFF expenditure:

- **Create a specific earmarked reserve above the MFF ceilings:** One possible option to cushion MFF programmes against adverse inflationary effects would be to increase margins. However, as margins are not earmarked, nothing prevents co-decision authorities to use them for other purposes. Normally, unused margins can be mobilised for "exceptional and unforeseen expenditures" through the Single Margin Instrument, therefore inflation accommodation would be put in competition with other unforeseen emergencies. Therefore, rather than increasing margins, a specific earmarked reserve above the MFF ceilings could be created for the purpose of protecting the various MFF programmes against significant inflationary developments.
- **Implement a permanent special instrument for interest expenditure over and above MFF ceilings:** A permanent special instrument should be established that covers over-runs of funding costs incurred by EU borrowings (particularly within NGEU, but also regarding other existing and future EU debt operations). The MFF mid-term revision adopted in February 2024 foresees a three-step funding mechanism ("cascade mechanism") to finance interest expenditures over-runs related to NGEU (Kowald et al., 2024): In a first step, the amounts foreseen under Heading 2b of the MFF shall be used up. In a second step, about 50% of the over-runs shall be covered by using margins, funds from existing programmes with delayed implementation, and the two existing non-thematic special instruments (the Flexibility Instrument and the Single Margin Instrument). In step 3, the new instrument established for interest payment over-runs would be mobilised. This new instrument would use decommitments from previous years and, if need be, Member States' contributions. Such an instrument should be made permanent, i.e. extended beyond the current MFF to cushion unforeseen interest payment shocks. As a new special instrument would come at the cost of increasing complexity and decreasing transparency by extending the already complex galaxy of the EU budget, an alternative could be to establish a permanent instrument over and above MFF ceilings, which would therefore not be subject to the complexities and potential diversion of other margins of the current cascade mechanism. However, such an instrument would avoid budgetary pressures from interest expenditure, which may be volatile in the medium term and therefore difficult to budget over a seven-year period, and might require cuts in other spending items under Heading 2 to remain within MFF ceilings.

Strengthen the resilience of the revenue system against inflation:

Currently, the system of own resources (which account for the lion's share of EU revenue) comprises traditional own resources (i.e. custom duties) and national contributions (i.e. the own resource based on Member States' value added tax (VAT) base; the own resource based on the amount of non-recycled plastic waste; and the own resource based on Member States' GNI). High inflation changes the contribution of the individual financing sources to overall EU revenues and accordingly Member States' shares in total revenues (Schratzenstaller et al., 2023). The shares of the VAT-based own resource and of custom duties based on *ad valorem* rates are increased by high inflation, while the share of the GNI-based own resource is reduced. Depending on country-specific inflation rates, a high inflation environment may result in higher financial burdens for Member States with above-average inflation rates. Moreover, high inflation erodes the real value of call rates expressed in absolute amounts, specifically of the call rate of the plastic-based own resource which amounts to EUR 0.80 per kilogram non-recycled plastic waste. The share of the plastic-based own resource in total revenues from own resources will shrink if the call rate is not adjusted based on the 2% deflator or the actual inflation rate. Against this background, two recommendations are suggested:

- **Automatic adjustment of the call rate of the plastic-based own resource to inflation:** To avoid the devaluation of revenues from the plastic-based own resources and the erosion of its steering potential, the call rate should be inflation-adjusted automatically. Had the call rate of EUR 0.80 been inflation adjusted annually, it would have been increased to EUR 0.87 in 2022 and to EUR 0.93 in 2023. Analogously, other call rates denominated in absolute values that may be introduced in the future should be inflation-adjusted automatically.
- **Speed up the introduction of the adjusted first basket of new own resources:** In June 2023, the Commission launched an adjusted proposal for the first basket of new own resources, which, in contrast to the current system of own resources, can be expected to be rather resilient against inflationary developments (Schratzenstaller et al., 2023). The proposed new own resources based on auctioning revenues from the EU Emission Trading System (ETS) as well as the revenues from the Carbon Border Adjustment Mechanism (CBAM) are not expected to be directly impacted by inflationary developments. Revenue from the proposed new own resource based on the corporate sector is likely to follow inflation in the longer run. Overall, therefore, all three new own resources included in the adjusted first basket of new own resources should be fairly resilient against inflationary developments, which speaks in favour of speeding up their introduction.

REFERENCES

- European Commission (2020). The EU budget powering the recovery plan for Europe. COM(2020) 442 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A442%3AFIN
- European Commission (2021). Horizon Europe, budget. Horizon Europe - the most ambitious EU research & innovation programme ever. Directorate-General for Research and Innovation, Publications Office of the European Union. https://data.europa.eu/doi/10.2777/202859
- European Commission (2023a). Summary of CAP Strategic Plans for 2023-2027: joint effort and collective ambition. Report from the Commission to the European Parliament and the Council. COM(2023) 707 final. https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en#assessment
- European Commission (2023b). Approved 28 CAP Strategic Plans (2023-2027). Summary overview for 27 Member States. Facts and figures. June 2023. https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en#assessment
- European Commission (2024a). European economic forecast: Spring 2024. Directorate General for Economic and Financial Affairs, EU Publications Office. https://data.europa.eu/doi/10.2765/219276
- European Commission (2024b). Horizon Europe Work Programme 2023-2025. Widening participation and strengthening the European Research Area. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-11-widening-participation-and-strengthening-the-european-research-area_horizon-2023-2024_en.pdf
- European Commission (2024c). Strengthening the EU through ambitious reforms and investments. COM(2024), 82 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52024DC0082
- European Commission (2024d). Mid-Term Evaluation of the Recovery and Resilience Facility: Strengthening the EU through ambitious reforms and investments. SWD(2024), 70 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52024SC0070
- European Commission (2024e). Half-yearly report on the implementation of borrowing, debt management and related lending operations pursuant to Article 12 of Commission Implementing Decision C(2022)9700 1 July 2022—31 December 2022. COM(2024), 93 final. https://commission.europa.eu/document/download/fb6687a7-4249-434c-bb07-5e9f34f4fd43_en?filename=H2%202023%20Half-yearly%20report%20on%20the%20implementation%20of%20borrowing%2C%20debt%20management%20and%20related%20lending%20operations.pdf
- European Parliament (2021). Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013, PE/12/2021/INIT. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32021R0695

- Kazukauskas, A., Newman, C., & Sauer, J. (2014). The impact of decoupled subsidies on productivity in agriculture: A cross-country analysis using microdata. Agricultural Economics, 45(3), 327–336. https://doi.org/10.1111/agec.12068
- Kowald, K., Pari, M., & Gallo, R. (2024). First-ever revision of the EU's long-term budget – Agreement between Parliament and Council. European Parliament, Members' Research Service, Briefing, PE 757.651, February 2024. https://www.europarl.europa.eu/RegData/etudes/BRIE/2024/757651/EPRS_BRI(2024)757651_EN.pdf
- Mennig, P., & Sauer, J. (2023). Revisiting the impact of decoupled subsidies on farm performance: A counterfactual analysis using microdata. Applied Economics, 0(0), 1–24. https://doi.org/10.1080/00036846.2023.2266601
- Schratzenstaller, M., Scheiblecker, M., Pekanov, A., & Kubeková, V. (2023). The impacts of recent inflation developments on the EU finances. Policy Department for Budgetary Affairs Directorate-General for Internal Policies, European Parliament. https://www.europarl.europa.eu/RegData/etudes/STUD/2023/756629/IPOL_STU(2023)756629_EN.pdf
- Severini, S., Tantari, A., & Di Tommaso, G. (2016). Do CAP direct payments stabilise farm income? Empirical evidences from a constant sample of Italian farms. Agricultural and Food Economics, 4(1), 6. https://doi.org/10.1186/s40100-016-0050-0

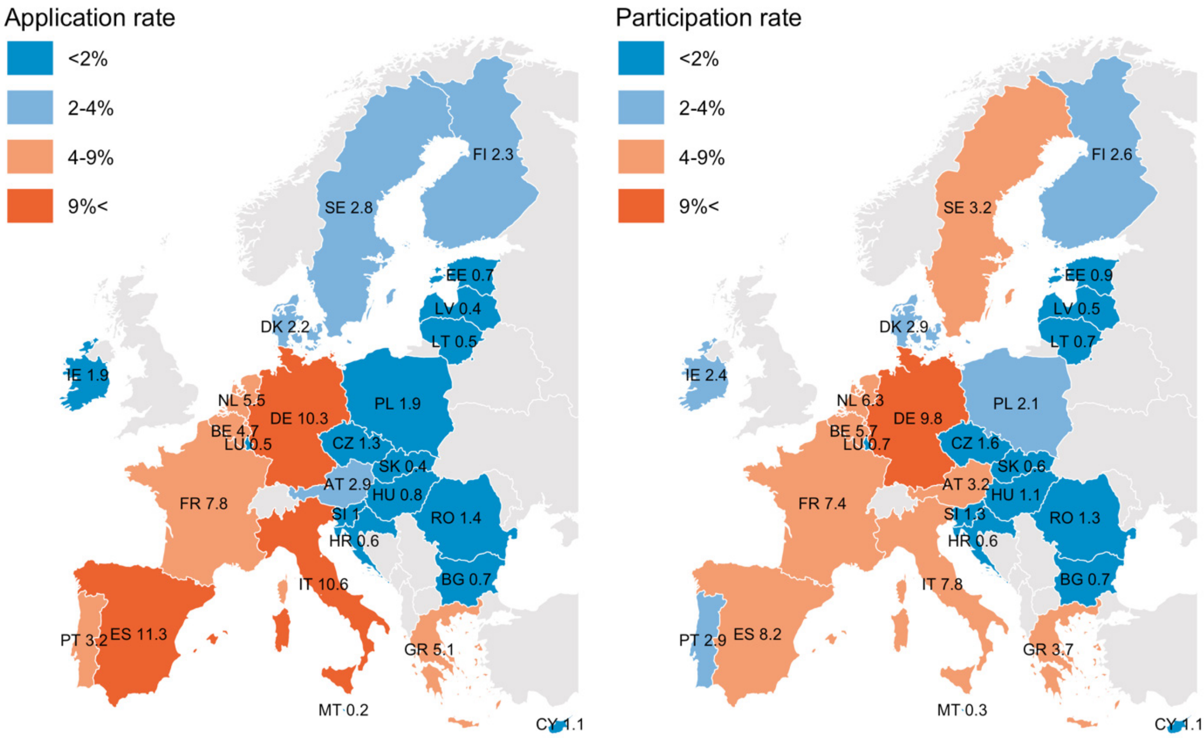
ANNEX

Table A1: Horizon Europe programme structure and budget

Thematic Pillar	Budget in EUR billion
(1) Global Challenges and European Industrial Competitiveness	**53.5**
- Health	8.2
- Culture, Creativity, and Inclusive Society	2.3
- Civil Security for Society	1.6
- Digital, Industry, and Space	15.3
- Climate, Energy, and Mobility	15.1
- Food, Bioeconomy, Natural Resources, Agriculture, Environment	9.0
- Non-nuclear Direct Actions of the Joint Research Centre (JRC)	2.0
(2) Excellent Science	**25.0**
- European Research Council (ERC)	16.0
- Marie Skłodowska-Curie Actions (MSCA)	6.6
- Research Infrastructures	2.4
(3) Innovative Europe	**13.6**
- European Innovation Council (EIC)	10.1
- European Innovation Ecosystems	0.5
- European Institute of Innovation and Technology (EIT)	3.0
(4) Widening Participation & Strengthening the European Research Area	**3.4**
- Widening Participation and Spreading Excellence	3.0
- Reforming and Enhancing the European R&I System	0.4

Source: European Commission (2021).

Figure A1: Horizon Europe application and participation rates, EU-27



Source: Horizon Dashboard, own calculations.

Notes: Participation rate and applications rate are computed as proportions of eligible proposals and retained applications, respectively, within the entire sample, encompassing both associated and non-associated third countries. Eligible proposals are proposals that fulfil grant requirements and excludes ineligible, duplicate, withdrawn, or unassessed proposals. Retained applications indicate those applications that are selected for funding.

Table A2: Accumulated inflation throughout the EU MFF periods 2007-2013, 2014-2020 and 2021-2027, in percent

	2007-2013	2014-2020	2021-2023	2021-2027
Hungary	39.7	12.5	41.1	**60.7**
Poland	24.5	8.0	34.0	**57.4**
Romania	44.0	11.8	32.0	**54.9**
Estonia	37.4	10.4	36.2	**52.8**
Lithuania	34.6	10.1	35.2	**46.7**
Latvia	38.0	9.6	32.0	**45.7**
Slovakia	17.9	8.0	27.9	**44.0**
Czech Republic	19.7	12.5	32.3	**43.4**
Bulgaria	35.1	3.5	26.2	**39.7**
Croatia	21.3	3.0	23.2	**36.6**
Austria	16.8	11.0	20.2	**34.0**
EU-27	16.7	6.4	19.5	**31.1**
Netherlands	14.3	7.5	19.5	**30.3**
Slovenia	19.5	4.4	19.2	**29.9**
Germany	13.3	7.4	18.9	**29.2**
Sweden	12.2	8.6	17.5	**27.9**
Belgium	16.9	9.4	16.5	**27.8**
Luxembourg	19.2	6.7	15.2	**26.8**
Italy	16.4	3.4	17.4	**26.7**
Ireland	6.4	1.5	16.4	**26.4**
Spain	16.8	3.1	15.4	**25.8**
Greece	17.7	-1.3	14.5	**24.8**
Portugal	12.9	3.9	14.9	**24.7**
Cyprus	17.3	-2.1	14.9	**24.6**
Malta	17.1	8.4	12.9	**23.4**
France	12.7	6.2	14.2	**23.4**
Denmark	14.9	3.5	14.4	**23.1**
Finland	18.9	5.1	14.1	**22.5**
Average (unweighted)	21.3	6.5	22.1	**34.6**
Standard Deviation	9.9	4.0	8.5	**11.9**

Source: IMF WEO (CPI, all items), Macrobond, own calculations.

The recent high inflation affects EU Member States differently. It is therefore important to quantify country-specific inflation impacts in regard to the implementation of the EU budget. This in-depth study focuses on country-specific inflation effects regarding research expenditures, Cohesion Policy, the Common Agricultural Policy, and NextGenerationEU. Moreover, policy options and recommendations at EU level to prevent adverse effects of future inflation shocks on the EU budget are identified and discussed.

This document was provided at the request of the BUDG Committee.

PE 767.094
Print ISBN 978-92-848-2435-9 | doi:10.2861/7242318 | QA-01-24-081-EN-C
PDF ISBN 978-92-848-2434-2 | doi:10.2861/6320873 | QA-01-24-081-EN-N