Pan-European Public Goods: Rationale, Financing and Governance

EGOV
ECONOMIC GOVERNANCE

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Abstract

Amidst a changed global environment and with the goal to defend its geopolitical weight, the EU should provide public goods with EU value added, so that efficiency gains can be achieved at the EU level. We propose an expanded EU budget to serve the dual role of more automatic stabilisation and the provision of EU public goods, where the European Parliament should have an enhanced role in setting investment priorities. We discuss three such areas of investment priority – infrastructure, defence and security, as well as research and development.
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<tr>
<td>ARPA</td>
<td>Advanced Research Projects Agency</td>
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<td>CAP</td>
<td>Common Agricultural Policy</td>
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<td>CBAM</td>
<td>Carbon Border Adjustment Mechanism</td>
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<td>CMU</td>
<td>Capital Markets Union</td>
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<td>DARPA</td>
<td>Defence Advanced Research Projects Agency</td>
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<td>DG</td>
<td>Directorate General</td>
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<td>EA</td>
<td>Euro area</td>
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<td>ECB</td>
<td>European Central Bank</td>
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<td>EDIS</td>
<td>European Defence Industrial Strategy</td>
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<td>EDTIB</td>
<td>European Defence Technology Industrial Base</td>
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<td>EGD</td>
<td>European Green Deal</td>
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<td>EIB</td>
<td>European Investment Bank</td>
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<td>EIC</td>
<td>European Innovation Council</td>
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<td>EMU</td>
<td>Economic and Monetary Union</td>
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<td>EPGs</td>
<td>European Public Goods</td>
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<td>ETS</td>
<td>Emissions Trading System</td>
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<td>EU</td>
<td>European Union</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GFC</td>
<td>Global Financial Crisis</td>
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<td>GNI</td>
<td>Gross National Income</td>
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<td>GPI</td>
<td>Green Public Investments</td>
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<td>GPS</td>
<td>Global Positioning System</td>
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<td>HSR</td>
<td>High-Speed Rail</td>
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<td>Acronym</td>
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<tr>
<td>IEA</td>
<td>International Energy Agency</td>
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<td>IIA</td>
<td>Interinstitutional Agreement</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>IPCEI</td>
<td>Important Projects of Common European Interest</td>
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<td>MFF</td>
<td>Multi-Annual Financial Framework</td>
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<td>NATO</td>
<td>North Atlantic Treaty Organization</td>
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<td>NGEU</td>
<td>NextGenerationEU</td>
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<td>NIH</td>
<td>National Institutes of Health</td>
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<td>NRRP</td>
<td>National Recovery and Resilience Plan</td>
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<td>NSF</td>
<td>National Science Foundation</td>
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<td>NZIA</td>
<td>Net Zero Industry Act</td>
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<td>OCA</td>
<td>Optimal currency area</td>
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<td>OSTP</td>
<td>Office of Science and Technology Policy</td>
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<td>PV</td>
<td>Photovoltaic</td>
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<td>R&amp;D</td>
<td>Research and development</td>
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<td>RRF</td>
<td>Recovery and Resilience Facility</td>
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<td>SME</td>
<td>Small and Medium Entrepreneurs</td>
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<td>SURE</td>
<td>Support to mitigate Unemployment Risks in an Emergency</td>
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<td>TEN-T</td>
<td>Trans European Transport – Network regulation</td>
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<td>US</td>
<td>United States</td>
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<td>VAT</td>
<td>Valued Added Tax</td>
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EXECUTIVE SUMMARY

The EU faces new challenges such as increased security risks, the necessity to deliver on the green transformation and the risks of supply chain disruptions. The changed circumstances make it necessary to defend its geopolitical role and its sovereignty. To fulfils this objective, the EU needs to reform both the scope of its expenditures and the financing thereof. We argue that, in a global environment of more frequent and more impactful external shocks, the EU should provide a broader set of pan-European public goods. However, this would require a bigger central budget. If effective, the improved provision of pan-European public goods would unlock economic benefits as well as reduced funding needs at the national level. A stronger focus on providing public goods is also necessary to ensure the stability and resilience of the EU economy, thereby allowing Member States to tap into new sources of economic growth.

In the current financial framework, spending on projects with European value added is increasing, yet there are still considerable deficiencies. Historically, many of the most pressing priorities of EU citizens have received little attention in the EU budget even if they may have been the subject of intense EU-wide debates and even rulemaking. Given the new geopolitical challenges, the EU should focus more on providing pan-European public goods – from design to implementation to financing. And the European Parliament should have an enhanced role in setting the parameters of such programmes.

To provide for these goods, the EU needs to mobilise funds. Because of the very nature of public goods, the incomplete nature of the EU Capital Markets Union and the long-standing challenges in its completion, it is unlikely that private funds will suffice to provide the financial means required in the coming years. We therefore conclude there will be a need for more public funding. We propose a future EU budget amounting to 4% of the EU Gross National Income (GNI). Such an increased budget would serve a dual role. First, by allowing for stronger automatic stabilisation in the face of economic shocks, it would make the EU more resilient and enhance internal cohesion. Second, and possibly even more importantly, it would ensure considerable and stable funding for investment in pan-European public goods.

We discuss three such areas for provision of pan-European public goods - infrastructure, defence and security, and research and development. Infrastructure spending currently suffers from under-investment especially in cross-border activities. At the same time, the European Green Deal, as well as measures to deal with supply chain and energy shocks, require considerable investments in transport and energy infrastructure. The EU already faces investment gaps to achieve the goals of the EU Green Deal. When, by end of 2026, the Recovery and Resilience Facility (RRF) expires, these gaps will increase as funding from NextGenerationEU (NGEU) on the green transition comes to an end. We evaluate the recent changes to the Economic Governance Framework as insufficient to solve this problem. Hence, we propose that an additional 1% of GNI should be committed towards the EU-budget to providing pan-European infrastructure.

Geopolitical developments and increased concerns about border security make defence and security spending at the EU level more relevant. Moreover, important cost efficiencies can be achieved through common public procurement on defence. We propose that an additional 1% of GNI should be committed to common defence and security spending, combined with the creation of a DG Defence office at the European Commission and improved public procurement rules. A part of this pan-EU spending should be committed to the development of high-tech military technology.

The EU already provides considerable funding for research and development. Nonetheless, in this area, too, we argue that up to 1% of the EU GNI should be allocated to the EU budget so that the Union may
remain competitive in state-of-the-art technologies. We discuss ways how this increased funding should be accompanied by better governance, creating EU-wide academic and research institutions, an enhanced environment for researchers, and improvements in the selection process of top scientific ideas.

Finally, while NGEU devotes some financing to pan-European public goods in the current EU budget, it is set to expire by end of 2026. EU institutions and policymakers will need to identify new funding instruments to bridge the gap in funding for public investments soon. Our proposal for an expanded EU budget for the provision of true pan-European public goods aims at ensuring the financing needs for such public investments, serving the goals of the Green Deal, but also providing pan-European infrastructure, expanding the potential for the EU economy to grow. The question of the funding of this expanded EU budget is largely a political one. According to the “golden rule” of public finance, investment into infrastructure can be financed by debt. Own resources could play a role, too, but they need to generate cash-flows over a long horizon. Finally, and likely most importantly, there would be a need for increasing contributions by Member States, as their own financing requirements for public goods go down. The exact mix is a political rather than technical question.
1. FINANCING THE EU’S GROWTH MODEL AMIDST GLOBAL CHALLENGES

Recently, the global economic and geopolitical environments have undergone substantial changes. In 2020, more than a decade after the 2008 Global Financial Crisis, the COVID19 pandemic highlighted again the challenges that large and unpredictable shocks can induce for the European economy. Uncertainty in the global economy increased even further with the start of the Russian war in Ukraine and remains elevated (Ahir et al., 2023). It is accompanied by a host of additional adverse developments, including the rise of other risks, such as geopolitical conflicts, energy shocks and the increasing risk of fragmentation of the global economy (IMF, 2024; Felbermayr et al., 2022). Supply chain disruptions have also put trade linkages and global flows of goods and services under pressure. These developments imply risks that are hard to forecast. At the same time, achieving the green transition and addressing climate change continue to be essential policy imperatives and need to be successful at the EU level, as they have already been enshrined in the European Climate Law1. This includes the implementation of existing EU initiatives and programmes aligned under the Multi-Annual Financial Framework (MFF) 2021 – 2027 supported with increased funding via the new, temporary instrument NextGenerationEU.

This new global geopolitical environment requires the EU to become more sovereign and to enhance its resilience to unexpected shocks. In times of security considerations, decision-makers need to give greater considerations to achieving resilience (Gopinath, 2023). Geopolitical conflicts imply an increased need for an improved defence and security framework in the EU. Geopolitical fragmentation has already affected bilateral economic relations, by slowing down trade and lengthening supply chains, all of which constitutes a drag on economic growth. Furthermore, intense geoeconomic fragmentation may furthermore slow growth by decreasing capital flows, technological diffusion, and the provision of global public goods (Ayiiar et al., 2023)2. Supply chain disruptions and the goals of the European Green Deal require an improved and modern infrastructure in the energy and transport sector, based on an EU-wide approach and compatibility. The productivity gap between the EU and the US has expanded further in recent years (Schnabel, 2024), which demands an enhanced framework for research and development, education, and innovation in the EU since maintaining competitiveness and promoting key technologies remains crucial for the future growth prospects of the EU.

In this paper, we argue that to become more resilient to these shocks the EU needs an expanded common budget so that it can contribute more to the provision of pan-European public goods that create true EU-wide value added (Felbermayr, 2024). This serves the goal of strengthening the EU growth model amidst a volatile and partly hostile global environment. In their activities, EU institutions are endowed with specific competences, and different tasks are distributed between the Member States and the EU-level. The principle of subsidiarity determines that in the cases where the EU competence on a given action is not exclusive, the EU can act when the objectives of an action cannot be sufficiently achieved by the Member States, but can be better achieved at Union level, by reason of the scale and effects of the proposed action. The principle dictates that all political decisions should be made at the lowest appropriate level: as close as possible to the citizens. This means that the EU should only act in areas where the given objectives of a policy cannot be sufficiently or successfully

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1 The European Climate Law embeds the goal set out in the European Green Deal for Europe’s economy and society to become climate-neutral by 2050.

2 IMF Research (2023) e.g., evaluates that further global economic fragmentation in the form of greater trade restrictions can reduce global economic output by up to 7% over the long term.
achieved at the national or the regional levels and where joint action by the Member States does indeed add value. However even if there is true EU-wide value added, when Member States have very pronounced differences in their preferences on a particular issue, the political costs of joint action might be too high and therefore the issue should still be decided at national or regional level. This is for example the case with many social and distributional policy issues.

In the current financial framework, spending on projects with a clear European value added has increased and has been directed somewhat to priorities such as Horizon Europe and the European Research Area. On top of that, the overall EU budget for 2021-2027 was significantly increased with the temporary introduction of NextGenerationEU (and the RRF as its main component) to fight the economic downturn induced by the COVID-19 pandemic. For many decades, approximately 40% of the entire budget was allocated to the Common Agricultural Policy (CAP). In the current MFF, this share has decreased. Funds for climate policy have on the other hand been significantly increased. Other policy areas however continue receiving little weight. Despite the experiences with the refugee crisis of 2015, in the 2022 budget, border security is allocated just 0.0096% of the EU’s gross national income (GNI). The maximum overall appropriations for migration and border management as well as security and defence are in total EUR 24.7 billion (2.3% of the budget and 0.02% of EU’s GNI) and EUR 14.5 billion (1.3% of the budget and 0.01% of EU’s GNI) in the current MFF 2021-2027 (in 2018 prices, see Figure 1). Cross-border infrastructure, clearly providing high European value added, in most years receives funds from the EU budget amounting to no more than 0.01% of the EU’s GNI. Major leaps are very difficult with such tiny contributions. The only major area where clear European value added squares with a significant share of the EU budget is the research budget. In the current MFF approximately 0.07% of the EU’s GNI is allocated to research, which corresponds to about 7% of the overall budget.

Looking at results from recent Eurobarometer polls on issues concerning EU citizens one can identify some discrepancies relative to the policies funded by the EU budget\(^3\). Figure 2 (left-hand side) lists the issues that are considered the most important for EU citizens in the 2023 waves. The most important issues in recent surveys – health, immigration, energy policy, climate change, international situation – historically have received little attention in the EU budget. Importantly as well, according to Eurobarometer data (Figure 2, right-hand side), a majority of Europeans favour common policy in important policy areas, including freedom of movement, defence and security, trade, migration and foreign policy. This majority has been at relatively stable levels of support throughout recent years.

\(^3\) For a discussion on the mismatch between the need and popularity of some public goods and the reluctance to increase their supply and finance them, see Papaconstantinou and Buti (2022).
Amidst the new geopolitical challenges discussed above, the EU should provide pan-European public goods where efficiency gains can be achieved by provision at the EU rather than at the national level. To provide for these goods in increased amounts, the EU needs to mobilise funds. One way is to create structures in which private capital is incentivised to fund the necessary public goods. However, the track record for such private-public partnerships is, at best, mixed, one problem being the fact that the EU still misses a genuine Capital Markets Union (CMU) which would require for instance the harmonisation of tax and insolvency codes (Lagarde, 2023). Adopting the steps to achieve a genuine CMU would be the first-best outcome for the EU, as also argued by the Letta Report (Letta, 2024), which proposes transforming this project into a “Savings and Investment Union”. A genuine and complete CMU will enable private capital to finance the necessary priorities in an optimal way. Yet the adoption of these steps has remained elusive in recent years, leading to the recent conclusion that the CMU project has “disappointed in its first decade” (Véron, 2024). Mobilising private capital to provide funding for pan-European public goods therefore seems difficult in the short-run. Moreover, even if the CMU makes progress, complementary public funding will be instrumental. Alternatively, a structural shift in EU expenditures towards spending providing more EU value added can be argued for, but given the current size of the EU budget and the importance of the priorities already embedded in it, we do not consider this could be sufficient for the policy priorities we discuss further.

We consider three main areas where the expanded provision of pan-European public goods is warranted and would contribute to strengthening the resilience of the EU to external shocks -

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4 For a review on the current state of progress and challenges to achieve a genuine capital markets union in the EU, see Véron (2024).
5 For the latest discussion see Eurogroup (2024).
6 E.g., also because due to their nature of public goods (for infrastructure) or because of the risks involved (breakthrough R&D), the private sector will not provide sufficiently for them.
infrastructure, defence and security, as well as research and innovation. The provision of a higher level of such pan-European public goods at the EU level would require an expanded EU budget, combined with a stronger role for the European Parliament.

Figure 2: Rating of the most important issues for the EU (left) and attitudes towards a common EU policy (right)

Share of Eurobarometer respondents in favour of the respective topics

Source: Eurobarometer, European Union (2019, 2023a, 2023b, 2023c, 2023d).
2. AN EXPANDED EU BUDGET TO PROVIDE EUROPEAN GOODS AND AUTOMATIC STABILISATION

2.1. The case for an expanded EU budget

Throughout the current MFF period 2021-2027, MFF expenditures will represent about 1% of the EU GNI. Together with NGEU the EU budget reaches around 1.7% of EU GNI in this period. Thus the current EU budget is significantly larger than in all previous years before the pandemic. This was made possible by the creation of the new NGEU instrument, which entails substantial borrowing and is only temporary. Compared to national budgets and to the size of the EU economy, this figure is minuscule. In most countries, government expenditure amounts to more than 40% of GDP. National gross contributions to the EU budget still amount to approximately 1% of GNI or around EUR 156 billion annually. They will probably have to go up to pay back the accumulated debt, unless budget cuts in traditional EU spending areas are made or the new own resources foreseen in the Interinstitutional Agreement (IIA) from December 2020 and outlined in the proposal by the European Commission from June 2023 are implemented. The current EU budget comprising MFF 2021 – 2027 and NGEU therefore constitutes a combination between expenditures funded by Member States contributions, traditional own resources, and various other revenue sources including revenue from issuing debt.

We consider the current size of the EU budget to be below what is sufficient from the perspective of a big global geopolitical player and from a macroeconomic standpoint. The insufficient size of the EU budget has been criticised by some authors ever since the Sapir Report deemed it a “historical relic” (Sapir et al, 2004). The determination of the optimal size of an EU budget should ideally be influenced by two factors: first, which tasks should be managed at the EU level and the resources necessary for them, and second, the macroeconomic role the budget plays in the functioning of the Single Market, the currency union, and the provisioning of an automatic stabilisation function.

The architecture of the European Economic and Monetary Union (EMU) has been subject to extensive debates since its inception and criticism has been directed at the EMU for its incomplete design (Constâncio, 2018; Pekanov, 2019). In a common currency area, national monetary policy is absent and interest rate decisions are taken based on the economic performance of the whole currency area without accounting for diverging developments in parts of it. If different regions are affected only by common shocks of similar magnitude, then a common monetary policy is an effective tool to compensate these shocks. If however different regions are affected by different, asymmetric shocks so that their business cycles are not synchronised, the common interest rate response policy can be unsuitable to compensate for region or country specific shocks (Farhi & Werning, 2017). This impedes economic growth and economic recovery of the common currency area after deep economic downturns. At the start of the EMU, the expectation was that integration through trade would lead to more synchronised economic developments among Member States - the so-called

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7 In 2022, total EU annual expenditures were EUR 243 billion. This amount represents approximately 1.54% of the EU's GNI.
8 For a theoretical consideration on the size of the budget of federal states and sovereign states, see Persson and Tabellini (1996).
“Rose effect” (Rose & Engel, 2002)⁹. This should have reduced the occurrence of asymmetric shocks, but it has not materialised in the EMU as expected (Glick & Rose, 2015)¹⁰.

The optimal currency area (OCA) theory underscores the need to have compensating channels to absorb diverse macroeconomic shocks in a currency union, where national monetary policy is absent (Mundell, 1961; Kenen, 1969). Traditionally, well-integrated countries like the United States achieve the adjustment of local shocks through capital and labour mobility or through a common fiscal policy at the currency area level, which redistributes resources to states to stabilise consumption or fund unemployment benefits or public investments. In federal states, whether one considers the US, Germany, or Switzerland, a large portion of the adjustment to asymmetric shocks is achieved through so-called automatic stabilisers.

Unlike the US, the EU and the EMU lacked the required fiscal instrument to address large macroeconomic shocks until the pandemic (Allard et al. 2013, Alcidi et al. 2017). While it is true that the euro area and the EU are no federal states, the overall growth performance of the EU is determined partly by its resilience and ability to absorb shocks, either common or idiosyncratic. Studies have compared the ability of the US and the euro area to overcome macroeconomic downturns by evaluating the shares of the absorption of economic shocks through different macroeconomic channels. Figure 3 (left-hand side) presents earlier estimations on the extent of risk-sharing and the shock absorption function at the EU and the EMU¹¹ level in comparison to some well-known examples of federal states (Allard et al., 2013). Allard et al. (2013) discuss critical gaps in the EMU architecture and argue that deeper fiscal integration can correct the institutional weakness which impeded economic recoveries in the EMU in previous crises. Such a fiscal integration would require a bigger EU budget. Another estimation, provided in Alcidi et al. (2017) (Figure 3, left-hand side), compares the US and the euro area using data until the end of the global financial crisis (GFC). It shows that, in the euro area, asymmetric macroeconomic shocks remained unsmoothed to a very large extent (75%), unlike in the US (17%), where macroeconomic channels, both private (capital markets and private savings) and public (fiscal transfers and public savings) contributed much more to absorption. The EU therefore under-delivered on all channels of shock absorption – the private channel through capital markets, the fiscal smoothing of shocks through fiscal transfers and the consumption smoothing channel through adjustments in aggregate consumption of households and firms. According to these evaluations, throughout the GFC and its aftermath, the EU and the EMU lacked the ability to provide risk-sharing and smoothing of macroeconomic shocks to a sufficient extent.

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⁹ The initial and prominent findings by Rose and Engel (2002) stipulated that members of currency unions are even more integrated through trade in goods and services than countries with their own currency and that their business cycles are more synchronised. Yet, Glick and Rose (2015) find this effect on trade in the case of the EMU was mildly positive at best.

¹⁰ Due to the specialisation of countries in different sectors, varying institutional frameworks, and differing per capita incomes, even global events such as a significant increase in oil prices affect each country differently. Dealing with these risks requires an ability of the EU to absorb different shocks.

¹¹ In this study the euro area is considered as the EMU.
Apart from smoothing short-term differences between subnational entities, automatic stabilisers also dampen the temporal fluctuations caused by shocks affecting all regions equally. This provides a form of macroeconomic insurance. The principle is as follows: the payments made by individual regions into the central budget fluctuate with the business cycle. During a recession, less is paid than during a boom. This is accomplished by making payments strictly proportional to economic performance, as it is essentially the case in the EU budget as large shares of the national gross contributions are linked to nominal GNI of Member States (e.g. the GNI-based own resource). Meanwhile, the funds flowing to regions are kept constant over the business cycle. Thus, during recessions, there is a higher inflow of central funds (or a lower outflow for net contributors), while during booms, there is a higher outflow (or a lower inflow for net contributors). The central budget can thus contribute to the macroeconomic stabilisation of a currency union and the more so, the bigger it is.

The creation of NGEU and its main component – the RRF – contributed to serving a fiscal stabilisation role. At the same time, the RRF provides funding for public investments in Member States. It has contributed to absorbing a part of the shock due to the COVID-19 pandemic and has facilitated the economic recovery (Bańkowski et al., 2022, Pfeiffer et al., 2021). This has partly alleviated the problem of the missing EU fiscal capacity with an automatic stabilisation function, although studies...
using the same methodology and recent data are not available yet to evaluate this quantitatively. NGEU is however a temporary instrument and after its end in 2026, the problem of the lack of a stabilisation tool at the EU level will return.

After 2026 there will be a renewed need to embed such an automatic stabilisation function in the EU budget. Instead of financing expenditure for consumption, wage replacement or other current expenditures by Member States, it may be preferable to focus on the financing of public investments in pan-European public goods. Public investments as a share of overall government spending have often fallen during economic crises or in the ensuing fiscal consolidation episodes in EU Member States, as exemplified by the aftermath of the GFC (Figure 4). Fiscal consolidation was the main driver for this reduction in public investments, but public investments did not recover to higher levels afterwards (Darvas & Wolff, 2021). It appears that spending cuts to investment tend to come with smaller political costs compared to cuts, e.g. in spending on the social system, transfers or other programs (Furman 2016). The European Fiscal Board (2019) argues about the need for instruments to protect government investment to enhance the potential of the economy and deliver long-term economic benefits, while the opposite happened after the GFC. Since a large part of public investment is committed to providing public goods, spending cuts entail an under-provision of such public goods. Furthermore, investments in pan-European public goods may be easier to coordinate at the EU level than other forms of automatic stabilisation – such as a European wide unemployment benefits scheme, which would face the challenge of harmonising different labour markets and unemployment regulations. This would be especially the case in the presence of a portfolio of so-called shovel-ready projects (Furman 2016), e.g. big cross-border infrastructure projects, which would have the biggest macroeconomic multiplier and therefore stabilisation effect through economic downturns. Specific types of public investments in public goods also expand the potential of the economy by helping to achieve the state of the art in the areas of energy, defence, technology, and research due to productivity-enhancing effects (European Fiscal Board, 2019) which have become more important in the environment of increased geopolitical competition and tension. Automatic stabilisation in the form of public investments would furthermore have the additional benefit that by providing pan-European public goods they would lead to less political disputes and controversies surrounding stabilisation in the form of programmes financing consumption or unemployment benefits, which inherently follow the “juste-retour” logic.

An expanded EU budget shall assume the dual function of providing automatic stabilisation and to finance pan-European public goods. To have a meaningful macroeconomic effect in terms of automatic stabilisation, a central budget must be of a certain minimum size. We consider that the current EU budget of around only 1% of the EU GNI is significantly too small. Instead, we propose that a budget accounting for at least 4% of the EU GNI is needed. An EU budget of such size can effectively address asymmetric shocks and act as a counter-cyclical macroeconomic stabiliser. Modern federal states consistently allocate double-digit percentages of their GNI to central budgets. A larger EU budget would also reduce adjustment burden on monetary policy instruments during crises.

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14 Where they might have different preferences and national specifics in terms of legislation.
15 For an overview, see Doll et al. (2018).
16 For a similar view, see Buti (2023).
17 It would reduce the necessity for the ECB to be “the only game in town”, for a general discussion on this problem see El-Erian (2017).
Figure 4: Gross fixed capital formation as a share of primary expenditure in selected EU Member States

The macroeconomic impact of increasing the EU budget in the long-term by up to an extra 3% will be significant. This would be the case however if it would predominantly represent additional spending and would not be combined with consolidation of national expenditures in the same policy areas. For extra spending on infrastructure and research & innovation, no such crowding-out of national spending by EU spending is expected – the infrastructure spending needs discussed below are considerable and Member States are not expected to decrease their national spending on infrastructure if the EU provides important cross-border energy and transport infrastructure. National spending might even increase in the long-term, as better infrastructure across borders can increase the appetite for common energy projects, given better grid, and will increase the appeal of cross-border EU travel, e.g., by high-speed train. Similarly for research & innovation, EU spending will create more incentives and gains from topping it up with national spending. In the defence area however increased spending at the EU level might induce some Member States to decrease their national spending, as common procurements of military equipment at the EU level can lead to gains from scale and reduce procurement costs, therefore making national spending less appealing. The exact impact therefore will be dependent on the specific reaction of Member States in each of the three proposed areas.

To estimate the exact effects of the proposed increases in government spending on output, the economic literature has long calculated fiscal multipliers – the percentage change in output that results from a government spending increase of 1% of GDP. An ample literature documents many differing views on the exact size of these multipliers. Many of the seminal studies on the effects of government spending increases examine historical periods of defence spending increases during military build-ups. Therefore, the best estimates of the direct economic effects of the increased

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It is important to note that most papers on fiscal multipliers focus on temporary and surprising government spending increases. In a neoclassical model, e.g. Aiyagari, Christiano and Eichenbaum (1992) or Baxter and King (1993), however even permanent spending
spending we propose can be obtained for the case of increased defence spending. The literature on such government spending multipliers varies in the methods and time periods used. In a seminal study Ramey (2011) estimates the effects of surprising government spending increases and obtains a government spending multiplier ranging between 0.6 and 1.2, with the higher estimates dating further back in time, while the lower ones are from the post-World War II period. An advantage of the paper is that it estimates the economic effects starting with the announcement of an increase in defence spending. The positive impulse to GDP continues up until reaching a peak in the sixth quarter after the announcement. The paper uses periods of military build-ups 19 to estimate these multipliers, which is the relevant measure for a period of increasing EU defence spending, as discussed throughout this paper. In the US, defence spending has been the major part of the variation of government spending around the trend in the post-war period and this is the value analysed by many studies on the effects of macroeconomic spending (e.g., Hall (1980), Barro (1981) and Hall (1986)). Finally, the multiplier estimates by Ramey (2011) use data in which distortionary taxes have increased during the military build-up periods in the US, dampening somehow the aggregate GDP multiplier. If such a military build-up is financed not through taxes, which disincentivise work, but rather through debt, then the multipliers can be potentially higher. The seminal work by Ramey (2011) therefore provides a lower bound of the fiscal multiplier from increased defence spending of between 0.6 and 1.2.

In another seminal study, Nakamura and Steinsson (2014) also use historical data on military procurement in the US to estimate the effects that government spending increases in one region relative to another have on relative output. To do that, they explore differences in regional variation in military build-ups. The paper analyses the effects of increased relative government spending in one region of a monetary union, which is the relevant framework for analysing increased spending in the EU, as proposed in this paper. Nakamura and Steinsson (2014) obtain a somewhat higher estimate of the relative multiplier of 1.5, meaning that when relative per capita government spending in a region rises by 1% of regional output, relative per capita output in that region rises by roughly 1.5%. An important conclusion from this literature is that there is no “single” government spending multiplier value, as the value will always depend on the type of spending, the reaction of monetary policy, and other factors. However, estimates between 0.6 at the lower end and 1.5 at the higher end can be assumed for the effects of increased government spending.

Finally, an important question is how, given such multipliers, an increased EU budget will affect the smoothing of shocks at the EU, the national and regional level, which as discussed above is still insufficient. Beetsma et al. (2024) analyse how a central fiscal capacity can contribute to smoothing euro area, country, and region-specific shocks through transfers. The authors use regional data (NUTS-3) from 1999 until 2021 and document that regional business cycles can diverge substantially between different euro area countries. The business cycle of some countries, e.g. Germany, is driven by the euro area business cycle, while in others such as Spain and Greece the business cycle is determined mainly at the national level. There are other countries still where region-specific shocks are driving the business cycle, e.g. in the Netherlands and Ireland. The authors then estimate regional fiscal multipliers in the range of the conservative values discussed above – between 0.6 and 0.8 – and show that a central fiscal capacity, designed with minimum moral hazard, could contribute to substantial stabilisation of the euro area and regional shocks.

19 In particular the periods of the Korean War, the Vietnam War, the Carter-Reagan Buildup and the aftermath of 9/11
The lesson to be drawn from these estimates is that the GDP effect of increased government spending through an expanded EU budget, while dependent on the exact multiplier effects, can be expected to be substantial and can contribute to the smoothing of regional shocks. As discussed, the impact on GDP can be best evaluated for increased defence spending since most empirical studies focus on it. The question of the GDP impact of increased infrastructure and R&D spending is more difficult to evaluate empirically, since the types of spending also create long-term public capital which enhances the productivity of the economy. As Ramey (2011) points out however this is a reason to expect that multipliers from these different types of increased spending will be even higher.

Returning to the exact size of the increase in EU spending, a concrete, model-based value for the optimal size of the EU budget cannot be estimated – it is a choice reflecting political priorities, electoral outcomes, and policy-makers decisions. We propose however a maximum ceiling of 4% – a combination of the existing and well-established current EU budget of close to 1% of GNI and a top-up of up to 3% of GNI, similar to the maximum 3% deficit embedded in the Maastricht criteria. This consideration is based on the idea that the Maastricht Treaty established the ceiling for Member States to incur government deficits up to a maximum of 3% under normal circumstances. It means that in a given year, Member States can incur government expenditures above their revenues and finance them by debt. Up until the COVID-19 pandemic, the EU budget was fully financed and that meant the EU did not incur debt to fund it under normal circumstances. Since the introduction of the temporary NGEU instrument however, the expenditures for national recovery and resilience plans (RRPs) for respective investments in the green and digital transition are funded by debt. Debt funds projects which have a long-term economic benefit and, by expanding potential output, it could thus at least partly pay for itself by increasing economic growth. A similar logic can be applied to the three sectors where we see an increased provision of EU level spending to be warranted – infrastructure, research and development, and defence spending. While infrastructure and research spending will enhance the EU economy by making it more productive in the long-run, increased defence spending can have short-term stimulative effects and fiscal multipliers above 1 as discussed above. All of this warrants that at least a part of this increased spending is funded by new EU level debt. The 3% reference value from the Maastricht criteria is taken as a reference value for our proposed maximum annual deficit ceiling since it has traditionally created a clear and transparent anchoring effect in EU policymaking as the maximum level of deficit allowed. We foresee this as an upper bound ceiling for the EU budget in a given year, whereas it need not be reached in each year. For example, while defence procurement and the expansion of defence provision at EU level might lead to a fast, but temporary military build-up in the coming years, thereby requiring a full 1% of increased spending on defence, pan-European infrastructure projects might require more time for planning and implementation and not reach the maximum 1% of spending for many years, while defence spending might start decreasing again. Furthermore, a more performance-based approach to the increased EU budget, based on the RRF, will mean that annual spending will not be set ex-ante, but will be based on fulfilling some criteria. This can be compared to the structure of NGEU, where the maximum commitments of EUR 806.9 billion will not be exhausted as some Member States did not request the loans part of their RRF funding and not all milestones and targets of the NRRPs might be fulfilled to obtain the grant payments fully.

Not the whole 3% increase in the EU budget needs to be financed by debt. To what extent the increased budget is to be financed through higher contributions by Member States, by additional new own resources or by debt is a further political decision. To the extent that the provision of pan-European public goods through this expanded budget might substitute in a more efficient way national spending and therefore reduce the necessity to spend at the national level (e.g. for infrastructure, defence or R&D as discussed below), it might necessitate increases in national
contributions to the EU while at the same time decreasing fiscal pressures on individual Member States
to spend at the national level for some priorities. For other priorities however, debt financing makes
economic sense. Large public investment projects, e.g. a high-speed railroad network, often create
long-term benefits for future generations. Therefore, they are often financed at least partially by public
debt instead of shifting current expenditures or raising taxes. Following the classical Musgrave
principle of “pay as you use” (Musgrave, 1939), the future debt service for public investments financed
by debt today is a way to make future generations co-finance the provision of public investments. Debt
financing of such public goods or public investments therefore ensures a fair intergenerational
distribution (Yakita, 1994; Balassone & Franco, 2000) and overcomes underinvestment today and its
harm on future generations (Bertram et al., 2022). Public investments often bring long-term positive
externalities for which the long-term social rate of return exceeds the private rate of return, making the
case for governments to provide them. In the case of the green transition or breakthrough research,
this also involves the development and implementation of innovative, often risky, and untested,
technologies for which insufficient private capital is provided and there is a role for public spending.
Investments under the European Green Deal or in transport infrastructure also add to the stock of assets
in the economy, which also partly warrants debt finance (Corti et al., 2022). Given all of this, the provision
of public investments for the green transition is thus provided through co-financing, private-public
partnerships, and state guarantees, but also essentially through public investment (European
Investment Bank, 2021; Delgado-Téllez et al., 2022).

An important mechanism to pursue is also the establishment of special purpose vehicles that
channel funds exclusively into clearly defined, investment-related uses (e.g., for the
construction of a pan-European high-performance electricity transmission network) and self-
finance through their own revenues (e.g. toll fees). The European Investment Bank (EIB) is a good
and quite successful example of such a vehicle. Member States guarantee its liabilities and receive
dividend payments in return. The guarantee ensures the initial funding through debt of any
infrastructure project, but it also then results in commission fees paid back to the issuer of the
guarantee. Another successful example is the model of the Austrian state-owned road-operator
ASFINAG. It is charged with road infrastructure operation, building and maintenance in Austria and has
a customer-financed model – reinvesting the revenues from toll fees back into the network for new
projects and maintenances. Such constructions protect funding for investments and aim to continue
reinvesting and building the stock of capital in the respective sector. They would ensure that debts
arising from new EU programmes also lead to investments, thereby expanding the capital stock
invested in the EU. This will also reduce the risk that new EU debt is used purely for transfers and
government consumption purposes. The Letta Report on the Single Market (2024) sees another avenue
in public-private partnerships to mobilise private capital. This would “require a shift from in-house
models (including state-own enterprises) to contractual and/or institutional public-private partnerships,
mainly through the adoption of concessions and licenses”. Such vehicles would thus impose less debt to
be accrued for specific pan-European public investments and would therefore imply that the EU
budget would be increased to a lesser extent.

While part of the expanded provision of pan-European public goods would thus be funded either
through special investments vehicles for public investments or an expanded EU budget financed
by recurring debt, a considerable amount of this expanded EU budget will still need to be
financed by new own resources. Such new own resources have been foreseen in the IIA
accompanying NGEU adopted in December 2020 and were laid out by the Commission in a first
proposal in December 2021 which was then updated in 2023 (European Commission, 2023a) in light of
the incoming needs to pay back NGEU debt up until 2058. With its current structure, the EU revenue
system is dominated by the contributions of Member States based on the VAT-based own resource,
the GNI-based own resource and, since 2021, the non-recycled plastic waste (plastic-based own resource). The overall share in total own resources (excluding other revenue) from such Member States contributions has been growing in the long run, reaching 83.4% in 2022. Instead the weight of traditional own resources (i.e. customs duties), which represent genuine own resources based on EU policies and grant financial autonomy to the EU, has decreased continuously, reaching 16.6% in 2022. Current own resources (except for the plastic-based own resource) are not mainly guided by important EU strategies and goals (Schratzenstaller et al., 2022). The continuous decrease in the share of traditional, genuine own resources implies a low and decreasing financial autonomy for the EU. The fact that currently EU expenditures are mainly financed through Member States contributions reinforces even further the *juste retour* logic and concentrates Member States in thinking about their net positions rather than on EU value added (Bachtrögler et al., 2020). Given the increased needs to repay NGEU debt, the long-standing debate about reforming the financing sources of the EU budget has regained momentum (Schratzenstaller, 2023). In this sense, it will be beneficial to introduce further genuine own resources connected to EU policies with the potential to address long-term challenges the EU is facing, such as climate change (Fuest & Pisani-Ferry, 2020).

As part of the MFF mid-term review in June 2023, the European Commission proposed an adjusted basket of new own resources (European Commission, 2023a):

- an Emissions Trading System (ETS)-based own resource, consisting of 30% of auctioning revenues from the ETS and yielding EUR 7 billion per year as of 2024 and EUR 19 billion per year as of 2028;
- a Carbon Border Adjustment Mechanism (CBAM)-based own resource, based on 75% of revenues from the CBAM, from which a yearly amount of EUR 1.5 billion is expected as of 2028, and
- an own resource stemming from levying 0.5% on the gross operating profit of corporations, which should generate yearly revenues of EUR 16 billion.

Altogether, this adjusted first basket of new own resources was expected to yield EUR 23 billion annually if starting in 2024 and up to EUR 36.5 billion by 2028. No agreement has been reached yet in Council. For the reasons mentioned above, the implementation of innovative new own resources without further delay seems advisable.

For the purpose of an expanded EU budget, the ETS- and CBAM-based own resources proposed by the Commission will be viable options given that they relate to cross-border externalities and are directly linked to current EU policies (the European Green Deal) that would not exist without EU-wide coordination. Moreover, their introduction would not necessitate Treaty changes. It is however also important to note that such own resources will not suffice in the longer run for the permanent provision of an increased level of pan-European public goods and an expanded EU budget, as they are incentive-based and aim at achieving a specific goal, namely the reduction of carbon emissions. As soon as the goal is achieved, these new own resources will not be useful anymore as revenue raising instruments. The EU should therefore also consider, as stipulated in the IIA, further new own resources, which are more permanent in nature for the long-run.

Importantly, if Europe were to finance and provide public goods that were previously provided nationally – in a decentralised and often insufficiently coordinated manner – then there would be reduced financing needs at the national level. If central, joint provision leads to economies of scale and other efficiency gains, then there would even be savings, with the same or even better quantity and quality of public goods. Therefore, the provision of pan-European goods through an expanded EU budget could thus imply decreased funding needs at Member States level. Joint provision could even lead to an expansion of total provision because decentralised provision does not take into account the benefits for other Member States. While such expansion may entail higher
financial costs, the overall benefit for EU citizens would increase even more. In the context of the EU budget, the question thus arises which tasks should be centrally assigned to the EU to achieve the above-mentioned stabilisation function, cost efficiency and possibly reductions in national funding requirements by providing pan-European public goods.

Finally, an expanded EU budget will necessitate political choices on its exact size and on the sources of its funding between higher contributions from Member States in the form of the existing own resources, new own resources and possibly debt financing. This will require an enhanced role in the decision-making process to ensure that funds are directed to priorities shared by European citizens and that citizens feel represented in this process. According to Eurobarometer data, a majority of European citizens in most countries would like to see the European Parliament play a bigger role in the EU (Figure 5). The increased involvement of the European Parliament would be best achieved if it could have full co-decision power on the spending priorities of the new expanded EU budget. This could be embedded in taking decisions on the exact structure and implementation of pan-European public goods we discuss further below – e.g. the exact characteristics of pan-European infrastructure projects or priorities in terms of research & development by setting EU research “missions”\(^\text{20}\). The increased role of the European Parliament in the decision-making on the EU budget could create a truly European debate on what the EU should provide that is currently missing. The European Parliament is the right decision-making body for this. Especially if debts are to be incurred at the EU level, an increased involvement of the European Parliament will be required. If genuine pan-European public goods are provided at the EU level, they therefore would be funded by a combination by new own resources that are related to EU policies or based on new taxes implemented at Member State level and by joint debt. As they are to be implemented due to efficiency gains and coordination issues centrally through different EU-level institutions (see e.g., our proposal for a European Infrastructure Agency below), they will require a democratically elected EU body to debate and take decisions on them. While the priorities on public goods funded by an expanded EU budget should be decided by the European Parliament, this should be done in a manner that ensures they finance only public investments. The funding should therefore be protected for investment purposes and should not be available to finance consumption expenditures by central institutions or national governments.

\(^{20}\) Along the line of the current EU Missions embedded in Horizon Europe.
Figure 5: Attitudes towards the role of the European Parliament

Question: Would you personally like to see the European Parliament play a more important or less important role?

Source: Eurobarometer, European Union (2023b).

3. PAN-EUROPEAN PUBLIC GOODS WITH EU VALUE ADDED

The resilience of the EU economy and the legitimacy and acceptance of the EU can be enhanced through the provision of pan-European public goods (Felbermayr, 2024). The provision of these specific public goods should be expanded as they can contribute to EU growth, a stronger competitive advantage in selected areas and would strengthen the EU’s broader geopolitical position. This can also help overcome the long-standing juste retour debate on net contributors and net receivers from the EU budget. If the EU budget primarily serves the purpose of redistributing funds, this will always be a contentious political topic. Net-contributing countries tend to complain about paying too much, while net-receiving countries feel potentially financially underserved. To avoid this dilemma, the EU should not use its expanded budget to implement automatic stabilisation just purely as a form of transferring funds as financial flows between central and national budgets for consumption or compensation purposes, but rather use the funds to finance the provision of common public goods in the forms of pan-European investments.

We discuss three avenues for an expansion of the provision of pan-European public goods – infrastructure, defence and security, and research and innovation. We discuss the increased provision of such goods at the EU level, but also different concrete steps for the implementation and institutional arrangement for providing them. While this should have already been achieved as part of the Single Market, in specific areas the Single Market still needs improvements. In a recent study, Santamaría et al. (2021) concluded that: “Europe is far from having a single market”. The incompleteness

21 Buti et al. (2023) propose an EU permanent fiscal capacity to provide common financing for European public goods and propose an operational definition of what are European public goods (EPGs).
of the internal market can be identified in observable trade flows, for example, by empirically measuring the trade-restrictive effect of European internal borders, as reported by Santamaría et al. (2021). The trade in goods between two comparable regions located equidistantly but in two different Member States averages only 17.5% of the value measured for regions within the same Member State. By comparison, the state border effect in the US is much smaller. It is questionable whether the EU would ever be able to achieve the benchmark of an internal market such as the US, given the EU has a higher cultural and linguistic diversity, which partly dampens trade.

A large, deeply integrated, dynamic Single Market in itself contributes to increasing resilience to unexpected current risks. The Single Market in itself is a public good enabling the EU growth model, which through different regulatory frameworks and institutions overseeing them enables the free movement of goods, services, capital, and labour across Member States, promoting economic growth. Felbermayr et al. (2022) show how different EU integration steps have contributed to economic gains in the EU and for Member States and quantify that the Single Market has been the biggest contributor for welfare gains.

There is therefore still room for improvement to complete the EU Single Market. We perceive part of this improvement can be through the closer integration and provision of pan-European public goods especially in the area of infrastructure and the research and innovation ecosystem. We therefore assess the provision of pan-European public goods as complementary and supporting the further integration in these mentioned sectors. Recently, the Letta Report (Letta 2024) recommended in a similar manner that strategic sectors, such as energy and defence, which at the creation of the Single Market were deemed too strategic to be integrated beyond the national level, should be provided more at the EU level. The Letta Report similarly posits that the EU should play a stronger role in providing and integrating research and development. Similarly, Draghi (2024) discusses the need to pursue more EU-based defence system, integrated energy infrastructure and improvements to the EU research environment.

3.1. Infrastructure

The provision of pan-European infrastructure is central to ensuring the growth prospects of the EU for the 21st century. It would also strengthen the Single Market by furthering integration. To provide for such pan-European infrastructure we consider that at least 1% of EU GNI should be embedded in a future expanded EU budget. This could fund critical infrastructure networks in the areas of roads, railways, and energy infrastructure for electricity and gas pipelines. As discussed below, current assessments on the need to invest in energy and transport infrastructure to reach the goals of the European Green Deal already lead to public investment needs of at least that magnitude. In addition to ensuring security against external threats, the EU should not only coordinate but also plan, implement, and finance infrastructure for the internal market through a new European Infrastructure Agency described below. In what follows, we concentrate mainly on two main types of infrastructure investments – transport and energy.

Transport infrastructure is a classic example for a public good where coordination at the EU level is needed. On one hand, this encompasses standard infrastructure such as road networks, tunnels, and railroads, which need to be expanded substantially (particularly green transport infrastructure as the following estimates show) and requires constant maintenance and modernisation to deliver high quality service. Especially in the area of cross-border transport,
infrastructure can however often be underfinanced. This presents a classic problem in the provision of public goods and leads to fragmentation of the Single Market. For example, if one country expands its transport routes near the border, it is of little benefit if the other country does not also expand. The provision of railroads for high-speed trains is another case in point. States which are small in territory do not have the incentive to develop their own high-speed train networks if neighbouring countries do not follow the same policy.

**Several proposals of a big push into transport infrastructure in the EU have been developed throughout the years.** Holzner, Heimberger and Kochnev (2018)²³ propose the building of a European Silk Road connecting industrial centres in the EU west with the populous, but less developed regions in the east of the EU. The authors propose the construction of a state-of-the-art motorway and high-speed railway line with a string of logistics centres, seaports, river ports and airports with the goal of setting homogeneous European standards, as well as setting standards in e-mobility.

The necessity to build a European high-speed railway network has also been stressed by the recent Letta Report (2024). It makes the case for the establishment of a comprehensive, pan-European high-speed rail (HSR) network, seamlessly linking all EU capitals and major urban centres. Such a network will contribute to EU integration by improving the opportunities for EU travel and to the green transition.

The EU has decided on objectives for the promotion of train travel by 2030 and aims at achieving a higher share of rail transport. The Trans European Transport – Network regulation (TEN-T) defines the high priority rail infrastructure that needs to be developed by 2030 and can therefore be used to estimate the investment needs. These investment needs include the development of fast and long-distance rail transport with common European standards. However, to achieve these objectives requires more investments than is currently allocated to railway infrastructure in the EU. As part of the evaluation of investments needed to achieve the European Green Deal goals, the investment gap for trans-European railway infrastructure was estimated to be at around EUR 29 billion per year and therefore an increase in the public investment in this area will be needed to achieve the goal of decarbonised long-distance travel (Calipel et al., 2024). This is based on an estimated annual needed investment of EUR 47 billion up until 2030, 0.3% of EU GDP in 2022. Instead, in 2022 the investment were EUR 18 billion, a mere 39% of the needed investments. Although this represents the total investment gap evaluated, including both private and public investment, investment in railways is mainly implemented by the public sector, as railway infrastructure has public good properties. This is a classic example of a natural monopoly and is an indispensable element of a green and just transition strategy.

Recent shocks to the geopolitical order in addition highlight new areas of physical infrastructure with a public goods nature that would require increased attention. A good example are pipeline connections for the delivery and storage of gas and grid connections for the delivery of electricity. All of these are important since they can become the key source of power autonomy after specific shocks. Such projects, especially in the energy sector, also suffer from the challenge of insufficient investments in cross-border activities described above because of higher administrative and diplomatic burden on governments in comparison to purely national projects. Related to the above, joint strategic reserves of gas and certain critical raw materials could also be important. Such reserves, too, have the character of public goods, as their volatility-reducing and supply-securing effects have a beneficial impact on the entire European market. Joint orders present a form of coordination between Member States, which

²³ Conservative estimations by the authors suggest that the European Silk Road should increase economic growth by 3.5% on average and is expected to create around 2 million new jobs during its construction period of around 10 years.
can have the character of public goods themselves and can help overcome situations of market stress and competition between Member States as evidenced by the joint orders of vaccines throughout the pandemic.

**Given the current geopolitical environment, the break-down of supply chains due to different shocks such as the energy shock of 2022, and the broader uncertainty on a possible fragmentation of the global economy, adequate energy infrastructure has become a crucial prerequisite for the autonomy and resilience of the EU.** In the energy crisis of 2022 supply problems and high prices in the gas and electricity markets were exacerbated by insufficient transport capacities within the EU. This was the amplified due to the fact that the existing European electricity market design generates significant intra-European price differences. Tertre et al. (2023) show that differences in the electricity mix of each country can exacerbate already existing price differences in electricity markets in situations of shocks such as the one in 2022. Such shocks change the historical intra-EU price differences and, in some situations, increase them permanently, even after the end of the shock. Low electricity prices are a decisive factor for EU industrial competitiveness, especially for high-intensity industries, therefore they have an effect of long-term EU growth prospects. Such differences thus need then to be further addressed through integration, for which a reliable and efficient energy transport and storage infrastructure is necessary.

**Grid and storage infrastructure are essential in ensuring the functioning of the new European energy system built on renewables and a diversified supply of commodities.** Draghi (2024) identifies that energy grids and interconnections are examples where the lack of European coordination results in insufficient investment. As wind and solar power contribute to a growing part of the energy mix, the problem of their variability causes increasing concern due to periods of excess electricity and the need to transmit it through the grid and store it for a later use. In peak hours, users demand more electricity than producers can supply, and the stored power needs to be transmitted back. The need for storage facilities as a backbone of the green transition will increase massively as renewables are rolled out and the electricity system is decarbonised24. The EU has therefore set itself an electricity grid target to meet the increasing need for energy security and transport. Modernisation of the grid will become more relevant in the coming years, as around 40% of Europe’s grid is more than 40 years old according to the European Commission (2023b). The EU has decided on an interconnection target of at least 15% by 2030 to encourage Member States to ensure the efficient interconnection between their installed electricity production capacities.

**Cross-border energy infrastructure, combined with common and fit-for-purpose electricity market regulation, thus can contribute to lower energy costs, electricity prices and makes the EU resilient in the face of crisis, thereby playing the role of a public good.** In its assessment for the investment needs to achieve the 2040 EU Climate Law targets, the European Commission (2024a) considers that annual investments in power grids would need to be at least EUR 79 billion in the period 2031-2040. An assessment by the Institute for Climate Economics (Calipel et al., 2024) estimates the deficit in investments in the power grid at EUR 42 billion per year. This is based on one hand on the investment needs estimated to be around EUR 89 billion per year until 2030 and on the other hand on the current realised investments, which according to the EIB (2024) and IEA (2023) are at around EUR 47 billion annually.

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24 One type of such storage opportunities is pumped hydro storage plants, which act as ‘water batteries’. Pumped storage plants push water uphill during the day when power generation is abundant and then use it to generate electricity when demand is at its peak in the evening. Common EU funding seems a fitting source to provide funding for such infrastructure projects with a clear EU added value, such as a network of ‘water batteries’ and related transcontinental high voltage lines to make the energy and green transition function efficiently.
EU institutions should also plan for a common pan-European smart grid in the long-term. The EU smart grid will enable a genuine Single Market for electricity with the advantages mentioned above. It will also have important trade-offs. A common smart grid can be built to function extremely smoothly by providing reserve grid and network connections thereby minimising any risks of downtime if there is high risk aversion to network downtime. However this will also be very expensive and probably not very efficient as the reserve networks will be used only infrequently. Such trade-offs between security, efficiency and cost minimisation impose important political decisions such as whether to build the most secure possible, but very expensive grid, or a grid which suffers some downtime in very rare cases, but is much cheaper. This is where an enhanced role of the European Parliament as a decision-maker could be useful.

A well-developed and modern energy infrastructure is not only crucial for securing energy supplies as well as harmonised and resilient power markets contributing to stable electricity prices across the EU, but also for achieving the goals of the European Green Deal and ensuring the decarbonisation of EU economies. The legally binding target of net zero greenhouse gas emissions by 2050, stipulated in the European Climate Law in 2021 require massive public investments in the decarbonisation of the economies of the EU.

In 2024, the European Commission (2024b) assessed the total investment needs to achieve the EU climate target for 2040. The assessment considers three different scenarios, but each of them calculates annual energy system investment needs (excluding transport) of more than 3% of GDP for the period 2031-2050. This compares to the average energy system investments in 2011-2022, which equalled 1.5% of GDP. Estimations of the “green investment gap”, the additional spending needed to meet climate targets, have been revised in recent years, consistently upwards, reflecting rising climate ambitions. The Institute for Climate Economics (Calipel et al., 2024) provides estimates on the necessary investments to achieve EU targets in terms of climate change mitigation and provision of clean, affordable and secure energy by 2030 by tracking private and public investments in 22 sectors and comparing their levels in 2022 to the levels that are required to reach the 2030 targets. The authors estimate that there is an investment need in the EU of at least EUR 813 billion per year, or 5.1%, of EU GDP, while actual investments in 2022 were in the order of EUR 407 billion. This results in a climate investment deficit of EUR 406 billion per year (2.6% of EU GDP). Current investments would thus need to double.

The sheer size of this green investment gap implies that a significant part of the funding for the increased investment will have to come from the EU level and from Member States in addition to private investors (Claeys & Tagliapietra, 2020; European Commission, 2022a). Darvas and Wolff (2021) estimate that the public-private ratio of these investments should be between 1:4 to 1:5, which would mean the EU needs to aim for 0.5%-1% of EU GDP as green public investment (GPI) in the coming years. Delgado-Téllez et al. (2022) estimate 1%-1.8% of EU GDP for GPI yearly.

Since their inception, NGEU and the RRF in particular have filled an important part of this green investment gap. NRRPs have to comply with two general conditions – at least 20% of the investment funding should contribute to the digital transition and at least 37% of the investment funding should contribute to the green transition. The RRF thus serves the normative role to direct and protect investments to two of the main current priorities of the EU – achieving the twin green and digital

25 European Commission (2019) estimated the green investment gap to be at the amount of EUR 260 billion per year, before the EGD increased the 2030 emission reduction target from 40% to 55% compared to 1990 levels. To achieve the Green Deal goals, the European Commission (2021) doubled its estimates for the investment gap and evaluated it at EUR 520 billion per year for the current decade (3.7% of 2019 GDP). Out of these, an annual amount of EUR 390 billion is required for the decarbonisation of the economy and the energy sector and a further EUR 130 billion are required for other environmental objectives.
transitions. Current EU programs allocate approximately EUR 50 billion per year for the green transition, with the RRF contributing around EUR 30 billion annually as Figure 6 shows (Pisani-Ferry et al., 2023). After the start of the energy crisis in 2022, the creation of RePowerEU was not accompanied by a top-up of the current MFF2021-2027 and NGEU to address the challenges created with the start of the Russian war in Ukraine. It therefore did not constitute new, additional funding, but rather redeployed existing funds from the current MFF2021-2027 and NGEU towards new purposes from.

Despite being the largest source of grants for the green transition, the RRF is set to expire by end of 2026. EU institutions and policymakers will need to therefore identify new funding instruments to bridge the gap in funding for public investment in the green transition in the near future. Our proposal for an expanded EU budget, tailored for true pan-European public goods, is aimed exactly at ensuring the financing needs for such public investments, which will ensure the Green Deal goals, but also will provide infrastructure with European value added, expanding the potential for the EU economy to grow in line with the priorities of citizens through the active participation of the European Parliament in setting investment priorities.

**Figure 6:** EU climate grants: the sharp post-RRF decline

Summing up these different estimates shows us that our proposed 1% increase in infrastructure spending through the EU budget will be able to deliver a significant contribution to delivering on the above spending gaps. The current spending gaps reported for the modernisation of the power grid and railway transport to deliver high-speed rail are estimated at respectively EUR 42 billion and EUR 29 billion annually, amounting to around 0.45% of the 2022 EU GDP. Half of the increase of 1% in infrastructure spending can therefore fully cover these costs and enable the provisioning of energy and transport infrastructure fit for the ambitions of the Green Deal and ensuring connectedness in the EU. The other half of the increased spending in infrastructure should be used to launch new projects with the goal of partly covering the significant investment gaps to achieve the ambitions of the Green Deal. As the latest estimates of these gaps in green investments to reach the EU climate ambitions vary between 1.5% (European Commission, 2024b, annual energy investment needs excluding transport)
and 2.6% of GDP (Calipel et al., 2024), this will still not suffice fully and will necessarily require further crowding-in of additional private green investments, as expected.

Instead of expanding the EU budget to fund pan-European public, an alternative would be to design appropriate mechanisms that incentivise Member States to direct their national budgets towards providing the necessary investments. The recent reform of the Economic Governance Framework constitutes an important improvement in terms of enabling more public investments by exempting some expenditures from the monitoring of the implementation of national fiscal-structural plans. In the future therefore, the European Commission will exclude the spending on national co-financing of EU programmes when assessing whether Member States comply with the EU fiscal rules. Because of this change, national investments on the co-financing of EU programmes, which normally mirror EU priorities, will be protected from periods of fiscal adjustments. The decrease in public investments due to periods of decreased growth or government spending cuts, demonstrated in Figure 6, would thus be mitigated. By setting the priorities of EU programmes thus, e.g. for the Green Deal, the EU budget will also lead to an incentive for Member States to direct more funding to those areas. While this is a positive amendment to the EU budgetary framework, it is still questionable how much Member States will adjust their budgets to make use of this exemption. And furthermore, while this change will direct more national funding to the common priorities of the EU, one can expect that the funds will still be used for projects at the national level. The risk will persist that cross-border activities with true European value added will be neglected.

Yet, it is not only funding that is required to ensure the efficient provisioning of energy, and transport infrastructure for the 21st century. Coordination is needed to align national government incentives to achieve common projects, especially with a view on cross-border linkages. From a political economy perspective, national governments are likely to focus on the additional benefits accruing to their own voters rather than to foreign voters. This may lead to systematic underinvestment in border regions. Felbermayr and Tarasov (2022) show that cross-border investments are likely to be lower if governments internalise only the domestic advantages of such projects and demonstrate why it may be optimal for individual governments to underinvest and underprovide transport infrastructure when they make their transport planning and decisions in a non-cooperative way (vis-à-vis the other government)26. Using European data, the authors find that about one fifth of the border effects27 observed in standard models explaining patterns of intra-European trade are due to this non-cooperative decision-making mechanism. Furthermore, big infrastructure cross-border activities tend to face more hurdles as they require the coordination of regulation and permits across two or more Member States with the implied extra administrative burden. Given all of this, governments may often find it easier to focus on infrastructure projects limited to their own territory. This leads to underdevelopment and under-provision of cross-country infrastructure that is central for the EU to be able to benefit from its economies of scale and scope. At the same time, this might mean a concentration of investment activity in the inner regions of countries.

To coordinate these processes and common decision-making, a European Infrastructure Agency should be created. The goal of the Agency will be to evaluate and help steer cross-border activities in relation to infrastructure investments. Currently, infrastructure projects financed with European funding are managed, designed and implemented by Member States. The creation of a European Infrastructure Agency will enable a more active role in the planning of such investments and thereby could contribute to higher efficiency in cross-border projects. The co-financing (or full funding) of

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26 E.g., when governments only take into account the benefits and welfare accruing only to their own citizens.

27 Decreases in the amount of investments across borders in comparison to investments inside of a single country.
infrastructure projects in Member States by European funding could then also imply some form of co-ownership of these projects at the EU level by the managing body – the European Infrastructure Agency.

To be effective the European Infrastructure Agency would need to be built on three important pillars. First of all, it would need to have its own financial resource to be invested in cross-border infrastructure projects. Member States can top up this budget, but to ensure incentives for participation in these projects, the main part of the funding should be provided by the Agency. Second, the Agency should also have operational independence to plan the necessary investment infrastructure with a view of optimising pan-European infrastructure, but taking into account national specifics. Third, the Agency also should have a mandate to publicly communicate the possible benefits of EU wide integration. As an example, it will have the duty to calculate and inform the public on the possible benefits of a high-speed railway network in terms of time gains, efficiency gains and possible reductions in carbon emissions. Thus it will ensure that European citizens are well informed on the gains possible from such coordination. This will be a counterpart to the International Energy Agency (IEA), which serves in a similar role for its members worldwide.

NGEU and the NRRPs provided an opportunity to perform soft coordination of infrastructure and especially energy and transport infrastructure in Member States without such an additional agency. However, the NRRPs included only soft recommendations instead of hard conditions for Member States to coordinate cross-country activities in infrastructure. Some Member States included such activities in their NRRPs, but for most Member States, the necessity to react fast in planning and submitting their national RRPs and use them as a macroeconomic investment tool against the recession induced by the pandemic left the more burdensome cross-border investments out of the scope of their plans. RePowerEU introduced in 2023 a much stricter requirement that 30% of investments should be related to cross-border activities. As RePowerEU is mainly focused on energy projects to make Europe more autonomous from foreign energy supplies, it should enable Member States to pursue common projects in terms of grid, storage and other infrastructure. Two concerns are however warranted. Firstly, Member States already face difficulties in administering and managing the programmes under NGEU and some delays in the disbursement of their payment requests under the RRF (European Commission, 2024c). Cross-border activities are typically linked to even higher administrative hurdles and would therefore run the risks of significant delays and challenges to finalising the projects under the relatively tight frame. Secondly, it could be argued that in evaluating which activities qualify as cross-border, the European Commission used a very wide definition including many activities which in a narrow sense are not cross-border (European Parliament, 2023).

3.2. Defence

The EU already cooperates on security and defence matters, contributing to regional stability. However, the heightened geopolitical tension since the start of the war in the Ukraine has highlighted the need for increased EU-level defence and security capabilities, as well as common border forces and border protection. Traditionally, this was an area where decisions have been left mostly at the national level and the EU has allocated a relatively minor part of its budget in this priority – for the MFF 2021 – 2027 the combined commitments on Security and Defence and Migration and Border Management are respectively EUR 14.5 billion and EUR 24.7 billion, making up a mere 3.6% of the EU budget altogether. The ongoing change to the international security environment requires a new, comprehensive approach to achieving consistent and continued provisioning of EU-wide security and

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28 In 2018 prices, see Council of the European Union (2024).
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defence. The changed security landscape must be addressed with new defence capabilities, which would require considerable private and public financial resources.

Numerous analyses have pointed out to the problem of EU defence underspending and the accumulation of gaps in the EU military inventories, as well as insufficient industrial production capacities (Koenig et al., 2023). The Joint Communication on EU defence spending gaps, issued after the Meeting of EU Heads of State in Versailles on 11 March 2022, concludes that “persistent underspending and lack of cooperation have resulted in critical defence capability shortfalls, particularly at the higher end of the spectrum, across domains, as well as in the fragmentation of the related industry in Europe” (European Commission, 2022b). It also warns on the necessity to overcome past mistakes leading to inefficiencies, duplications and dependencies. The Joint Communication lists as first priorities the replenishment of stockpiles, replacing Soviet-made equipment with more modern European solutions, and strengthening EU states’ multilayer air and missile defence systems. Medium- to long-term priorities include the air domain e.g. by developing the “Eurodrone” (MALE RPAS) and procuring counter-drone capabilities, and a land domain by expanding the existing inventory of main battle tanks and armoured fighting vehicles. Furthermore, for the maritime domain, the priorities include procuring high-end inter-connected ships; for the space domain enabling space-based assets and for the cyber domain working toward a full-spectrum cyber-defence capability.

From the start of the Russian war in Ukraine until mid-2023, EU Member States have made pledges to increase their annual defence expenditure by 61% by 2028, or EUR 400 billion in real terms, which equals around 2.6% of the EU’s GDP (Koenig et al., 2023). As the Munich Security Report on European Defence 2023 concludes, a significant part of this extra spending will have to be used however to close capability gaps due to years of underinvestment, e.g. in air-to-air refuelling, long-distance air lift and, more broadly, in different equipment categories. Exact costing of the funding requirements to achieve the above short-, medium- and long-term priorities are however not publicly available – they require both hard and reliable military assessment, while the prices of such goods, equipment and defence systems can be high and very volatile. As a general conclusion however, at the current pledges for increased national spending on defence, the EU will continue to be on track to have a spending gap relative to the US of 1.3 percentage points by 2028 (Koenig et al., 2023). This points once more to the need to increase such spending, while efficiency and coordination gains point towards the need to do so at the EU level.

In March 2024, the European Commission presented a new European Defence Industrial Strategy (EDIS) with the goal to secure “EU readiness through a responsive and resilient European defence industry”. The strategy analyses the current situation in the EU defence industry, including SMEs working in the sector with the goal of boosting the sector to provide a higher-level of EU defence readiness in the future and to provide immediate defence deliveries to Ukraine. The strategy identifies specifics goals to increase the provision of EU defence capabilities by strengthening the EU defence industry. The main points in the strategy revolve around:

- strengthening the EU defence production capacity (by ensuring that by 2030 at least 50 percent of EU countries’ defence procurement comes from the European Defence Technology Industrial Base (EDTIB));
- increasing the share of common EU defence procurement (to at least 40%);

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29 Decisions in that direction have already been taken and embedded in the Versailles and Granada Declaration and the European Economy Security Strategy by the European Commission.
increasing the value of intra-EU defence trade to 35% of the value of the EU defence market by 2030.

**To do so, the Strategy has two main approaches – reduce fragmentation in the market for defence and reduce the import share.** The first approach is welcome and could be interpreted in the same way as enhancing and making use of the Single Market more broadly, but in the area of defence. The second point is more subtle and deserves scrutiny however. As pointed out by Wolff (2024a), the Strategy sets bindings targets for domestic production of defence equipment. This might on one hand mean that targeted measures to increase the domestic production of arms and ammunitions might lead to inefficient subsidies. What is more, it could mean an increase in the overall price, as cheaper foreign imports get substituted for more expensive domestic production, thereby resulting in lower quantities provided.

If EU Member States agreed to collectively organise their national defence, efficiency gains, compatibility gains and savings at the national level could be realised. By aligning with NATO guidelines on military spending amounting to 2% of GDP, Member States can agree that half of this 2% should be provided by common defence at the EU level – the EU could itself therefore set a target for the future EU budget that 1% of EU GNI\(^\text{30}\) should be directed to defence and security spending. Member States would be able to achieve significant savings because duplications and inefficiencies caused by poorly coordinated national defence policies would come to an end. The harmonisation and coordination at the EU level would also bring efficiency for the defence industry, while the increased production would create jobs. It would decrease country-level requirements for defence spending in accordance with NATO targets and would therefore ensure savings for national budgets. Common EU spending could thus ensure higher efficiency for the same spending through economies of scale and compatibility gains— if Member States want to top that up with extra national spending, they would continue to able to do so. Furthermore, if secure external borders were seen as a common public good, the concrete benefit of the EU for citizens would also be better illustrated. It would be much easier to communicate how the EU defends against external security threats than to demonstrate its contribution to economic prosperity through the existence of the Single Market.

**An integrated approach to defence and security policy is also shared by a majority of EU citizens.** According to the Autumn 2023 Eurobarometer survey nearly 8 in 10 (77%) citizens remain in favour of a common defence and security policy among EU Member States (European Union, 2023d). Importantly this share has been very stable in the last 20 years. What is more, “[m]ost EU citizens agree that co-operation in defence matters at EU level should be increased (79%), and the purchase of military equipment by Member States should be better coordinated (77%)” (European Union, 2023d).

If the EU truly understands and funds the protection of common external borders as a collective responsibility, significant funds will flow from the countries in the centre of the continent to the periphery. There is a strong theoretical basis for such Union action as efforts to secure borders benefit border states and non-border states alike. This would effectively promote cohesion policy because peripheral areas are typically economically disadvantaged, and investments in securing external borders would have a significant impact in these regions. The EU could finance infrastructure and its maintenance and pay for personnel and equipment. This would channel money into structurally weak regions. Other economic sectors would also benefit from multiplier effects, from local construction to gastronomy. Because the intensity of border security must not depend on the economic cycle, while

\(^\text{30}\) Even though there are clear differences between the concepts of GDP and GNI, as an approximation we use them here interchangeably.
payments from states into the common budget are indeed cyclical, the communisation of border protection is also associated with the advantage of automatic stabilisation.

**Common defence expenditure will also bring operational and economic benefits.** In 2022 European countries, both EU and NATO Member States, spent a total of USD 350 billion on defence. A crucial improvement in terms of economic benefits can be common defence procurement. The current procurement model is fragmented and bureaucratic, which also makes it expensive (Wolff, 2024b). Common procurement would make European defence more efficient as the current model often leads to national weapon systems which are incompatible. Joint funding and provisioning will result in economies of scale through bigger orders. Common defence procurement can in itself be a type of industrial policy as it can trigger the development of advanced technologies and their diffusion into the broader economy. Higher coordination and more centralisation in the initial phase should drive efficiency gains.

To oversee the organisation and efficient implementation, a new Directorate-General for defence and a Commissioner for EU Defence should be created, as discussed by President von der Leyen in February 2024. This Commissioner will oversee organising and implementing joint procurement processes in terms of guaranteeing efficiency and cost decreases. Best practices were already gathered throughout the COVID-19 pandemic when Member States decided that the joint purchase of vaccines would have been more efficient and communicated that to the Commission. Subsequently, the Commission was entitled to allocate a budget and entrusted with procurement responsibilities, facilitating the swift acquisition of vaccines by the EU in significant quantities and ensuring equitable distribution. This approach bolstered the bloc’s leverage in terms of negotiating power and mitigated the risk of individual members acquiring vaccines at the expense of others.

**Current procurement rules and bureaucratic procedures can also mean that the EU is too slow to react to changing geopolitical circumstances**31. Public procurement rules existing from a different geopolitical environment therefore might impede the ability to react quicker and use considerable resources to achieve efficiency gains. Public procurement rules would therefore need more flexibility. These adjustments to existing procurement rules should include the possibility of fast-tracking the expansion on industrial sites and ensuring the priority of government contracts, as similar measures were already used in the pandemic in the case of procurement of healthcare related goods32.

**With the increase of spending on common defence and border control, the EU should not only focus on mass production, where it necessarily has a comparative advantage, but also on the development of high-tech military technology and equipment.** This could be ensured by committing a share of the increased defence spending to high-tech industries and R&D. For example, technologies to curb the carbon footprint of military operations without compromising the functionality of equipment are urgently needed. Furthermore, many ground-breaking, civilian dual-use technologies have been developed in the US during the Cold War by firstly testing them for military goals, as in the case of DARPA discussed below.

The increased funding, an enhanced organisational structure and more flexible procurement rules are the essential factors to develop further the European defence industry in the coming years. This will constitute the necessary amount of support from the EU budget, combined with a level playing field that does not erode market principles completely. Intervening more deeply in the

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31 As argued by Boone and Popescu (2024).
32 In the US under the US Defence Production Act.
3.3. Research and development

The EU already provides significant funding for research and development and education. In the current MFF 2021-2027, research spending in the EU amounts to around 7% of the total budget. Yet in relation to the EU economy’s size, that makes a mere 0.07% of the EU GNI. We consider a significant increase of up to 1% of the EU GNI to be warranted. Cutting-edge research is an area where European value added is evident. Yet, Europe is lagging in terms of innovation to the EU, as the recent European Innovation Scoreboard has highlighted once again. The EU should first and foremost help in establishing and further developing European top universities, e.g. through a European excellence initiative, and strengthen the European innovation ecosystem by focusing on cutting-edge. This would require considerable additional funding for education and research and innovation, as well as a well-functioning organisational framework.

The EU lags considerably in terms of total spending on R&D and education behind the US (Figure 7, left-hand side). As pointed by Fuest et al. (2024), around 90% of the current R&D expenditure in the EU comes from the national level rather than the EU. This calls for an increase at the EU level, where further gains from coordination can be explored, as discussed below. The difference between R&D spending between the US and the EU is driven mostly by the large spending difference in R&D from the private sector (Fuest et al., 2024). The reasons for this relate to a mixture of different factors. Importantly, firm demographics are different. As Schnabel (2024) points out, EU firms are less innovative, less productive, and older than firms in the US. Pinkus et al. (2024) decompose R&D spending in the US, China, the EU, Japan and the rest of the world using the 2,500 firms with the highest spending on R&D globally in 2022. They find that US firms significantly outspent all others in this sample with this being driven mostly by three sectors: IT, software, and pharma/biotech. This is however mainly because the US has much larger firms, which make considerable R&D spending, and which are especially big in scale in the technology sector. Europe does not have firms among the five biggest R&D spenders in the IT sector worldwide and this matters in an area where a few global superstar firms dominate. This is all the more an argument in favour of providing expanded R&D funding at the level where scale can be achieved, i.e. the EU level. This firm structure and the ensuing research funding landscape from the private sector is unlikely to change in the short run. Mobilising more private capital for R&D spending in the EU will be the first outcome, yet it is unlikely given the firm structure and therefore will continue resulting in failing to close the innovation and research and development gap with the US.

We see therefore an increase in the R&D and education expenditure in the EU budget and changes to the way funding is organised as a way to overcome this gap. We discuss two main points, first establishing an EU excellence initiative to help turning some EU universities into global leaders, and strengthen the European innovation ecosystem by focusing on cutting-edge research. We know from the empirical literature that such institutions attract research-intensive firms as well as talented staff and students, and they are much more prolific with regard to the creation of spin-offs. Second, we propose changes to EU research funding programmes, both with respect to the amount of funding and to the way funding is allocated, by using DARPA-style organisational structures.

Comparing university spending and their performance shows a somewhat similar difference between universities in the EU and the rest of the world. Janger (2024) discusses the relationship between spending and university output performance by comparing spending per student in real terms throughout different universities in Europe (Figure 7, right-hand side). Most of the top 50
universities in Europe are based in the UK, Switzerland and the Netherlands. The most prominent UK universities - Oxford and Cambridge - spend five to six times more per student than the leading comprehensive universities in continental EU countries, after adjustments for national prices (Janger, 2024). Europe’s 50 leading universities, measured by the share of highly cited articles among their total output, spend on average about 3.5 times more per student than universities outside of the top 100. The Swiss federal technological universities ETH Zurich and EPF Lausanne spend about three times more than the leading technological universities in Germany and Austria such as the technical universities of Munich and Vienna. As an example, to match the spending of ETH Zurich per student, TU Vienna would need to increase its annual spending almost threefold from close to EUR 400 million to more than EUR 1.1 billion.

**Figure 7:** Expenditure on R&D and world rankings of universities per country

![Expenditure on R&D and world rankings of universities per country](chart.png)

Note: Left: R&D as a % of GDP, 2000-2021, selected countries; Right: Number of universities per 10 million population in the global top 100 (share of top-cited articles) (right).

Source: Janger (2024, fig. 5, fig 6.).

**These are very large differences in the funding landscape.** To put them into perspective, the European Universities Initiative currently provides EUR 2 million of funding each year to each multi-institution alliance in the scheme. Germany’s flagship national excellence initiative provides EUR 10 million to EUR 15 million to each chosen university per year. Given the amounts mentioned above, initiatives based on excellence with the goal to enable EU institutions a research environment comparable to the top US, UK or Swiss universities would need to concentrate funding on a small number of institutions.

**We see therefore an increase in the R&D and education expenditure in the EU budget as a way to overcome this gap.** It is however a necessary, but not a sufficient condition to strengthen further research excellence in Europe and ensure cutting-edge research. The organisational structure of top EU universities matters greatly as well, with factors such as the design of career paths, recruitment
practices and the organisation of research and teaching, including doctoral training, having a very high importance (Janger, 2024). This would include small operational steps such as allowing or expanding teaching in English, as well as longer-term career re-organisation, including early independence, tenure conditional solely on performance and working with strong peers. This should serve up as a blueprint for a good research environment, drawing on best practice and existing knowledge to inform an EU-level excellence initiative. To add real value to European research, the EU would then provide large funding amounts to a small number of institutions which commit to structural reforms to optimise the conditions and environment for knowledge and innovation production. This is unlikely to work with project-based funding though, it needs rather EU-level institutional base funding, which would be a real innovation in the EU’s research programmes. Top European universities therefore require central and stable funding, more coordination and an international appeal. Existing national structures can be integrated into this framework. It is of paramount importance in the scientific community that research and teaching activities are marketed under one brand. International visibility is furthermore essential for attracting top researchers. These amendments can be seen as enhancing the demand on behalf of scientists to pursue a career at the research frontier in the EU.

EU research programs like Horizon 2020 and Horizon Europe fund collaborative research projects that benefit multiple countries. All Member States profit from these programmes, as they enable a cooperation between researchers from different Member States and different scientific traditions and thus enrich the scientific discovery process. The EU profits from this richness as it enables more depth in scientific talent and diversity of scientific ideas to be explored. In a globalised world with fierce scientific competition, the EU would need to expand even further on such programmes to ensure its leading role in scientific excellence and basic and fundamental research. The Letta Report (Letta, 2024) argues on the need to integrate and develop further the European landscape of research, development and education and enshrine it as a “fifth freedom” of the Single Market. This calls for the development of leading industrial ecosystems and a strong European technological infrastructure, enhancing the mobility of researchers and innovators, retaining top talents in Europe and achieving a competitive and dynamic European Research Area. The Commission (European Commission, 2024) recently also proposed a blueprint for a European degree, to be awarded jointly and on a voluntary basis by a group of universities across Europe. Such a European degree will offer the opportunity to study in different EU countries and combine offers from different universities in joint programmes, thereby contributing to producing highly skilled qualified graduates with a diverse educational experience. This new type of degree will provide an award after transnational Bachelor, Master, or Doctoral programmes. We pursue the same should be encouraged and further developed also for post-doc and early scientists, building on the positive experience from the Marie Skłodowska-Curie Actions. All of these measures can be seen as the supply side of providing opportunities for young scientists and top researchers to pursue a scientific career in Europe.

In this area, beyond more funding, better coordination and governance at the EU level should also be considered. The creation of the possibility to build European consortia under the model of Important Projects of Common European Interest (IPCEIs), introduced in 2018, was a milestone in this sense. IPCEIs provide the opportunity for Member States and private firms to engage in partnerships with other Member States and private firms with the goal to enhance value chains and technological development across sectors deemed as strategical33. These public-private partnerships are then evaluated by DG Competition to get approval to receive funding under the State aid regime. However, so far, all this funding has come from Member States and private sources. Different IPCEIs therefore

33 So far IPCEI partnerships have been initiated in the area of batteries, microelectronics, cloud computing and hydrogen.
include only the Member States that have decided to join them and private sector funding. This is a soft form of coordination of research spending at the EU level, which would need to be enhanced further.

**Top-down governance at the EU-level and a clear performance-based approach to research & development is therefore still missing in the EU.** This contributes to the insufficient performance in terms of the innovation and productivity gap between Europe and the US. What is more, the EU still lacks a sufficient focus on breakthrough research, as less than 5% of Horizon Europe today supports breakthrough innovation and innovative disruption (Fuest et al., 2024). Draghi (2024) also points to the inability of the EU to transfer its strong research into innovation in the market and upscale it.

The recent experience with the creation of the European Innovation Council (EIC) was aimed at addressing this issue, yet the EIC still lacks in two important avenues (Fuest et al., 2024). A big part of its spending is directed to SMEs, with ideas which are closer to market realisation and therefore do not constitute breakthrough innovation. Furthermore, EIC decisions are still influenced mainly by the European Commission. Fuest et al. (2024) propose that top scientists should be embedded more actively in the selection process of funding. Below we discuss different structures of funding decision-making in the US and compare the trade-offs. For the selection of individual projects, we see still a combination between a strong role of the institution granting the funding via an active role of programme managers and the fact that such programme managers should themselves be top scientists and recruited with significant academic credential. This is the organisational structure of the National Science Foundation, discussed below.

To overcome this lack of an institutional framework for directing research funding in innovative and state-of-the-art projects, Pinkus et al. (2024) discuss the idea to create an EU version of the US DARPA (Defence Advanced Research Projects Agency). This EU Advanced Research Projects Agency should be entitled with a significant budget and be able to manage a portfolio or projects with different forms of financing (loans, guarantees and equity) for innovative projects at the technological frontier. Importantly, the Agency needs to be entitled with operational independence, to be able to make the high-risk, high-reward funding decisions necessary to fund state-of-the-art innovations. In the case of DARPA, there is a portfolio of offices, managing a specific set of projects, and the portfolio is being updated throughout time, with some offices closing and others opening, to take into account the changing innovation and technological frontier. We view this question of the choice of offices as crucial – and needs to reflect both political priorities, as well as technological considerations.

To set research priorities and therefore the portfolio of offices, a coherent and comprehensive intervention framework, e.g. designed to actively nurture technological sovereignty in key enabling technologies, has been lacking so far in the EU and would need to be designed. Janger (2024) proposes a way to organise policies in three policy mix bundles given by the distance of the EU performance level to the global technological frontier. The bundling in the three policy bundles crucially should rely on the identification of key critical technologies based on transparent criteria by an independent expert panel. All Member States can benefit from the advantages of a large integrated market as is the EU for research and innovation – each individual Member State would be too small to

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34 Pinkus et al. (2024) propose a total budget of EUR 5 billion.

35 While the number of offices in the case of DARPA is relatively small, the number of projects they supervise is relatively high. This enables the offices, which have operational dependence, to pursue the ideas they consider economically and technologically viable in their priority area.
master all critical technologies. EU membership is the most effective way for any Member State to secure access to a wide range of critical technological know-how.

**Catching up in key critical technologies needs a focused, targeted and co-ordinated R&D effort.** Historical examples illustrate that countries such as the US or South Korea were originally behind the frontier but have managed to catch up using a variety of focused and co-ordinated approaches. This could serve as an example for the EU, but so far the EU has not adopted a clear catch-up mindset. Such a mindset would explicitly evaluate and acknowledge the gap to the frontier in critical technologies and would identify clear goals, instruments, coordinating agencies at the national and EU level with a direct aim to catch up. Performance lags in key technologies and the urgency of the geopolitical situation are factors which should drive the adoption of the most effective way for catching up to the frontier.

Even the largest individual EU countries face limitations in achieving technological sovereignty independently due to the dispersion of key research institutions and firms across the EU. In critical technologies of strategic importance, there is only a small number of relevant firms and research institutions (e.g., equipment makers for chip production such as the ASML in the Netherlands). In such cases, the provision of national funding programmes is inefficient if the goal is to catch up to the frontier, as the applicant pool will be too small. Therefore, in principle, all R&D and innovation support for critical technologies might need to be driven to the EU level. This clearly points to the necessity for substantially increasing funding at the EU level for R&D programmes, to help achieve and capitalise a larger and more comprehensive pool of pertinent research contributors. At the peak of the space race, when the US undertook a focused effort to overtake Russia in the wake of the Sputnik shock, NASA's budget was 0.7% of GDP, compared with 0.1% of GDP for the EU’s Horizon Europe programme (Janger, 2024).

**To achieve best performance, any future institution focused on top scientific outcomes, such as a possible European Advanced Research Projects Agency (ARPA), needs organisational flexibility to be able to recruit entrepreneurs in the area of venture capital, scientists and technical specialists to be able to evaluate properly different projects.** It will also require clear and quantifiable metrics to be able to evaluate its performance. Similar to our proposal above about a European Infrastructure Agency, such a European ARPA could contribute the missing pieces in the current provision of R&D as a public good, i.e. to implement stricter and more result-oriented coordination between Member States, going beyond simple common rules and funding frameworks, but also designing the EU innovation landscape and providing funding at the most appropriate level. Independent evaluation of the success of different targets will be necessary. Robust indicators and monitoring would need to be in place and should evaluate and measures both the factors of the research and innovation environment in Europe and the outcomes in terms of innovation output, research impact and economic returns.

**In terms of the organisational perspective, the EU would need to consider the different approaches used by different leading research funding institutions in the US.** Broadly, in the US there are three main sources for research funding: DARPA (USD 1.8 billion annual budget in 2022), National Institutes of Health (NIH) (USD 43.6 billion annual budget in 2022) and National Science Foundation (NSF) (USD 6.9 billion annual budget in 2022) (NSF, 2024). They have different frameworks for evaluation of funding proposals. The National Institutes of Health puts a bigger role of panels (so-called Study Groups) consisting of top scientists to evaluate projects, led by study group leaders. Programme managers from the NIH, who are representative of the institution itself, have a smaller role and oversee that there is no conflict of interest and how funding proposals top up to a maximum amount. The National Science Foundation, organised in directorates and divisions, has different
Programmes funding a portfolio of projects. Project evaluation decisions at the NSF are structured differently to the NIH. They constitute an anonymous panel at the first stage, evaluating project proposals, however the final decision is taken then by Programme Managers, who also have to take into account the balance of the portfolio in terms of exposure to different ideas, concentration of funding to specific states and other factors. The Programme Manager is employed at the NSF, but has high academic credentials, with the requirement that they are full tenure track professors.

**The role of the Programme Manager is therefore essential.** This is key to ensuring both academic understanding of the state-of-the-art research and innovation, but also independence from the scientific ecosystem. This could be important in setting decisions which are path-independent of the previous scientific history of the decision-maker and from the wider academic community – a problem, which can often occur if decisions are taken solely by top scientists from universities.

The National Science Foundation also has Lead Agency Agreements with research agencies across the world – such as with Switzerland, France and Germany – but does not have one with the EU as a whole, as it does not have a similar counterpart at the EU level, yet another example of the lacking organisational framework at the EU level to do pan-European research and development.

**Decisions for funding from DARPA on the other hand are more flexible, as they require higher risk and higher rewards.** DARPA funding is often secured for applied projects with a fundamental discovery element, such as the development of internet, GPS and other historical examples, which did not involve a clear-cut short-term economic return. Decisions to fund such project ideas are therefore also more flexible and undergo fast-tracking procedures when they involve a rapidly involving technology.

Finally, in the US case, the Congress can set priorities and decide on specific projects to be funded during the adoption of the annual NSF budget. A similar approach could be investigated and implemented for the EU by foreseeing that a part of the research funding at the EU level could be decided by a vote in the European Parliament. This would increase the role of the Parliament in affecting research outcomes and setting priorities for innovation and discovery in line with voters’ preferences. In the US, the NSF sits directly under the Office of Science and Technology Policy (OSTP) in the White House. The US President and the OSTP can therefore develop initiatives on specific priorities. A case in point was the Brain Initiative (Brain Research through Advancing Innovative Neurotechnologies), a public-private initiative announced by the Obama administration to understand the human brain. It was developed by the OSTP and included many governmental re-search organisations such as the NSF, DARPA, NIH, universities, and private organisations. The initial funding committed for 2014 by DARPA, NIH and NSF was approximately USD 100 million (The White House, 2013).

**Increased R&D expenditure should also be seen as a way for EU industry to ensure its position of a leader in state-of-the-art technologies and a more efficient way to fulfil the goals of industrial policy without engaging in a subsidies race in industrial production. Through increased funding for research and development, the EU should be able to deepen its knowledge on cutting-edge research also for the green transition.** The EU is currently leading the US, but trailing China in its market share of green technologies (Pinkus et al., 2024). A case in point can be made regarding subsidies for the sector of solar panel production. The European Net Zero Industry Act (NZIA) has proposed binding targets of 40% for the home production of green technologies, loosely following the example set by the US Inflation Reduction Act. In the solar sector, this should translate in a much higher percent of solar photovoltaics (PVs) produced in Europe in comparison to the current situation. It is questionable whether engaging in a subsidies race with China in this area would be economically
beneficial, however. McWilliams et al. (2024) discuss the current competitive position of the EU in terms of solar production vis-à-vis China and conclude that EU solar manufacturing subsidies will not be appropriate if we look at the current cost structure and performance of EU and Chinese manufacturers. Committing substantial public resources for subsidising and producing more solar PVs in Europe will not be efficient – it will lead to higher prices and therefore endangers slowing down the deployment of solar PVs and therefore achieving the targets of the Green Deal. The authors however conclude that European solar manufacturers have an advantage in terms of competitiveness in the most innovative solar systems. Any subsidies for manufacturing should therefore be directed only to innovative production, rather than producing at scale. This will ensure real economic benefits and true EU value added, in line with our previous discussion.

4. CONCLUSION

Geopolitical shocks make it urgent for the EU to consolidate and strengthen its own geopolitical position. The EU should more strongly focus on providing pan-European public goods. Such goods cannot be efficiently provided by Member States on their own to the same extent of efficiency. To deliver on this, the EU needs an expanded budget. We propose a future EU budget in the amount of 4% of the EU GNI. Traditional federal states or confederations have much bigger central budgets. Our more modest proposal reflects the European political realities. A budget of 4% of GNI is a very substantial step from the status quo, even including the NGJEU. This expanded budget will not only provide funding for specific goods with true EU value added, but it will also serve the additional purpose for the EU to have a more active role in automatic stabilisation of economic shocks, similarly to other common currency areas. We propose that this should also involve a more active role for the European Parliament.

In this paper, we discuss three main areas where we see an expanded provision of EU public goods as enhancing the resilience of the EU. New challenges of the 21st century and the goal of a geopolitically stronger role for the EU reveal new priorities for public goods to be provided by public investments and common funding by the EU. In an environment of more frequent external shocks, a wider set of public goods becomes not only beneficial, but necessary to ensure the stability and resilience of the EU economy.

The EU should place much stronger emphasis on issues that Member States cannot effectively address on their own and for which European citizens have a shared concern. This includes common defence and border protection, ensuring energy and transport infrastructure to ensure resilience to supply chain disruptions and boosting research and innovation policies to improve EU competitiveness and productivity. In terms of infrastructure, we focus on increased spending on transport and energy infrastructure as crucial for achieving the ambitions of the European Green Deal. To achieve effective coordination, this increased spending should be managed by a newly created European Infrastructure Agency, with its own budget, operational independence in planning of pan-European infrastructure and a mandate to publicly communicate the possible benefits from EU-wide integration e.g. in terms of time and efficiency gains and reductions in carbon emissions. In terms of the increased defence and border management spending, we argue that this will require an enhanced organisational structure at the European Commission, with the addition of a Directorate-General Defence, as well as improvements to public procurement rules to enable economic gains from joint orders. Finally, an increased R&D and education budget to help close the innovation gap will need to be accompanied by a strengthening of the European Excellence Initiative by focusing on developing further top European universities. Research & Development spending should be directed more to
breakthrough research, including via the establishment of an EU version of DARPA with the proper mechanisms to independently and efficiently choose breakthrough innovation.

In the provision of all of these pan-European public goods, we see an enhanced role for the European Parliament, e.g. to vote on the specific characteristics of pan-European public goods, which might impose trade-offs, and to choose on future EU missions, setting the priority areas for future research.

If the EU administers and finances those issues for which genuine European value added can be achieved, the economic utility for the Member States and their citizens increases. The EU becomes more worthwhile for them. Jacques Delors famously said “nobody falls in love with the Single Market”. The essence of this phrase echoes in the understanding that European citizens need the EU to deliver on things that matter directly to them and which they can see and feel. The public goods presented above are complementary to the four freedoms of the EU Single Market, but they will also make the importance of EU-wide interventions and the provision of collective goods more salient and clearer to European citizens. Moving beyond the Single Market as only a set of regulations and laws, the EU needs to develop further in the provision of goods and services that citizens cherish. Not only that, but the public goods identified above are also those crucial for a successful economic performance of the EU growth model in the 21st century.
REFERENCES


Pan-European Public Goods: Rationale, Financing and Governance


Amidst a changed global environment and with the goal to defend its geopolitical weight, the EU should provide public goods with EU value added, so that efficiency gains can be achieved at the EU level. We propose an expanded EU budget to serve the dual role of more automatic stabilisation and the provision of EU public goods, where the European Parliament should have an enhanced role in setting investment priorities. We discuss three such areas of investment priority – infrastructure, defence and security, as well as research and development.