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Capitalism, Sustainability and Democracy

Future-proofing the European model

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Preface

This publication brings together reflections from some twenty senior European scholars, backed up by Joint Research Centre (JRC) researchers, who contributed to JRC's working paper series *For a Fair, Innovative and Sustainable Economy*. The independent scholars supported the JRC during 2024 and 2025 to examine, each one from their specific perspectives and expertise, the various dimensions of a Fair and Sustainable Economy in Europe (FASE).

The approaches chosen are multidisciplinary in nature, based on academic dialogue between economists, geographers, psychologists, sociologists and political scientists; in short, they are pluralistic, and not all based on consensus. 'Reality' in the current geopolitical context is complex and fluid. Bauman aptly describes it as ´liquid modernity´ ([1]), often contradictory and uncertain, with consensus not necessarily constituting a strength.

In this synthesis report, the work has been framed using a Schumpeterian perspective, analysing tensions and synergies between capitalism, sustainability and democracy in today's Europe, while recognising the central role of technological change and innovation in the long-term economic development and structural transformation of society.([2]) We discuss under each section the main challenges the EU faces today.

Considering the current geopolitical situation, the perspective of 'security' as an additional cross-cutting policy dimension was added to each of the three sections. Many authors interpret this term in a broader sense than referring exclusively to the military or defence. This broader definition of security is, explicitly or implicitly, applied throughout the chapters, notably when it comes to reflections on the interplay between security and economic development.

The reflection is based on summaries by the individual scholars, derived from their full working papers produced for the Joint Research Centre in 2024 and 2025. The individual concept papers were proposed, discussed or reviewed among both the independent scholars and JRC researchers, and are all available as full working papers produced for the JRC. We are aware of the risk of misunderstandings when extracts of text are taken out of their context. Therefore, for a full understanding, we strongly advise complementing this report by reading the full concept papers of each scholar, as referred to in the first part of the Reference section of this publication. ([3])

The Editors

([1]) Bauman, 2000.

([2]) This report synthesizes the contributions by the individual experts in a new conceptual framework. In doing so, we as editors have taken liberties in the selection of reflections, ideas and even concrete proposals, building on extracts from individual concept papers. We, the editors, take full responsibility for our interpretations of the expert papers and the conclusions we draw.

([3]) An overview of all working papers in the JRC serie *For a Fair, Innovative and Sustainable Economy* is available at the beginning of the Reference section of this publication.

Abstract

Inspired by Schumpeter's seminal 1942 work C*apitalism, Socialism and Democracy*, this report identifies the triangular relationship between capitalism, sustainability and democracy as the fundamental dynamic that will decide Europe's future. Currently, tensions between these are undermining Europe's ability to benefit from the value-creating effects of capitalism, and they risk derailing Europe's sustainability efforts and destabilising democracy. However, we argue that Europe is potentially well suited to combine capitalism, sustainability and democracy in a synergistic and mutually reinforcing relationship, and thus to forge a new path for a prosperous, thriving and sustainable society. To succeed, Europe and the EU will need to become much more dynamic, agile and above all, effective, in responding to the geopolitical and economic challenges they are confronted with. This in turn requires far-reaching changes to how we govern, regulate and legislate, as well as to how we invest in future prosperity and well-being.

We hope our analysis provides a relevant complement to the 2024 Draghi report, by proposing how to strengthen competitiveness and innovation while driving sustainability and ensuring social cohesion. We argue that the EU's ability to help shape a new world order requires both agency (economic and technological clout) and a powerful narrative (offering something others aspire to and want to be part of). In a world increasingly characterised by growing nationalism, isolationism, and polarisation, the EU must reinvent itself if it wants to uphold democratic values and personal freedoms, drive sustainability, ensure its international competitiveness and prosperity and contribute to a rules-based global order.

Unless it shifts from a consumption-oriented and rent-seeking economy to an investment- and innovation-driven economy, the EU's social market model and democratic value base could drift into stagnation, divisions and political instability. But, with radical reforms, an inclusive narrative and the confidence to embrace change, the EU could find its own way, proving that capitalism, sustainability and democracy can reinforce each other. In preparing its future, the EU should now set the direction and truly deliver, through future-oriented infrastructure, smart public procurement and other demand-driven innovation, innovation-friendly regulations and integrated research and innovation systems by combining EU-strategic investment with bottom-up specialisation in regions and cities.

The analyses presented in this report call for a future-proofing of the **European model**. The EU policy debate needs a **broader conceptual framing**. A one-sided policy focus on competitiveness risks undermining the overall European project. Europe's DNA and future depend on a dynamic combination of capitalism, sustainability and democracy, where one dimension cannot be isolated from the other. Several concrete lines of action are proposed, addressing the current strains that capitalism, sustainability and democracy face. More broadly, the claim is made that the EU's current governance structure is not really fit for purpose. It lacks essential further integration elements, such as a European capital market, a European energy union or single regulatory regimes in areas of common strategic interest, as highlighted by Draghi and Letta among others. An excessive focus on process rather than outcome is preventing the EU from experimenting with new solutions and scaling those that work, from taking necessary but responsible risks, from tackling structural problems and from seizing opportunities when they present themselves.

Going forward, the central questions should be: at what level of governance are common challenges addressed most effectively? How can competences be allocated between EU Member States and the EU to ensure that the Union can effectively compete with China and the United States, respond to rapidly changing circumstances and defend itself while safeguarding functioning democracy and driving sustainability? How can unhelpful path dependencies be overcome more effectively? These questions become particularly relevant at a time when economic development, resilience and well-being on the one hand and security and defence on the other hand have become increasingly intertwined and co-dependent.

While the triangular relationship between capitalism, sustainability and democracy is fraught with tensions, it also brings opportunities. Europe – given its social model, integration project and normative power – could forge a path where capitalism is realigned with sustainability and democracy, provided the EU reforms governance, fosters innovation and renews solidarity. For the EU today, the lesson is that, unless it revitalises innovation and maintains social legitimacy, its social market model could drift into stagnation and political instability. But, with reforms, Europe could prove Schumpeter wrong by showing that capitalism, sustainability and democracy, the distinctive pillars of the European model, can reinforce each other to ensure prosperity, security and well-being.

Executive summary

The title of this report, *Capitalism, Sustainability and Democracy*, highlights three concepts and their interactions that define Europe and the European Union today. The first, capitalism, describes the economic system for financial value creation and development. The second, democracy, summarises the values on which the unique supranational integration project that is the EU was built, such as personal freedoms, the rule of law (accountability, checks and balances, protection from the state) and fairness. The third, sustainability, is a (relatively) new kid on the block, challenging the way capitalism and, to some extent, democracy in their current forms have led us down a global unsustainable development path, resulting in an existential climate crisis, the loss of biodiversity, polarisation and political discontent. This report calls for a fundamental rethink of how capitalism ([4]), sustainability and democracy could and should interact in Europe, and how this can pave a third way between China and the United States. To do so requires a rebooting of the EU: future-proofing the European model.

A changing global context

Since the finalisation of the report *For an innovative, sustainable and fair economy in Europe* ([5]), published in the aftermath of the Draghi report and just before the 2024 presidential elections in the United States, a new global economic and political context has emerged. While war on Europe's borders continues to incur immense human suffering and physical destruction, the political shifts following Donald Trump's return to power are eroding international rules-based institutions.

We are heading towards a multipolar world, dominated by the national interests of the United States on one side and China on the other. The EU needs to reinvent itself to remain an independent and relevant actor in this new global order, while being undermined from within, with political movements questioning its founding values and its capacity to deliver.

Furthermore, rapid technological advances (particularly AI) and the increasingly destructive impacts of climate change, challenge the EU as a supranational entity. How can the EU become more impactful, efficient and resilient, reaffirming its unique and distinctive global value proposition of capitalism, sustainability and democracy? As Mario Draghi put it: 'Models of political organisation, especially supranational ones, emerge at least in part to solve the problems of their own time. When those problems change to the point of making existing structures fragile and vulnerable, those structures must themselves change' ([6]). In short, Europe is increasingly struggling to uphold democratic values, drive sustainability and ensure its international competitiveness and prosperity in a polarised world.

([4]) For the sake of clarity, when we refer to capitalism in the text, we are referring to an economic system that strikes the right balance between the market and the state in mixed European economies, whereby, while recognising the evident benefits of the market mechanism and its decentralised system of price signals for economic efficiency, we are also very much aware of the limitations of pure or unfettered capitalism in terms of, for example, inequality, financial instability, oligopolistic trends and the neglect of economic externalities in the case of climate change, among others.

([5]) Schwaag Serger, Soete, and Stierna, et al., 2024.

([6]) Draghi, 2025.

A revised Schumpeterian framework: capitalism, sustainability and democracy

The title of this report paraphrases the title of Joseph Schumpeter's seminal work *Capitalism, Socialism and Democracy*, published in 1942 ([7]). At that time, Schumpeter warned that the very success of capitalism risked eroding its foundations, replacing transformative dynamism with bureaucratic and rigid systems. A similar comment could be made today with respect to capitalism in Europe, and in the EU in particular. The momentum of the European transformative integration process has been lost and appears increasingly to have become characterised by rules and regulations stifling any endogenous creative dynamism ([8]). Today, the challenge for the EU is twofold: on the one hand, reinstating entrepreneurial dynamism and creative destruction as drivers of economic renewal, competitiveness and growth; on the other hand, defending and strengthening Europe's social market model in a rapidly changing global economy and geopolitical landscape. Europe's social market economy (*die soziale Marktwirtschaft*) has tried since its conception to balance capitalism, social welfare and democracy, advocating a social market economy that relies on the market as a means, not as an end, for a fair society. This mirrors Schumpeter's idea of capitalism needing institutional scaffolding (welfare state, regulation, rights) to remain legitimate.

This is why a Schumpeterian perspective was chosen for the analysis that follows. In many ways, the figure of Joseph Schumpeter himself is illustrative of the dramatic changes Europe has undergone over the last 150 years. Today he would be a Czech citizen, yet at the time of his birth he was Moravian, part of a region of the then Austro-Hungarian Empire. He witnessed two world wars and the Great Depression and lived through a time of profound industrial and technological changes, reminiscent in speed and intensity to some of the challenges we are confronting today ([9]). Today, globalisation, deindustrialisation and digital monopolies have weakened the EU's industrial base without new companies and sectors rising to take their place – echoing Schumpeter's concern about capitalism's loss of entrepreneurial dynamism.

Moreover, social and territorial inequalities, combined with self-reinforcing perceptions, fuel political discontent, thus undermining democracy – just as Schumpeter predicted when capitalism fails to deliver widely shared benefits. At the same time, the new imperative of achieving sustainability by protecting biodiversity and decarbonising the economy is increasingly pitted against, and thus straining, both capitalism and democracy, raising questions about how long the balance of the EU's social model can hold. It follows that if, the EU cannot foster its own creative destruction, capitalism becomes defensive and over-regulated, and its legitimacy weakens – opening space for populism or more authoritarian, state-driven models, paralleling Schumpeter's warnings.

([7]) A comparison between present-day Europe and Schumpeter's seminal 1942 work *Capitalism, Socialism and Democracy* is made by Soete and Stierna 2023.

([8]) In this context it seems fitting that the 2025 Prize in Economic Sciences in Memory of Alfred Nobel went to Philippe Aghion and Peter Howitt for demonstrating the importance of creative destruction for sustained growth.

([9]) The turbulent times of Schumpeter inspired many intellectuals in the social sciences, including Max Weber, Georg Simmel, Émile Durkheim and Sigmund Freud. The dissemination of innovations in the late 19th and early 20th centuries deeply changed society, cities and ways of living. Schumpeter was in dialogue with these scholars, which is why his definition of innovation was broad. What is interesting epistemologically is that times of deep transformation inspire new thinkers, new ideas and collective creativity. Hopefully, that still holds true today.

For the EU today, the lesson is that unless it revitalises innovation and maintains social legitimacy – but also, as we argue, specifically reinvigorates its unique model of capitalism, sustainability and democracy – its social market model and democratic value base could drift into stagnation, divisions and political instability. But with more fundamental and radical reforms, the EU could find its own way, showing that capitalism, sustainability and democracy can reinforce each other.

A geopolitical trilateral framework with a central role for innovation

The Schumpeter-inspired trilateral framework of capitalism, sustainability and democracy captures the way in which Europe differentiates itself from the two other dominant geopolitical powers: China and the United States.

Capitalism in the United States at the expense of sustainability?

Today, US capitalism seems to be seeking to establish a new form of nationally based, high-tech monopoly capitalism at the expense of any long-term commitment to sustainability. The active support for the concentration of high-tech leadership in a handful of US-based companies enables these to extract monopoly rents from the rest of the world. At the same time, the government shields US industry from international competition through high import tariffs on other goods and services. This represents a new form of technology-powered mercantilist capitalism that runs counter to any belief in the global welfare gains of international trade and investment. The protectionist stance of the Trump administration also has an explicit social aim: to create new blue-collar employment opportunities through a reindustrialisation of the United States' old manufacturing base, which is seen to have been sacrificed through a decades-long overvaluation of the dollar as the world's reserve currency ([10]).. The central issue from the Schumpeterian trilateral perspective presented here will be whether democracy can survive in this new, technology-powered mercantilist capitalism.

Thus, the employment impact of advanced technology, specifically AI, is likely to significantly reduce the demand for not just routine but also many skilled jobs, while most of the remaining 'essential' jobs will be low paid, providing few new income opportunities ([11]). Not surprisingly, the discussion on future

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([10]) As was argued by Stephan Miran in November 2024 before the Trump administration took office, the United States faces a structural imbalance in its international trade because of the overvaluation of the dollar as the world's reserve currency. The latter will be reflected in an inelastic demand for US Treasury securities. 'As global GDP grows, it becomes increasingly burdensome for the United States to finance the provision of reserve assets and … the manufacturing and tradeable sectors bear the brunt of the costs' (Miran, 2024, p. 1). The United States, in Miran's words, is confronted with a 'Triffin world' in which its 'reserve assets are a form of global money supply, and demand for them a function of global trade and savings, not the domestic trade balance or return characteristics of the reserve nation … In exporting US Treasury securities (USTs) … America receives foreign currency, which is then spent, usually on imported goods. America runs large current account deficits not because it imports too much, but it imports too much because it must export USTs to provide reserve assets and facilitate global growth … Therefore, as the rest of the world grows, the consequences for the [United States'] own export sectors – an overvalued dollar incentivizing imports – become more difficult to bear, and the pain inflicted on that portion of the economy increases'. (Miran, 2024. P.6-7)

([11]) On a more positive note, it could be argued that such a new form of high-tech monopoly capitalism might evolve in what Harry Braverman (1920–1976) described in his classic book, *Labor and Monopoly Capital*, published in 1974, as one of unity between craft and science, thanks to the use of AI. To quote Braverman: 'My views about work are governed by nostalgia for an age that has yet to come into being, in which, for

US employment growth resulting from the society-wide diffusion of AI has emerged as a central policy concern.

Capitalism in China at the expense of democracy?

In contrast to the US government with its focus on 'America first', the current form of Chinese state capitalism is explicitly dependent on global trade and investment access to foreign markets to continue to reap the huge scale advantages of what ultimately might become 'dark factories' powered by robots and AI, leading to lower labour and energy costs, increased throughput and enhanced consistency through continuous, human-free operation. In contrast to the US administration's current policy stance, China's automated capitalism increasingly incorporates environmental sustainability objectives. Its high savings ratio provides the country with the financial means to carry out the necessary investments to achieve future sustainability targets. Furthermore, to the extent that many pollution and sustainability challenges are directly affecting Chinese citizens' welfare, there will be continuous pressure on the political establishment to adhere to long-term sustainability targets. More generally, it could be said that, given that technological directionality is fully embedded within its model of state capitalism, China is likely to be able to provide more effective systemic solutions to complex problems and security threats.

Democracy plays no role in this process. Internally, China's form of state capitalism depends both on high savings ratios and the continuous and active redistribution of the productivity gains from the introduction of new technologies in widely shared higher incomes and welfare benefits for the population at large. Externally, continuously increasing productivity and improving product quality in manufacturing and, more broadly, production depend on an open, international trade and investment model. It explains why China is keen on developing Global South trade and investment partnerships.

Capitalism in Europe: combining soft power with technological prowess?

European capitalism differs from the Chinese and US versions in that it represents a form of supranational capitalism forged through economic and monetary integration, combined with limited political integration. Currently, the EU is the most prominent example of integrated sovereign countries in the world, even though political integration is limited compared with the economic and monetary integration the EU has achieved. One of the main reasons why many of the remaining internal tariff barriers within the EU ([12]) are much higher than in China or the United States has to do with aspects of non-political integration in the various European treaties as they were approved or rejected over the last 80 years. Given the remaining significant internal tariff and non-tariff barriers, Enrico Letta's proposal for the 28th regime represents in many ways an illustration of how best to compensate for the lack of political integration.

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the worker, the craft satisfaction that arises from conscious and purposeful mastery of the labor process will be combined with the marvel of science and the ingenuity of engineering, an age in which everyone will be able to benefit, in some degree, from this combination' (1974, p. 5).

([12]) The International Monetary Fund estimates non-tariff barriers within the EU single market to equate to tariffs of around 44 % for goods and 110 % for services – three times higher than between states in the United States (Adilbish et al., 2025).

The core question is whether it will be possible to safeguard Europe's form of soft capitalism along these economic integration lines, considering the challenges of sustainability and democracy. The Draghi report, for example, focuses on the EU's growing innovation gap with both China and the United States; it proposes a new active industrial policy that (among other things) drives resilience and innovation, brings down energy costs and implements radical deregulation (including of the General Data Protection Regulation) and fast-tracks 28th regime regulatory approvals. More skeptical analyses of the EU point to the EU's lack of political power as intrinsic barrier to address effectively many of these issues. Of course, in many areas, the EU cannot be compared to a traditional "national state" never having developed its own European military capabilities([13]) but in many other areas the EU does operate as a supra-national state, which gives it legitimacy and also, increasingly, makes it stand out as a lighthouse of democracy, international cooperation and rule of law in an era of growing autocracy, isolationism and super power bullying. Examples include the EU's own internal Emission Trading System and external Carbon Border Adjustment Mechanism, passport-free travel across large parts of the EU, and its unique internal solidarity mechanism, so-called 'cohesion' policy with regional support policies based on the transfer of resources between member states.

A central challenge will be how to move the EU's integration model from a consumption-oriented, rent-seeking economy to an investment and innovation-boosting economy; in short, shifting spending from consumption to investment. The EU currently has an investment rate of approximately 22.5 % of GDP; in China, this figure is 40 %. In this sense the call made in the Draghi report for a massive increase in European investment is reminiscent of the old European Commission investment plan for Europe, known as the Juncker plan, aimed at unlocking both public and private investments during 2015–2017. However, whereas at the time of the Juncker plan few profitable projects could be identified offering sufficient European additionality, the current overflow of sustainability projects and needs, following the European Green Deal, offers major investment opportunities. The central question now will be how to channel savings to those projects ([14]).

Need for governance reform

The findings of our analysis call for a fundamental rethink of the European model, **a future-proofing of the European model**.

- The EU policy debate needs a **broader conceptual framing.** An exclusive policy focus on competitiveness risks undermining the overall European project. Europe is anchored in a unique but dynamic combination of capitalism, sustainability and democracy, where one dimension cannot be isolated from the other.

- We propose several **concrete lines of action** to address the current challenges to capitalism, sustainability and democracy in the EU. Most of our recommendations are complementary to the recent Letta and Draghi reports plus some of the other high-level independent reports, such as those by Heitor, Niinistö and Rodríguez-Posé. These did not receive as much policy attention, yet

([13]) See e.g. Auer, 2022.

([14]) Within this context, see also the attempt at measuring how much governments spend in their annual budgets on the future as opposed to the present or past (Bohne et al., 2025).

they provide – each in its respective area of research, security and cohesion – concrete and relevant policy proposals.

- The broader framework proposed here calls for reopening the public debate in Europe – including **revisiting the Lisbon Treaty** – on the structure, division of labour and organisation of Europe's current multilevel policy governance between the EU, EU Member States and regional authorities. The institutional complexities with respect to Europe's policy governance structure, enshrined in the treaty, have made the EU ill-equipped to handle the present and, more importantly, the future towards which we are headed, leading instead to the sort of over-regulation that the Draghi report described as 'gold-plating', but which could similarly be described as preventing any further full implementation of single market principles.

In terms of **concrete lines of action**, which could be implemented in the short term, we propose the following to take up the Chinese and US challenge:([15])

- **Position Europe in AI technology for society, industry and science.** Several Member States have launched large-scale national initiatives pertaining to AI technology and its industrial applications. The EU should welcome such initiatives and could act here as an honest broker in a pragmatic and outcome-oriented way, creating momentum for integrated initiatives based on a new 'coalition of the willing', searching for economies of scale and scope, diversification through experimentation and support for integrated new supply chains. Pooling resources can enable and encourage EU-based firms to develop AI products and services, while at the same time accelerating the widespread adoption and adaptation of AI in firms across the EU. In doing so, the EU should focus less on getting the right regulatory framework in place *ex ante* than on allowing experimentation and assessing the impact of the new digital innovations in *ex post* fashion. In parallel, the need for major productivity growth in public services, particularly relevant in the European context, offers major opportunities for new AI products and services focusing on government technology. Proactive policies will also be needed today to manage the major labour market disruptions likely to be triggered by AI not least for university-educated, early career workers.

- **Address the EU's innovation gap and science fragmentation.** Member States and the EU have committed themselves to significant investment in defence over the coming years. A substantial part of this investment should be allocated to science and technology development. The European system of civilian-only R & I should be reorganised to reap broader synergies with defence-oriented R & I, promoting dual-use opportunities, increasing the capacity of disruptive technology development and facilitating the emergence of new start-ups focusing on innovations. At the same time – and to strengthen the role of open, independent science in addressing global challenges – the EU should reinforce its science base by pooling national funds for breakthrough fundamental science, positioning itself as a global top science hub to attract international scientists, talent and firms, enhancing cooperation.

([15]) The wording is inspired by Jean-Jacques Servan-Schreiber's 1967 book, where he outlines the risk to Europe of becoming irrelevant in a global market dominated by US multinationals.

- **Connect industrial policy to territories for place-based economic rejuvenation.** The EU has large potential for productivity development in its diverse network of regions and territories. Therefore, it must connect its new industrial policy to bottom-up initiatives in regions, cities and rural communities with a view to increasing productivity in areas where Europe still leads, while incrementally transforming existing industries in all territories that adopt an outcome-oriented approach. Building on bottom-up creativity and endogenous capacities, with a strong focus on governance and institutional capacity building, the next generation of smart specialisation strategies will have to play a central role in Europe's realisation of productivity and competitive sustainability, with a renewal of European solidarity now also including security and the defence of its borders. The EU's diversity has real economic potential for reindustrialisation and productivity growth, if policies combine top-down and bottom-up approaches embracing experimentation and product differentiation, while strengthening local cultural identity.

- **Reap Europe's opportunity in competitive sustainability.** The US administration's current focus on fossil fuels and its partial withdrawal from renewable energy and broader sustainability aims provides a significant opportunity for European industry. The EU must match its strength in environmental technologies with demand for sustainable products and services, through lead markets, while ensuring that EU firms are not disadvantaged through unfair competition (e.g. from China). It should work with a range of policies – including resources, incentives, price mechanisms, regulations, capabilities and opportunities – to induce changes in business models, market signals and consumer preferences. EU investment in renewable energy production and integrated decentralised grids, combined with incentives for a circular economy and urban mining, has become an essential strategy for security and autonomy. The European Green Deal set the direction for connecting EU strategic investment better to bottom-up smart specialisations in regions, cities and rural communities. However, the costs and benefits of EU policy must be distributed proportionally across social groups and territories.

- **Unite and partner**. **F**irst, enlarging the single market should remain a top priority as argued in the Letta report. US and Chinese firms benefit from huge economies of scale and scope advantages in their domestic markets. By contrast, the EU market is still fragmented, on both the demand and supply sides. Enlarging the Single Market and further strengthening trade, science and innovation cooperation with relevant countries and regions in Europe and around the world will increase the competitiveness of European companies, boost economic growth and strengthen Europe's international leverage and agency. Second, the EU should encourage its member states, companies or other relevant actors to form 'coalitions of the willing' with partners that share the principles of a rule-based-order, respect territorial integrity and a sustainable development. Coalitions can also allow smaller countries and regions to act as 'speedboats' to team up and accelerate technological development, take the lead in developing innovation-friendly regulation and reform, and drive strategic investment partnerships (e.g. in defence, or in mining of critical minerals). ([16])

[16] See also Lausberg and Riekeles, 2025.

Reforms needed – reopening the European debate

The EU's current multilevel governance structure lacks essential further integration elements, such as a European capital market, a European energy union and single regulatory regimes in areas of common strategic interest, as highlighted by Draghi and Letta among others. The EU also needs simpler governance that constantly asks at what level of governance common challenges are most effectively addressed. How can 'subsidiarity' be reconciled with the current geopolitical context? How should competences be allocated between Member States and the EU to ensure that the Union can effectively compete with China and the United States, respond to rapidly changing circumstances and defend itself, while safeguarding a functioning democracy and driving sustainability? What should the minimum fiscal room for manoeuvre be for the EU as opposed to its Member States? Is there anything one can learn here from the United States or from other economic and political unions? And, more fundamentally, how to develop transnational European policy 'power' and strengthen collective decision making in areas which have traditionally been reserved to national policy making. A first, particularly relevant question in this context, is how to best combine bottom-up impetus and transformative power (place-based agency) with national and EU-level policies and actions. In short, as argued here, the EU's multilevel policy governance structure has often prevented the EU from taking swift, effective policy action and has made the EU particularly vulnerable to political turmoil. Hence the need for a fundamental reassessment of the EU's multilevel policy governance structure.

Over the last decades the EC has been successful in sometimes unexpected areas such as the Erasmus program generating widespread student mobility and in fundamental research with the European Research Council becoming the basis for intensive top-quality research collaboration between European researchers. As first step and as argued in the many contributions presented here: why not learn or even copy such successful stories to new transnational areas such as defence? This last question becomes particularly relevant at a time when economic development, resilience and well-being on the one hand, and security and defence on the other hand, have become increasingly intertwined and co-dependent.

Overall, Europe's, and the EU's, performance is better than often described. While, as highlighted in the Draghi report, average economic prosperity in the US is today significantly higher than in Europe([17]), the EU is more successful in distributing that prosperity and causing less damage to the environment. The inequality-adjusted Human Development Index (HDI) shows that the EU has been performing better than America since 2018([18]). As a result, it is not surprising that citizens across the EU benefit on average from a significantly higher average life expectancy.([19]) The environment-adjusted HDI also shows that the EU has been performing better than the United States since measurements began in 1990.

([17]) The American GDP per capita in PPP units was in 2023 over €54,000 compared to €37,000 in the EU (data: World Inequality Database); Americans are also on average almost €100,000 richer than Europeans, with average assets worth €320,000 in 2022, compared to €230,000 in Europe.

([18]) UNDP, 2024. *Income inequality* in the US reached an S80-S20 income share ratio of 8.9, with an EU value of 5.3.(JRC, 2026)

([19]) In 2022, *Life expectancy* in the EU stood at 80.5 years, while in the US it was just 78.0 years.(JRC, 2026)

In short, focusing on the interaction of capitalism with sustainability and democracy, this publication has a broader conceptual scope than Draghi and Letta. It highlights Europe’s distinctive combination of social market-based capitalism with sustainability and a well-functioning democracy, within the context of increasing geopolitical pressure on security. Europe’s key policy focus must be to ensure that these wellbeing achievements are not just a view of the rear-view mirror, that they don't become a thing of the past.

Maintaining and building on Europe's achievements in terms of economic and social development, equal opportunity, quality of life, environmental sustainability and attractiveness requires in our view also a willingness to embark upon far-reaching changes to how we govern, regulate and legislate. The goal must be to lay the foundation for economic development, while safeguarding social and environmental sustainability. That is why, we make the case here that broader and bolder reforms of EU’s governance are needed to assert and safeguard the EU’s global independence and unity.

While the triangular relationship between capitalism, sustainability and democracy is fraught with tensions, it also brings opportunities. Europe – given its social model, integration project and normative power – could forge a path where capitalism is realigned with sustainability and democracy, provided the EU reforms governance, fosters innovation and renews solidarity. For the EU today, the lesson is that, unless it revitalises innovation and maintains social legitimacy, its social market model could drift into stagnation and political instability. But, with reforms, Europe could prove Schumpeter wrong by showing that capitalism, sustainability and democracy can reinforce each other to ensure prosperity, security and well-being.

As Jean Monnet, one of the ‘founding fathers’ of the European Union famously phrased it:

> *People only accept change when they are faced with necessity and only recognize necessity when a crisis is upon them.*

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Overall introduction: Capitalism, Sustainability and Democracy

'For the times they are a-changin'' ([20])

The reflections included in this publication are elaborated from December 2023 to the autumn of 2025. This period is characterised by deep economic, social and political change, conflict and turmoil.

It was a period of military aggression just beyond the EU's eastern borders: in Ukraine, following Russia's invasion in 2022; and on the Mediterranean Sea border ([21]), following the physical and human destruction of Gaza by the Israeli army in retaliation for the Hamas attack on Israel on 7 October 2023.

It has also been a period of political upheaval, with the election of Donald Trump and the installation of a new US administration that gives exclusive priority to national interests and no longer appears interested in the principles of a rules-based world order rooted in international conventions and principles. These discarded conventions include the old free and fair trade principles, enshrined in the General Agreement on Tariffs and Trade ([22]), of non-discrimination undermining the 'most favoured nation' principle, fair treatment and reduction of trade barriers through negotiations; international legal institutions (such as the International Court of Justice or the International Criminal Court); and collective efforts to combat and mitigate climate change (such as the Paris Agreement). Thus, it is a move from a rules-based international order into a United States-first transactional paradigm, based on economic and defence muscle, as exemplified by the recent wave of US tariffs à la carte ([23]).

Finally, this is also a period of technological upheaval, with dramatic advances in the development and uptake of AI, and in particular generative AI (genAI). GenAI holds the promise of a paradigmatic change for innovation, productivity and societal transformation as a disruptive technology, owing to its capability of producing human-like content at an unprecedented scale. As such, it offers multiple opportunities for advancements across various sectors, including healthcare, education, science and the creative industries ([24]).

These fundamental shifts are occurring against the backdrop of an accelerating climate and biodiversity crisis, the disruptive effects of which are becoming more noticeable and impactful, contributing further to economic and political instability. Meanwhile, progress towards climate neutrality is slow and requires intensified efforts, with many trade-offs to be sorted out politically with the help of robust data and science ([25]).

([20]) Bob Dylan, 'The times they are a-changin', song, 1964.
([21]) Cyprus is only 400 km from Jerusalem.
([22]) The General Agreement on Tariffs and Trade was a foundational international treaty established in 1947 to promote freer and fairer trade among nations. Designed in the aftermath of the Second World War, the agreement played a central role in rebuilding the global economy by reducing tariffs, eliminating trade barriers and creating consistent rules for international commerce. It was succeeded in 1995 by the World Trade Organization. See https://www.wto.org/english/docs_e/legal_e/gatt47_e.htm.
([23]) Salotti et al., 2019.
([24]) Navajas Cawood et al., 2025.
([25]) Black et al., 2025.

Alongside these more radical changes, the period during which these papers were written saw many more regular changes of political power in Europe: for example, European elections with a new European Commission starting on 1 December 2024; a new government in Germany, leading the country in a new fiscal direction with respect to the public funding of defence; and the United Kingdom election outcome opening up new opportunities for closer collaboration with the EU following Brexit. At the same time, Eurosceptic parties and politicians are gaining influence, and countries such as France are struggling to combine necessary investments and reforms with growing budget deficits and fiscal responsibility.

The European project as a 'space of hope': combining soft power with technological prowess?

The developments described above have led, particularly in Europe, to ambitious new transnational or supernational initiatives and proposals for policy action, including, for example, a joint strategy for vaccination and a common debt to finance NextGenerationEU and recover from the pandemic ([26]), initiatives that would have been considered impossible just a few years earlier. At the same time, the EU, as a unique transnational union of countries, finds itself having to assert itself not just geopolitically vis-à-vis the two major powers China and the United States, but also in terms of defending a rules-based world order, international law and human rights, and its own social market economy model. Particularly with respect to the emerging, neo-nationalistic trend in the United States, this positions the EU, quite abruptly, together with several other Organisation for Economic Co-operation and Development (OECD) countries as a guardian of democratic global values and defender of the postcolonial rules-based world order. The EU has greatly benefited from this world order, and in it is attempting today to find ways to collectively address issues such as economic development and poverty alleviation, climate change and biodiversity, global health and disease prevention.

At the same time, several authoritative reports published in 2024 and 2025 point to significant European challenges, regarding Europe's economic fragmentation ([27]), lack of competitiveness ([28]), technological, innovative and scientific deficiencies ([29]), insufficient civil and military preparedness ([30]) and lack of territorial cohesion ([31]). These reports highlight the need for renewed, more radical reflections on the EU's policy governance.

Particularly with respect to EU's multilevel policy governance structure, it is high time to recognise the need for fundamental reforms, because of not only the many missing integration elements in the EU's institutional construction (e.g. a European capital market and a European energy union) or the need for simplification (e.g. the proposals for single regulatory regimes in areas of common strategic interest, including the 28th regime to facilitate economic regeneration through EU homegrown start-ups, as highlighted in both the Letta and Draghi reports) but also the lack of common purpose beyond economic integration and competitiveness. Thus, there is also a need to redefine the purpose or narrative of the European project for coming generations of Europeans.

([26]) Michels et al., 2025.
([27]) Letta, 2024.
([28]) Draghi, 2024.
([29]) European Commission: Directorate-General for Research and Innovation, Heitor et al., 2024.
([30]) Niinistö et al., 2024.
([31]) Rodríguez-Posé et al., 2024.

The limits of such European purpose were painfully exposed with the election and installation of the new Trump administration in the United States and the sudden politicisation, even weaponisation, of international trade and investment. As Mario Draghi put it in a speech at the Rimini conference 2025:

> *We had to resign ourselves to the tariffs imposed by our largest trading partner and long-standing ally, the United States. We were also pushed by that same ally to increase military spending – a decision we perhaps should have made anyway, though in forms and ways that would likely have reflected Europe's own interest more faithfully. Despite having provided the greatest financial contribution to the war in Ukraine, and despite having the greatest stake in a just peace, the European Union has so far played only a fairly marginal role in peace negotiations. Meanwhile, China has openly supported Russia's war effort while expanding its industrial capacity in order to flood Europe with excess production, now that access to the US market is constrained by new barriers imposed by Washington. European protests have had little effect: China has made it clear that it does not view Europe as an equal partner and uses its control over rare earths to make our dependency increasingly binding* ([32]).

In light of this situation and in light of the new position the EU finds itself in, we see a need for a more fundamental reform of the EU's multilevel policy governance structure not just from the perspective of economic strength, as argued in Draghi's competitiveness report, but also in collectively addressing with the rest of the world global issues such as climate change, biodiversity and health as well as the defence of democratic values.

Capitalism, sustainability and democracy: a Schumpeterian thought experiment

The title of this report paraphrases the title of Joseph Schumpeter's seminal work *Capitalism, Socialism and Democracy*, published in 1942. Schumpeter (1883–1950) spent most of his life in Europe and witnessed the devastating effects of the First World War, which led to the falling apart of empires in Europe. On a more personal level, he experienced the Great Depression and observed, like no other economic historian, the Industrial Revolution's impact on society. This was a period of dramatic change in which the long-lasting political, economic and social effects of the Industrial Revolution became visible, often in disruptive, sometimes destructive ways, including the Second World War, resulting in a complete transformation not only of countries' industrial systems but of their entire economic and social structures.

There are striking similarities between the era Schumpeter experienced and present times. As noted above, politically, rising geopolitical tensions reflect the emergence of a new multilateral political order, today one in which China and the United States compete for global strategic dominance and Europe finds itself confronted with a new multipolar world, while locked in a particularly complex governance structure.

Economically, increasingly experts recognise that unfettered capitalism has led to a global unsustainable development path resulting in out-of-control climate change, declining biodiversity and

([32]) Draghi, 2025.

rising inequality. And finally, now, as then, we face technological disruptions, as advancements in AI enable machine learning on a scale previously unknown to humanity.

However, we are not striving for a precise historical analogy with the period in which Joseph Schumpeter lived. Schumpeter detailed in his 1942 *magnus opus* the reasons why, in his view, capitalism in a democratic setting is ultimately unsustainable and socialism will triumph if technological change and creative destruction can be routinised ([33]). Instead, we apply the Schumpeterian approach to a new triangular relationship that, in our minds, captures the situation we find ourselves in today: namely, the relationship between capitalism, sustainability and democracy.

'Capitalism' can be considered, at least so far, as the most effective economic system for economic value creation and development. This explains why even socialist regimes, such as the China's, have today fully embraced capitalism. However, while capitalism might be an essential mechanism, it is not a guarantor of societal cohesion and political stability. When we refer to capitalism within the context of the European Union, we are referring to an economic system that strikes the right balance between the market and the state in mixed economies. This European vision of capitalism is anchored in the specific form of blending of liberal market forces, well-being and balanced state intervention partly institutionalised with the European Union. Competitiveness, openness and efficiency are vital for ensuring a functioning social market economy.

'Sustainability', on the other hand and as a new kid on the block ([34]), could be said to be compatible with capitalism if it succeeds in aligning demand and supply for solutions that ensure sustainable development, whereby externalities such as biodiversity, climate, natural resources are priced correctly (i.e. not discounted at the expense of the future of the planet and future generations).

([33]) In *Capitalism, Socialism and Democracy*, Schumpeter argued, tongue in cheek, that capitalism was not optimal in the long run and that democracy would turn to socialism, something which certainly in 1942 seemed perfectly feasible. He argued that, if innovation were routine and emerged from corporate research and development (R & D) labs financed with monopoly profits, there would be no reason not to switch to socialism and nationalise all production factors, because the monopoly profits motivating corporate R & D would no longer be necessary to reward engaging with the uncertainty inherent in innovation (Knight, 1921). Instead, a well-organised and democratically supervised bureaucracy could more efficiently provide innovation and production. Today one could argue that one is in the midst of this debate. On the one hand, the United States, as an example of unfettered capitalism, illustrates that innovation and entrepreneurship can never become routine, so capitalism will always be superior; whereas China shows that, in many areas, innovation and entrepreneurship can be controlled and routinised in society without losing their transformative and competitive edge. In this sense, Schumpeter's claim is, contrary to popular belief, still very much open to debate. Whereas most economists would consider the fall of the Soviet Union and the Warsaw pact evidence of the end of socialism whereby capitalism proved its superiority, the rapid growth of China and its emergence as a technological and innovative leader in many different areas illustrate the opposite.

([34]) Contrary to the Draghi report (2024), sustainability is a much broader concept than just the clean energy transition with its huge decarbonisation efforts. The transition of the energy system from being fossil-based to being renewables-based can in fact be envisioned as a cyclical part of the capitalist economy in a Schumpeterian conceptual frame. However, sustainability as a broader vision goes beyond economy to also include a value framework or an ethical intergenerational sense of responsibility. In this sense, we here follow the definition proposed in the Brundtland report, *Our Common Future*, proposed within the framework of the United Nations in 1987: sustainable development is development that 'meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Without price signals that reflect the cost of climate change, resource depletion or loss of biodiversity, capitalism becomes adversarial to sustainability by sending the wrong market signals ([35]).

'Democracy' has been Europe's most effective system for guaranteeing peace, personal freedoms and the rule of law (accountability, checks and balances, protection from the state) over the last 80 years and for ensuring that economic wealth is redistributed to maintain societal cohesion and political stability. As Mario Draghi put it:

> *The EU was created because in the first half of the 20th century the previous models of political organization – the nation states – had in many countries utterly failed to defend those values. Many democracies had abandoned every rule in favour of brute force, and Europe plunged into the Second World War. It was therefore almost natural for Europeans to develop a form of collective defence for democracy and peace. The European Union was an evolution that addressed the most urgent problem of that time: Europe's tendency to slide into conflict* ([36]).

'Security' is not part of the triangle as such but could be said to reflect the current political and social context in which the triangular tensions between capitalism, sustainability and democracy unfold. Throughout the analysis, and within all the authors' individual contributions, the concept of security is interpreted in a broad sense, which is not limited to defence or military considerations. An existential sense of security, a mobilisation of collective preparedness and a historic mobilisation of resources for defence across the EU are game changers that are likely to have an unforeseen transformative impact.

We argue that there has been a build-up of tensions, even incompatibilities, between these three paradigms, with each potentially undermining the other two. But we also argue that there are ways to resolve these tensions and that Europe could be uniquely positioned to point the way in ensuring that capitalism, sustainability and democracy can not only coexist but even reinforce each other.

A dynamic triangle

The three concepts of capitalism, sustainability and democracy provide a particularly useful analytical framework for this report, identifying three distinct forces that can either complement and reinforce or undermine each other, depending on how each of them is designed and how they interact with each other.

The first section of this report focuses on capitalism. The relationship between capitalism and democracy was highly successful for Europe. In the period after the Second World War, this relationship created prosperity, while ensuring societal cohesion and political stability. However, in recent decades, the relationship has become strained, and tensions are increasingly visible. Several of the scholars point to increasing inequality and polarisation across income groups and territories in

([35]) As Dominique Foray notes in his contribution, this might well involve the development of new economic and financial instruments: 'New economic instruments will be needed to measure the economic value of natural ecosystems' (social productivity and shadow prices – prices that cannot be observed on markets) and 'to finance the – non-cheap – passive investments such as the creation of protected areas' (new financial engineering instruments such as social impact bonds; Foray et al., 2025).

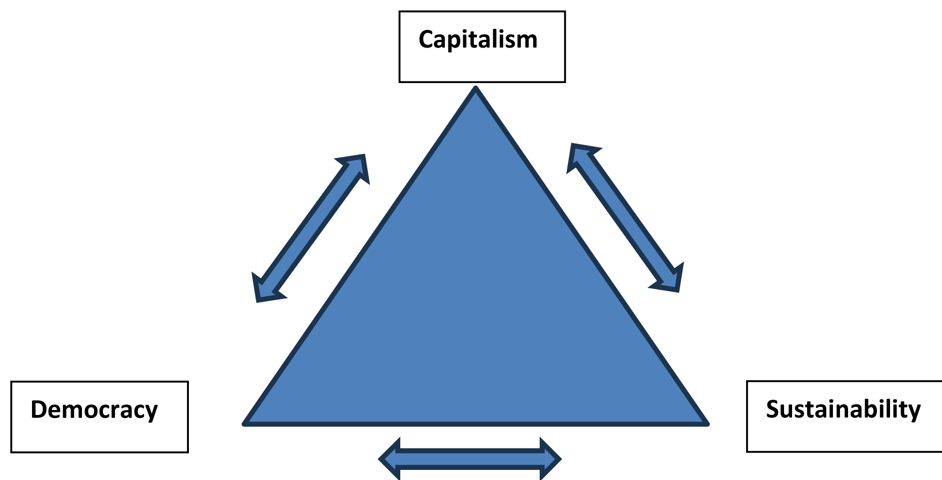
([36]) Draghi, 2025.

modern capitalistic societies as an important explanation for these tensions. Furthermore, the combination of capitalism and democracy has hitherto failed to find a way to include consideration for sustainability.

The second section examines the relationship between capitalism and sustainability. The structural challenge of respecting planetary boundaries has not been successfully resolved by the intrinsic mechanisms of capitalism, such as price signals or technological progress. In the short term there will be clear frictions linked also to public understanding and perceptions. Making fundamental changes to the economy in the name of sustainability requires public and political faith in science. Many of the benefits of sustainability are invisible and intangible to firms facing fierce global competition, to regions confronting economic decline and depopulation, or to ordinary citizens trying to make ends meet. Increasingly, challenges to capitalism are reflected only in competitiveness. However, in the long term, sustainability will be a fundamental precondition for both democracy and capitalism – the European Green Deal and the Inflation Reduction Act can be seen as visionary policy responses to this fact.

Finally, the third section focuses on democracy, including its tensions with sustainability. Democracy can promote sustainability, since it is a mechanism for holding decision-makers accountable for failure to ensure sustainability. But it can also work against sustainability, particularly when disinformation and populism campaign on the denial of sustainability challenges or on pitting sustainability against people's livelihoods. If democracy fails to ensure that the short-term costs of achieving sustainability are distributed fairly, sustainability will fail and democracy itself will come under pressure.

Figure 1: Triangular tensions of capitalism, sustainability and democracy



The triangular relationship illustrated in Figure 1 provides a simple framework for understanding the current systemic competition we find ourselves in. Thus, it could be said that the current US government prioritises capitalism and democracy, at the expense of sustainability; China is seeking to align capitalism with sustainability at the expense of democracy; and Europe has sought to achieve sustainability within its existing democratic system by tempering capitalism. Most of the remaining OECD countries currently lean either towards the US or the European approach.

Europe's social market economy (*die soziale Marktwirtschaft*) has in the past tried to balance capitalism, social welfare and democracy. It was this perspective that most closely mirrored Schumpeter's idea of capitalism needing institutional scaffolding (welfare state, regulation, rights) to remain legitimate. It explains our choice of a Schumpeterian perspective for the analysis in the next sections. Schumpeter offers a very European perspective from someone who lived at a time of profound changes and upheaval, similar in speed and intensity to some of the challenges Europe is confronted with today. Globalisation, deindustrialisation and digital monopolies combined with innovation-unfriendly regulation and bureaucracy, institutional and industrial stagnation and atrophy have weakened the EU's industrial base – echoing Schumpeter's concern about capitalism's loss of entrepreneurial dynamism. Social and territorial inequalities fuel political discontent, undermining democracy – just as Schumpeter predicted when capitalism fails to deliver widely shared benefits. Sustainability demands (the European Green Deal, decarbonisation) strain both capitalism and democracy, raising questions about how long the balance of the EU's social model can hold. It follows that, if Europe cannot foster its own creative destruction, capitalism becomes defensive and over-regulated, and legitimacy erodes – opening space for populism, Eurosceptic nationalism or more authoritarian, state-driven models paralleling Schumpeter's warnings.

The sections that follow try to understand how the EU could turn Schumpeter's paradox on its head by re-energising reformed capitalism with sustainability and democracy – embedding creative resource efficiency and place-based innovation (with its potential for product differentiation) into its social model, thus making capitalism resilient rather than self-undermining.

For the EU today, the lesson is that, unless it revitalises innovation and maintains social legitimacy, its social market model could drift into stagnation and political instability, while continuing to trespass planetary boundaries. But, with reforms, Europe could prove Schumpeter wrong by showing that capitalism, sustainability and democracy can reinforce each other.

Capitalism

Introduction: capitalism as changing post-war framing for the European integration project

In Europe and, more broadly, in the old, industrialised Organisation for Economic Co-operation and Development countries, the decades following the Second World War were characterised by rapid economic growth. These years are sometimes referred to as *les trente glorieuses* ([37]) and were a period of gradual convergence in production, distribution and consumption patterns on US levels, reflected in high gross domestic product and productivity growth rates. This was also a period of massive social, cultural and economic change. It led to many welfare benefits such as paid holidays, pensions and social security, which came to define the European social model.

From this perspective, it could be argued that the European integration project, particularly after decolonisation, fit well within what could be called a fruitful union of capitalism and democracy. This project, with its focus on reaping scale economies through an economically driven 'single market' process controlled by a strong European competition policy framework and with political power in the hands of nation states, all committed to human rights and a common European *acquis Communautaire,* brought together the values of capitalism and democracy. The end of the Cold War and the enlargement of the EU to 28 EU Member States appeared to confirm the fruitfulness of this union. Moreover, the union of capitalism and democracy also had effects in the social sphere. Trade unions were instrumental in guaranteeing a certain level of income equality and redistribution, while states were committed to full employment, universal access to education and public health.

There is a large body of literature on the reasons why this period of three 'glorious' decades came to an end. As Giovanni Dosi put it in a recent work: 'There are many convergent factors … However, in my view, the major one rests in the very nature of its previous success. Collective expectations rose more than proportionally with respect to the actual achievements, and social conflict intensified' ([38]). We return to the tensions between capitalism and democracy as they have emerged over the past few decades in more detail in the third section of this report in, among other contributions, the detailed analyses of Luis Ayala and Éloi Laurent on the foundations of the European welfare state. The emergence of global value chains that exploited more fully international cost differences in different phases of production – resulting in, among other things, the offshoring to low-cost regions of some of the most labour-intensive parts of production – has been insufficiently taken into account by policymakers and has ultimately further accentuated social divides. Mario Draghi described the period as follows:

> *The Union then evolved again in the postwar years, gradually adapting to the neoliberal phase between the 1980s and early 2000s. That period was characterized by faith in free trade and open markets, by a shared commitment to multilateral rules, and by a conscious reduction of state power, as states assigned tasks and autonomy to independent agencies. Europe*

([37]) A term first introduced by Jean Fourastié in his book *Les Trente Glorieuses* in 1979 (reedited 2004). The title of the book took its inspiration from *les trois glorieuses* – the three days of the July Revolution in France in 1830 – and refers to the approximately 30-year period between the end of the Second World War in 1945 and 1973.

([38]) Dosi, 2025.

prospered in that world: it transformed its common market into the single market, became a key player in the World Trade Organization, and created independent authorities for competition and monetary policy.

He concludes quite abruptly:

But that world has ended, and many of its features have been erased. Where once markets were relied upon to guide the economy, today there are sweeping industrial policies. Where once there was respect for rules, now there is the use of military force and economic power to protect national interests. Where once the state saw its powers shrink, today every instrument is employed in the name of state authority.

In this context and following the reasoning of Mr Draghi, let us first have a closer look at the role industrial policy played in European economic integration and could again play in the current context.

Industrial policies assisting deindustrialisation in Europe

In the early post-war period, with the creation of the first institutions that eventually led to the European Union, such as the European Coal and Steel Community, industrial policy became one of the cornerstones of economic policy in Europe, providing support for a more rapid structural transformation of European economies towards large industrial sectors and complexes that were internationally stronger.

In the late 1970s and early 1980s, the focus of European industrial policy gradually shifted from the old coal and steel mining sectors and more traditional labour-intensive sectors, which were suffering increasingly from growing international competition, to sunrise industries. The old narrative of a 'technology gap' with the United States remained, but this became focused on space, the rapidly growing information and communication technology sector and the expanding civil aviation market. While several large-scale 'strategic' intergovernmental projects were launched to create economies of scale and compensate for the lack of a common European market – including Airbus (1970) and the European Space Agency (1975) – most Member States opted for the defence of their national industries and their 'national champions', often state-owned companies. In 1984, inspired by Japan's successful technological catching-up policies, Etienne Davignon, the Commissioner of Industry in the European Community at the time, gathered Europe's largest IT firms together and invited them to cooperate in drawing up what would eventually be the first European 'framework programme', the European programme for research and development in information technologies (Esprit). It was oriented around five principal areas that were in pre-competitive research and development: advanced microelectronics, software technologies, advanced information processing, office systems and computer-integrated manufacture. In 1986, with the Single European Act amendments to the Treaty of Rome, this framework led to a list of European-Community-specific responsibilities for strengthening 'the scientific and technological basis of European industry', which were translated into a variety of new programmes (and new European acronyms!) describing various industrial policy

support measures, including subsequent framework programmes. Discussions are currently under way on the design of the 10th such programme for 2028 to 2035 ([39]).

Many of these programmes focused, particularly in their initial conception phase, primarily on interfirm cooperation. Esprit awarded up to 80 % of all its contracts to the 'Big 12' (incumbent European IT firms that had themselves been part of the IT task force that set up Esprit). In retrospect, it can only be concluded that the close involvement of the main industrial players, something which had been characteristic of the earlier 'industrial adjustment' policies of the 1970s intended to support struggling dust-belt sectors (textiles, shipbuilding, iron and steel), was ultimately inappropriate for sunrise sectors and possibly even illustrative of a certain naivety in European high-tech industrial policy. As Stephen Martin summarised ([40]):

> EC [European Community] *Member States' policies of the 1970s were not successful in developing national champions, and the corresponding EC policies of the 1980s were not successful in developing European champions. Surviving European firms … turned outward … using strategies that involved world-wide cooperation to carve out places for themselves in what is now a world market ... To develop internationally competitive national or European firms would have required a 'tough love' policy that combined financial support and the brokering of alliances with an insistence on restructuring and vigorous product-market rivalry. European governments offered only love, and for a time diverted their home firms' attentions inward rather than outward in a way that slowed down unavoidable structural change.*

The European Community's awareness that it would have to shift industrial policy from its negative, job-reducing image towards a more dynamic, 'sunrise' image was inspired by the success of the Japanese government in rapidly catching up in many industrial sectors, from motor vehicles to semiconductors, in the 1970s and early 1980s. At the same time, one of the political responses to Japan's industrial policy success, the US–Japanese semiconductor trade agreement providing the US industry with breathing space, became one of the most clear-cut examples of what was to become a new form of 'strategic' industrial/trade policy. This had major long-term implications for the competitiveness of the US semiconductor industry. Not surprisingly, in Europe too, the potential 'strategic' nature of industrial policy became its new *raison d'être* ([41]).

The new notion of 'strategic' policy is intimately connected to its political interpretation: having national, preferential access to some products or technologies conveys a long-term strategic political advantage. This notion was most clearly operationalised in the various attempts by the United States to prevent the export of 'strategic' high-tech products to communist countries at the time of the Soviet Union. Today, the same strategy is being used with respect to the export of chips and chip-producing machinery to China. However, and as also illustrated by the lack of success of the policies followed by the Council for Mutual Economic Assistance (Comecon) in the Soviet bloc in the 1980s, it is not immediately obvious why only high-tech products should fall under the category of strategic products,

([39]) For an overview of EU innovation policy and its evolution, see Soete et al., 2021 and Kastrinos, 2024.

([40]) Martin, 1996.

([41]) Elsewhere, Soete (2007) classified strategic industrial policies as having three different economic approaches: a technological one, a trade one and an industrial cluster one. Today all three have become subject to more political interpretations.

particularly when compared to scarce raw materials and minerals, the extraction and processing of which are concentrated in particular countries, as further analysed by Arnold Tukker in his contribution.

'Creative destruction', innovation and the fact that knowledge and technology are difficult to contain within firms and countries make the protection of strategic high-tech products difficult and often meaningless. But 'strategic' also refers to the disproportionate importance of such high-tech products, sectors or technologies in terms of their cross-cutting impact. A related concept is 'general-purpose technologies'([42]). As in the case of chips, these ultimately represent an essential intermediate technological input that opens new value creation opportunities, described by Erik Brynjolfsson as technological 'augmentation' ([43]), as is currently the case with Nvidia and ASM's AI chips, which enable the creation of generative AI applications.

In short, current geopolitics and the strategic importance of certain general-purpose technologies are making a case for there being strong industrial policy at the European level, even though Europe does not have a particularly good track record on industrial policy. Trying to learn from the successes and, more importantly, the failures of previous industrial policies might be a first step. How to design new European industrial policies, given the current European multilevel policy governance institutional set-up, is the first question addressed by scholars on the Fair and Sustainable Economy (FASE) Panel in this chapter, under the heading 'Industrial transformation and competitiveness'. Other important questions addressed include the following. To what extent is the new industrial policy compatible with the EU single market? What can the EU do to strengthen productivity in its existing manufacturing industry while monitoring and learning from progress? What is the best way to design new EU-level funding mechanisms? How can strategic visions be maintained in global value chains? What room for manoeuvre exists with respect to effective support for regional industrial competitiveness within Europe's economically integrated model of capitalism? Finally, and more closely building on the call by Draghi for new tech or knowledge-intensive firms in Europe, the chapter ends with reflections on 'European innovation dynamism: the challenge of creative destruction'. These reflections are closely aligned with the theories of a young Joseph Schumpeter and his analysis of economic renewal though the creation of new firms. In summary, the three dimensions of the EU's current reindustrialisation – value upgrading in the existing manufacturing industry, place-based industrial competitiveness and high-tech creative destruction – are mutually reinforcing and should be read in a comprehensive manner.

European capitalism: industrial transformation and the pursuit of economies of scale

The revival of industrial policy will have to address the specificity of Europe's current industrial and technological structure, while being constrained by the current set-up of European institutions. As Slavo Radosevic points out in his detailed analysis of the trade-offs and policy challenges of industrial policy within the EU's single market,

([42]) Deng, 2024
([43]) Brynjolfsson, 2022.

> *the debate hinges on precisely how the EU defines the boundary between market liberalisation and proactive industrial support. If done thoughtfully, the next generation of EU industrial policy could become a template for tackling global challenges like climate change and strategic autonomy within a modified rules-based multilateral framework. If not, the Single Market may be pulled in too many directions simultaneously, creating an inconsistent architecture that pleases no one and failing to meet the EU's strategic objectives.*

Radosevic proposes 'integrated orchestration' as the optimal model for governance:

> *a governance model that strategically aligns regulatory frameworks, funding mechanisms, institutional platforms, and stakeholder participation to deliver industrial policy objectives, without relying on fiscal federalism or centralised authority. It extends the basic idea of orchestration (governing through intermediaries using soft tools) into a multilevel, multi-instrument system, adapted to the unique constraints and strengths of the EU … Integrated orchestration reframes the EU's role not as failed coordination or weak federalism, but as a deliberate governance model suited to its institutional architecture. It distinguishes this from both 'command-and-control' and laissez-faire models.* ([44]).

The proposal by Sylvia Schwaag Serger for a European manufacturing initiative recognises and seeks to address several aspects of industrial policy. First, she recognises the changing geoeconomic, not just geopolitical, context surrounding the European manufacturing industry, wherein both China and the United States are using interventionist and protectionist policies to advance their industries at the expense of European industry both at home and abroad. Second, she highlights the renewed importance of reducing European dependencies on products and services, such as critical minerals, rare earths and computer chips, that might increase the EU's vulnerability to economic and political coercion but also directly undermine its ability to defend itself against foreign aggression. Third, she identifies the opportunity and imperative to utilise and enhance Europe's strength in manufacturing and its ability to build complex systems by combining manufacturing with the development, uptake and diffusion of general-purpose technologies, particularly AI. Strengthening both the demand for and the supply of advanced manufacturing products and services is critical to the success of such an initiative. The former requires market integration and creation (e.g. through public procurement), while the latter could be driven by new forms of public–private partnerships, groups of Member States and/or companies leading such initiatives, and the strengthening of framework conditions, such as European standards strategies, innovation-friendly regulations, the availability of affordable clean energy, adequate public infrastructure and the mobilisation of private investments.

Industrial policy, anno 2025, once covering a specific sector facing profound transformations, will need new forms of monitoring and different types of policy learning in 2025, as illustrated in Karoline Rogge's analysis of the European automotive industry. The European automotive industry, once a global innovator of internal combustion engines, is now under severe pressure to reinvent itself, as it is overtaken by other global industries in the race to produce electric vehicles and reach zero-emissions

([44]) Radosevic, 2025.

targets ([45]). Rogge proposes the introduction of a 'community acceleration survey' in each Member State with a strong automotive industry. This would provide

> *a much-needed, up-to-date, complementary evidence base that policymakers can harness to effectively navigate the transformation of the European automotive industry considering competitiveness and decarbonisation objectives ... More precisely, it would address a gap in micro-level, sector-specific evidence on transformative business activities and policy effectiveness in the acceleration phase of ongoing net-zero transitions* ([46]).

As Rogge's detailed automotive sector study illustrates, the nature of such industrial policy will now have to involve 'a broader rethinking of our interconnected energy-mobility systems' as an aim.

Finally, European industrial policy will also have to try to leverage local strengths and capabilities to drive industrial transformation, particularly with respect to some of the new challenges related to sustainability, security and resilience. Andrea Renda's contribution 'Combining place-based industrial transformation with centrally coordinated industrial policy in the EU' looks at enhancing coherence between place-based innovation and EU-wide industrial policy. Underlying Renda's approach is

> *the recognition that one-dimensional approaches to industrial development (e.g. decarbonisation pathways) are unlikely to deliver prosperity and well-being, which stand as the ultimate goals of the European Union; and that a multidimensional approach aimed at addressing key trade-offs from a comprehensive perspective on EU policy is much more suitable for such an enterprise.* (47)

To summarise, and complementing the Draghi report, we emphasise that in times of radical economic, political and technological transformation, combined with the deepening climate crisis and the urgent need for decarbonisation, it is important for policymakers, particularly within supranational settings such as the EU, not to neglect the industrial core and the opportunities it presents for transforming – through technology and evolving markets – and scaling up, thus making better use of the advantages of the single market. Start-ups play a critical role in value creation, technology adoption and diffusion, and renewal and disruption, all of which are critical in ensuring that Europe is economically and technologically competitive, as recognised and emphasised in the Draghi and Heitor reports. We also fully agree with the Draghi and Letter reports that there is an urgent need to address the poor European institutional set-up to enable more venture capital opportunities in Europe, especially through the reform and integration of capital markets. The EU should focus on the large and medium-sized firms that make up its industrial core as well as on the swift adoption of general-purpose technologies such as AI into existing industrial firms and innovation ecosystems, as these firms are the backbone of Europe's strength in manufacturing, industry and export ([48]). In this sense, the

([45]) See research conducted by the Joint Research Centre in 2024: European Commission: Joint Research Centre and Carbonell, 2024; European Commission: Joint Research Centre, Gavigan et al., 2024; and European Commission: Joint Research Centre, Rueda-Cantuche et al., 2024.

([46]) Rogge, 2025.

([47]) Renda, 2025.

([48]) Schwaag Serger, 2025.

Schumpeter's Mark II theory might appear more characteristic of Europe, and Schumpeter's Mark I theory more characteristic of the United States.

It is striking that, as pointed out in the Draghi report, if the digital sector is excluded from the analysis, EU firms have in fact increased their labour productivity more than the US firms over the past few decades. Moreover, the fact that all the large EU firms were created over 50 years ago shows, contrary to the emphasis in the Draghi report, that these European incumbents have been both globally competitive and resilient over time, surviving several business cycles and successfully adapting to technological and other disruptions. These are large, medium-sized and smaller firms building on engineering patents – 'mid-tech' firms – that are often in energy-intensive industries but also working at the level of world excellence in engineering, design and arts. Maintaining Europe's competitive advantage will require a policy mix of public–private cooperation not just to maintain competitiveness, but also to promote firms' long-term resilience and capacity for transformation, building on openness, an equal playing field at the global level (as encouraged by, for example, the Carbon Border Adjustment Mechanism) and the potential benefits of a more transparent and less bureaucratic single market.

There is, in other words, a need for a more systemic and transformative perspective with respect to industrial policy. One that recognises and factors in the current period of systemic change and deep transformation and even centres on industrial security. In short, not all of Europe can or should be a start-up economy (like Silicon Valley) nor can or should the EU pursue strongly state-centric technology and innovation policy like China. It should focus instead on creating a favourable environment for scale-ups and strategically supporting Europe's unique strengths and diversity in manufacturing, which include building complex systems (advanced systems engineering) and inter-firm ecosystems, place-based development, variable geometry and experimentation so that certain entities/regions/countries can pilot initiatives or roll out successes. The EU also needs trust-based, transparent, flexible and effective public administration systems to provide the framework conditions for a thriving start-up and scale-up ecosystem. From this perspective, European policymakers should be looking at not only the United States but also China, which is building up its core industry with a truly long-term strategy (even leapfrogging into the lead in certain industries, such as the automotive/battery sectors).

A more long-term vision with respect to industrial policy has often been hindered by too much short-term thinking and by attempts at quick fixes to increase competitiveness. The primary long-term issue is how to make industrial competitiveness sustainable and avoid capture by incumbent actors and sectors. As discussed in more depth in the contributions in the next chapter, 'Sustainability', the main challenge here is for Europe to lead the way in linking sustainability and competitiveness. Admittedly, this might be easier in a more isolated capitalistic world in which purely national interests dominate. The challenge here will be, as discussed in the next section, lifting national interests to the European level. With Member States remaining committed to recognising the importance of strategic strength at the European level, the EU can pursue circular economy principles beyond national borders and support the enlargement of market created by the EU emissions trading system and the EU Carbon Border Adjustment Mechanism, not just to protect national energy-intensive industries but to accelerate European industries' decarbonisation.

European integration versus place-based industrial competitiveness

As hinted at in Andrea Renda's contribution to this chapter on place-based industrial transformation, the new top-down industrial policies discussed in the previous section of this introduction will have to be closely connected to bottom-up initiatives and ecosystems. Territorial industrial policy will have to focus on upgrading, creating more complex products and services, and linking much stronger territorial competitive advantages and initiatives to EU-wide initiatives ([49]).

Particularly since the financial crisis of 2008, it has become clear that clinging onto the idea that economic integration can be pursued without any regard for place-based industrial competitiveness will ultimately be self-defeating. Chasing sectors in which Europe is already on the back foot may well produce diminishing returns, exacerbating, rather than reducing, inequalities both within and between Member States, as illustrated in Andrés Rodríguez-Posé and Lewis Dijkstra's paper ([50]). In contrast, place-based opportunities for innovation might be found in new ecosystems, such as those in central and eastern European regions, which might offer ideal testing grounds for innovative solutions to competitiveness challenges, as argued in Daria Gołębiowska-Tataj and Ramojus Reimeris's contribution ([51]). It is clear from these different contributions, but also from earlier work carried out for the Joint Research Centre ([52]), that place-based innovation must be considered an essential feature of Europe and the EU. Yet, many European policies are space-blind and assume, as being implicit to some extent in the concept of the 'single market', that diversity is Europe's Achilles' heel when it comes to competitiveness. As Andrés Rodríguez-Posé and Lewis Dijkstra argue, diversity might well be Europe's most potent weapon:

> *Harnessing it calls for a paradigm shift in how we conceptualise competitiveness, guided by evolutionary economics, path dependence, and place-sensitive strategies. Through this blend of frameworks, we can chart a future that maximises Europe's inherent strengths and leverages the transformative power of new technologies, without succumbing to the territorial myopia that risks not only bypassing Europe's economic potential but also exacerbating the galloping discontent currently gripping the continent* ([53]).

Daria Gołębiowska-Tataj and Ramojus Reimeris further develop the potential of a place-based vision of innovation and entrepreneurship. They advocate for the networking of innovation ecosystems across the EU, where hotspots in the most advanced Member States and metropolitan areas can be connected with emerging innovation ecosystems. In this context, they highlight emerging innovation hotspots in central and eastern Europe that also offer unique conditions for piloting and testing innovative solutions, given their newer and more flexible dynamics and their strategic positions in terms of technological sovereignty and security ([54]).

([49]) In fact, place-based industrial policy development, focused on the EU's cohesion policy, was transformed in the 1990s to include dynamic innovation policy. For an overview and in-depth analysis of case studies and the optimal framework conditions for dynamic local ecosystems and science, technology and innovation policy, see Landabaso (1995).

([50]) Rodríguez-Posé and Dijkstra, 2025.

([51]) Gołębiowska-Tataj and Reimeris, 2025.

([52]) Schwaag Serger et al., 2023.

([53]) Rodríguez-Posé and Dijkstra, 2025.

([54]) Gołębiowska-Tataj and Reimeris, 2025.

From a place-based innovation perspective, the various contributions on the territorial coordination of innovation appearing in the chapter 'Capitalism' could be said to complement the Draghi report, stressing the current need to enrich scale-focused policies through bottom-up creativity and even economic development, which can be triggered by place-sensitive security investments. In earlier concept papers ([55]), we developed several ideas on the territorial articulation of innovation that rely on smaller Member States developing 'speedboats', i.e. testing innovative solutions in real-life settings, and building on applied research from universities in collaborating with local ecosystems to become engines for local development. All this raises fundamental questions with respect to the policy toolbox available to policymakers.

European dynamism: the challenge of 'creative destruction'

The Draghi report rightly stressed that the EU has failed to realise the potential of digitalisation, thus creating an 'innovation gap'. The Draghi report referred to 'deep tech', a term it used primarily to talk about digital technologies. These new technologies, particularly those known as artificial intelligence, open up a different set of opportunities for new growth. This is not so much the case when it comes to forms of automation, but as Erik Brynjolfsson highlighted about forms of augmentation:

> *Humans have evolved over millions of years to be able to comfort a baby, navigate a cluttered forest, or pluck the ripest blueberry from a bush. These tasks are difficult if not impossible for current machines. But machines excel when it comes to seeing X-rays, etching millions of transistors on a fragment of silicon, or scanning billions of webpages to find the most relevant one. Imagine how feeble and limited our technology would be if past engineers set their sights on merely matching human-levels of perception, actuation, and cognition.*[56]

This tech-driven form of modern AI 'capitalism' is likely to be part of a new business cycle (traditionally these cycles involve more radical innovative entrepreneurship) that Schumpeter described at length in his youth and that became known as Schumpeter's Mark I theory. It emerges from new tech innovations or – more broadly – 'new combinations' that are driven by entrepreneurs with different skills and objectives from the actual people behind the inventions. The current crystallisation of monopoly markets and tech oligopolies resulting from the swarming of firms points to one truth, namely that we are in the second part of the digital transformation of capitalism.

The deep transformation driven by the rapidly increasing and widespread use of generative AI tools that are based on the exploitation of personal data also has major implications for democracy, as we will discuss in the third chapter of this report ('Democracy'). Here we note, within the European context, the many interfaces between digital tech and both the ongoing energy transition and the intensification of the political challenge of defence/security. At the same time and reflected in the increasing geopolitical tensions the EU is finding itself confronted with, these phenomena cannot be viewed in isolation. The race for the mastery of this technology has also unleashed a global, high-speed, large-scale investment competition in which Europe is clearly lagging behind China and the United

([55]) Trippl et al., 2023.
([56]) Brynjolfsson, 2022

States. As the Draghi report noted, the lack of entrepreneurial dynamism in Europe is closely linked to the nature, size and risk adversity of capitalism in Europe relative to the United States.

Therefore, what is at stake for the EU is not only the competitiveness of its existing industry but also its capacity to deliver 'creative destruction'. Europe's apparent inability to deliver creative destruction is linked to regulations and bureaucratic 'ossification', a lack of 'development capital' (e.g. venture capital and savings that can be invested in innovation and start-ups), market fragmentation (as stated by Enrico Letta in his proposal of a 28th regime) and the inability of governments to create value by connecting new firms with the demand for new technology and innovation, such as through defence investment and procurement. All of this has prevented research, technology and entrepreneurship from driving innovation, development and renewal at scale.

It is here that the FASE contributions make a strong plea for more radical policy proposals, addressing the multilevel governance of both research and innovation in Europe. More specifically, there is a proposal, as detailed in the paper by Sylvia Schwaag Serger and Luc Soete ([57]), to move a significant part of the financing of fundamental research from the national to the EU level (e.g. the financing of trade policy). A new European hub for breakthrough science could probably also count on new forms of private-risk-based capital funding, as explained in the contribution by Benoît Cornet and Dominique Foray. This way, the EU could aspire to become a world leader in research excellence, attracting top scientists from across Europe and beyond. On the technology and innovation side, public innovation policy could benefit from the new priority given to defence to develop its own European variant of institutions like the Defense Advanced Research Projects Agency, as argued in the paper by Reiner Kattel and Josh Entsminger ([58]). However, as they put it,

> *instead of striving for a singular, monolithic institution, Europe should aim to build a diverse and interconnected ecosystem of agencies, each with specialised strengths and capabilities. This ecosystem should be underpinned by robust governance in the form of a network of defence R & D programme managers, support infrastructure, and active engagement with broader societal agendas, such as the twin green and digital transitions.*

It might even include criteria for a European innovative company and the 28th regime. In short, a careful reassessment of how the framework programmes operating within the context of the EU's emerging 'innovation gap' are working is warranted.

Ultimately, the question will be how to address the challenge of more radical innovation and creative destruction within a setting primarily focused on European integration through economies of scale. As outlined above, since the 1980s the EU has had at its disposal framework programmes for supporting research, technological development and innovation, an area of shared parallel responsibility between the EU and its Member States. The design of the European framework programmes has gradually evolved over the past forty years or so based on trials and policy learning. For framework programme 10, many new concrete proposals were made in the previously mentioned Heitor report. Among the FASE scholars, Daniël Gros provides additional insights on the challenges currently facing the European

([57]) Schwaag Serger et al., 2025.
([58]) Kattel et al., 2025.

framework programme if its purpose is to contribute to closing Europe's competitiveness gap with the United States ([59]).

To sum up, capitalism in Europe has shifted over the past 75 years in significant ways, from a period of rapid reconstruction and catching up to the United States following the Second World War – which can be described *ex post* as a period of synergy between capitalism and democracy – to a period following the end of the Cold War that was characterised by deindustrialisation and globalisation, with an increased reliance on the international trading of goods and services and on global value chains.

National industrial policies, combined with social policies, were an essential tool for preventing the fissures between capitalism and democracy from becoming too large. Some European countries were much more successful than others in achieving such synergy. However, the financial crisis in 2008 and subsequent reform of the Economic and Monetary Union challenged the sustainability of many European countries' social and welfare models. The European institutional system needed to distribute the gains from international trade in a fair fashion was not in place, as Luis Ayala highlights in his contribution, which is reviewed in the third chapter of this report. Tensions emerged between capitalism and democracy, which continued to grow with the monopolistic digitalisation of the economy and now of society more broadly, a digitalisation controlled by a handful of increasingly powerful US companies ([60]).

Recently, with new geopolitical pressures, industrial policy is being rediscovered in Europe as a tool for strengthening and even rebuilding European competitiveness. As discussed above, to have any impact policymakers will have to focus on Europe's specific industrial strengths, the local impact of policy actions and the window of opportunity for more radical innovation dynamics. Crucially, they also must avoid the mistakes and pitfalls of many of the industrial policies from the 1970s and 1980s.

([59]) Gros, 2025.

([60]) As Meredith Whittaker, president of the Signal Technology Foundation, put it recently in an interview with Dutch newspaper *NRC*: 'People in Europe regret that they missed out on having hyperscale surveillance monopolies. But you don't beat a monopoly by replicating it. It is more empowering to first think about what kind of future you want, for example regarding climate and democracy in Europe, and then consider what role technology can play in that.' (Hijink, 2025).

1. Industrial transformation and competitiveness

The EU single market embracing industrial policy: trade-offs and policy challenges – towards a new model of governance

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The European Union's single market has historically functioned as a rules-based framework designed to eliminate barriers to intra-EU trade and foster competition. In recent years, however, we have witnessed a major shift in how the single market operates. Rather than simply remaining an open, rules-based mechanism for economic integration, it has been increasingly tasked with supporting broader strategic goals. These include promoting green growth and achieving 'strategic autonomy' – concepts that extend far beyond the traditional mandate of a free trade bloc.

The emerging emphasis on these goals has prompted debates over whether the single market is effectively taking on elements of an 'industrial policy', that is, a coordinated set of policies to shape and steer specific industries or sectors. Such a transformation would be far from trivial: the single market was originally structured around the principles of competition, non-discrimination and a level playing field among Member States, not the proactive shaping of industrial ecosystems. Yet, many argue that policy goals like decarbonisation or technological sovereignty must now be integrated into the single market's regulatory framework to address climate change imperatives and geopolitical uncertainties.

This paper explores the key questions underpinning this potential paradigm shift. For example, can a set of rules originally designed for free and fair trade adapt to complex priorities like decarbonisation and strategic autonomy? Or are we on the brink of a fundamentally new model of European integration? To explore these issues, we examine the main trade-offs, hypothesise possible outcomes and discuss the challenges of aligning industrial policy with the single market's foundational rules.

This paper is structured around a central tension: the evolution of the EU single market from a rules-based liberalisation mechanism to a hybrid platform increasingly shaped by the objectives of industrial policy. We approach this evolution through a dialectical framework: first, by presenting the established liberal model of market integration and its development (thesis); second, by identifying the emergence of competing priorities such as strategic autonomy and green transformation (antithesis); and third, by exploring the potential contours of a new synthesis – a reconfigured single market that combines these priorities through orchestrated governance, selective regulatory flexibility and coordinated investments.

The paper argues that the EU's single market is undergoing a gradual but significant transformation driven by integrating industrial policy into its rules-based system. Whether this amounts to a genuine paradigm shift or merely an incremental development remains to be seen. The EU has a history of adapting its institutions over time, often in response to crises or emerging priorities. Green growth and strategic autonomy may well spur the kind of institutional innovation that, years from now, we will look back on as a turning point.

However, the practical challenges – fiscal, legal and political – cannot be understated. Balancing competition rules with ecosystem-based industrial strategies, reconciling external openness with the drive for strategic autonomy, and ensuring consistent governance across 27 Member States all demand a high degree of policy finesse. The greatest risk may be a fragmented approach that fails to resolve these tensions, ultimately weakening both the single market and Europe's industrial potential.

From now on, the debate hinges on precisely how the EU defines the boundary between market liberalisation and proactive industrial support. If done thoughtfully, the next generation of EU industrial policy could become a template for tackling global challenges like climate change and strategic autonomy within a modified rules-based multilateral framework. If not, the single market may be pulled in too many directions simultaneously, creating an inconsistent architecture that pleases no one and fails to meet the EU's strategic objectives.

Usually, changes in a policy paradigm emerge when the old policy paradigm cannot address emerging challenges. Accommodating industrial policy tasks into the fabric (institutional architecture) of the single market, originally conceived as a predominantly market-enhancing governance mechanism, may push it to its limits. In the case of the EU, we can observe the addition of policy instruments and explicit new goals (i.e. surrounding green growth and strategic autonomy). Sooner or later, the dominant paradigm of the single market will have to change to reconcile market enhancement with policy governance. The new instruments and goals introduced may become incompatible with an unchanged setting or the existing market governance of the single market.

So far, the European Commission has accommodated the trade-offs inherent to the emerging paradigm. A good example is accommodating the initiative of Important Projects of Common European Interest into the existing legal framework. However, the issue is whether ad hoc adjustments are adequate to further strengthen industrial policy at the EU level. The time is ripe for a strategic overview and deeper analysis of the outlined trade-offs.

EU industrial policy faces major constraints owing to the weak fiscal capacity of the EU. This, combined with the division of competences in industrial policy between the EU and its Member States, opens up many issues regarding what can be done in this context (see the full JRC paper of Radosevic, 2025), including the four scenarios summarised in Table 4 of that paper). Assuming an unchanged context, the EU policy space will remain confined to regulations and price-directed mechanisms like carbon trading schemes. Investment policy and tax credits are missing from this space, though recent policy documents identify investment as the major and central instrument (see Figure 5 in the full paper (Radosevic, 2025)).

The essential policy implication is that a successful greening policy would need all three groups of instruments to work together and in sequence – investment, tax credits and regulations ([61]). The challenge for the EU is ensuring proper sequencing in the policy mix in the current institutional context, given the weak fiscal capacity of the EY and mixed EU / Member State competences in industrial policy**.** Unless we see a shift towards a more investment-centred view of greening, the current overly price-

([61]) Lonergan et al., 2022.

centred view and the soft conditionalities that are dominant will have limited effects ([62]). It is time to reconsider the effectiveness of the current derisking approach and explore changes in unorthodox directions, like green credit policy, as an alternative ([63]).

If we accept the EU's weak fiscal capacity constraint, the only remaining option is to achieve much stronger industrial policy coordination at the EU level. Strengthening coordination on industrial policy is not really about issues of subsidiarity, or the vertical coherence of policy. It is more about horizontal coordination and accountability, which are central to the network programmes that prevail in industrial policy. I have not addressed this issue, although it is crucial for effective implementation in all four policy scenarios (see Table 4 of the full paper (Radosevic, 2025)) ([64]).

Given the EU's constraints, its underlying industrial policy principle can be orchestration ([65]). Orchestration is often associated with a lack of fiscal or coercive capacity. Its defining trait lies in governing through intermediaries, not merely compensating for resource constraints ([66]). The EU's institutional design – characterised by regulatory leadership, national implementation and soft fiscal instruments – closely aligns with this model. Thus, orchestration in the EU context is less about the absence of power and more about distributed execution through multilevel governance structures.

There are several real-world examples of industrial policy being driven more by coordination and orchestration than by direct public spending ([67]). These models are particularly relevant for the EU, which lacks centralised fiscal power but can still exert influence through regulatory frameworks, convening power and market design. However, in the EU context, we consider it appropriate to define the optimal governance model for the single market as 'integrated orchestration'.

'Integrated orchestration' in the EU describes a governance model that strategically aligns regulatory frameworks, funding mechanisms, institutional platforms and stakeholder participation to deliver industrial policy objectives without relying on fiscal federalism or centralised authority. It extends the basic idea of orchestration (governing through intermediaries using soft tools) into a multilevel, multi-instrument system adapted to the unique constraints and strengths of the EU.

Integration implies that the EU combines soft and hard instruments (regulation, co-funding, standards, conditionalities and procurement), connects levels of governance (EU institutions, Member States, regional authorities and public–private intermediaries), coordinates across sectors and ecosystems

([62]) Gabor, 2023.
([63]) Kedward et al., 2022.
([64]) For exploratory research on governance issues related to network industrial and innovation policy programmes see Radosevic et al. (2023).
([65]) Abbott et al, 2015; Abbott et al., 2012.
([66]) Abbott et al. (2015) were the first to introduce the concept of orchestration as a governance mode, whereby international organisations steer intermediary actors toward policy goals using soft tools rather than direct authority.
([67]) For example, in the 1950s–1980s, Japan's Ministry of International Trade and Industry became the classic model of strategic coordination. Japan's success wasn't fiscal, it was institutional: it was a state that could set priorities and organise delivery across actors. US policy during the Biden administration adopted coordination as a choice – especially in strategic sectors like semiconductors, clean energy and AI. Chinese policy also contains many elements of experimentation at the local level and orchestration.

(energy, mobility, digital, defence, etc) and aligns instruments using strategic goals (e.g. the green transition, resilience or technological sovereignty).

A critical reader is probably disappointed with this conclusion, as the EU has long performed orchestration-like functions. The EU has long acted as a de facto orchestrator through its regulatory power (single market rules, state aid control), by convening and agenda-setting (e.g. the Lisbon strategy, Europe 2020, Green Deal), through platform creation (e.g. alliances, important projects of common European interest, smart specialisation) and by leveraging funding (e.g. cohesion, Horizon Europe and InvestEU funds). So, in practice, the EU already engages in orchestration as it lacks direct authority or fiscal muscle.

The idea that the EU is now becoming an orchestrator of industrial policy can sound tautological or simply descriptive of its long-standing governing style. However, as now applied, the concept of orchestration adds analytical clarity and normative weight to the EU's evolving role in a way that distinguishes it from liberal market regulation and full industrial coordination.

I have pointed out that we are in the process of changing the paradigm of the single market. We have outlined the layers of functions added on top of the old role the EU had as guardian of the rules-based single market. The process of outlining demonstrates that what was once an emergent governance logic is now becoming a structured approach: the EU is no longer merely coordinating policies at the margins but increasingly shaping industrial outcomes through flexible rulemaking, conditional incentives and platform governance. Recognising this shift helps avoid false dichotomies between dirigisme and market liberalism and better captures the distinctive character of EU industrial policy in the 2020s.

Integrated orchestration reframes the EU's role not as failed coordination or weak federalism, but as a deliberate model of governance suited to its institutional architecture. It distinguishes this from both 'command-and-control' and laissez-faire models.

The emerging synthesis is a reconfigured single market that includes multilevel orchestration, selective regulatory flexibility and coordinated investments. The issue is that the transition towards 'integrated orchestration' is not guaranteed. As pointed out, the paradigm change process is politically loaded, and it is unclear in which quadrant paradigm will end up.

Moving towards a more deliberate orchestration strategy requires that the EU develop its capacity to align and steer diverse public and private actors without direct control by using soft law, strategic guidance, joint platforms and co-funding to shape investment flows and policy priorities. This requires selective regulatory flexibility, through which single market rules can be temporarily relaxed or core single market rules (e.g. on state aid or procurement) can be adapted to enable innovation and respond to geopolitical shocks, while preserving the single market's overall coherence. Finally, coordinated investments are key to overcoming fragmented national initiatives as they pool resources for EU-wide strategic sectors (e.g. through important projects of common European interest, InvestEU funding or mission-oriented consortia).

The EU can become a platform for industrial orchestration, using rules, incentives, coordination bodies and co-investment tools to act strategically, even within limited fiscal boundaries. By leveraging its regulatory power, trade policy tools and procurement rules, the EU can shape both internal and global technological development – but it must act with strategic clarity and coordination. This makes the EU's constraint (limited spending power) a design feature, not a fatal flaw.

A new manufacturing initiative in Europe

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In a world where the United States is making significant efforts to rebuild its manufacturing strength and China – within a very short time span – has risen to become a world leader in manufacturing in both scale and sophistication, we should remind ourselves that Europe is a continent teeming with large and small industrial companies, which form a critical foundation for value creation, exports and innovation. They are also essential to driving the green transition, both through decarbonising their production and through providing goods and services upon which the green economy and society will be built. Europe's industry is also critical to the service sector, as can be seen in the fact that a large share of Europe's service exports is linked to and embedded in manufactured goods (e.g. trucks which contain sophisticated software systems).

One of the biggest potential areas in which Europe can reap the economic benefits of artificial intelligence (AI) is in the industrial applications of AI. While the United States, and particularly Silicon Valley, has been the epicentre of the AI revolution, in terms of the development of foundation models, the erosion of the country's manufacturing base is currently impeding its ability to develop industrial applications for AI. China combines prowess in AI with a strong and increasingly sophisticated manufacturing sector, allowing it to potentially gain lasting competitive advantages in both AI and manufacturing. Government policy, not least the made in China 2025 initiative, launched in 2015, has strongly driven China's rapid rise as a manufacturing power ([68]). The middle technology trap, which the EU now finds itself caught in, describes Europe's position between low-cost producers and frontline innovators well. AI, as a transformative technology, is not itself part of the trap but a potential way out of it. If Europe accelerates its adoption of AI in industry, it can move beyond the mid-tech position; if it lags behind, AI will reinforce the trap by widening the gap with China and the United States.

Research and innovation policy focused on European firms' digitalisation, and particularly the adoption and development of AI-based systems, is hence both urgent and essential for Europe's future competitiveness and value creation, as well as for driving the green transition. A strong industry, ultimately, will be the backbone of European security, sovereignty and resilience in a time of increased threats of foreign interference and aggression and disrupted and disintegrating global supply chains.

Recommendations

- **Launch a European manufacturing initiative that combines a range of measures.** It should include the following points.
    - Strengthen EU research partnerships (e.g. joint undertakings) by making them more open to small and medium-sized enterprises, enhancing cross-sectoral collaboration and dual-use innovation. Partnerships should focus on pre-competitive technologies – those not yet commercially available but critical to Europe's industrial competitiveness (e.g. AI for manufacturing, green materials, advanced semiconductors). Governance reforms, including new operational rules within Pillar II of Horizon Europe, should be tweaked to make the formal minimum requirement of three participants from two countries the

([68]) For a critical assessment of this initiative, see Boullenois et al., 2025.

effective limit by dropping or reinterpreting additional criteria like European added value and inclusiveness, as proposed by Daniël Gros [69], ensuring that partnerships serve Europe's future industrial base rather than narrow corporate interests.

- Strengthen the EU's role in international standard-setting (see the recommendations in the Heitor report for more).
- Use public procurement as a vital driver of technological development (market creation) (see the recommendations in the Heitor report for more).

Strengthen dual-use innovation. Defence innovation has historically been a key driver of technological advances in civilian areas, and today civilian technologies are equally critical for defence. Strengthening dual-use innovation thus requires recognising the two-way nature of this interaction; ensuring that defence investments generate civilian spillovers, and that civilian breakthroughs are integrated into defence applications [70]. This also entails expanding the joint procurement of defence solutions at both the Member State and EU levels to provide scale and accelerate innovation.

Recognise the importance of place-based initiatives in driving industrial revitalisation and upgrading. These are important to:

- ensure a level playing field for European industry in a world increasingly dominated by state-driven and -supported industrial development (particularly in China);
- avoid current industries and firms setting the policy agenda at the expense of future industries and firms.

[69] Gros, 2025.

[70] See, for example, European Commission: Directorate-General for Research and Innovation, 2025.

Towards a community acceleration survey for Europe's automotive industry

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Introduction: legacy and a new technological trajectory

Transitioning to an innovative net-zero economy represents a great opportunity but also a major challenge for Europe, with the European automotive industry being a case in point ([71]). Its modernisation requires changes that go well beyond incremental innovation in the legacy technology of internal combustion engine vehicles. Rather, considering the global race for innovation in the new technological area of electric vehicles, Europe's automotive industry is under severe pressure to reinvent itself. Having long been in a global leader because of its innovativeness in internal combustion engines, over the past few decades global competitors have not only caught up with Europe in terms of legacy technology but, more strikingly, they have overtaken the European automotive industry in the emerging area of net-zero-emissions electric vehicles.

Yet, the European automotive industry remains highly innovative, as evidenced by research and development (R & D) expenditures that place EU-based original equipment manufacturers among the global leaders in this area ([72]). However, traditional innovation indicators do not differentiate between innovation related to legacy technology and emerging net-zero technology. For example, according to the industrial R & D investment scoreboard, Europe's automotive industry continues to hold a leading position in R & D investment. However, the scoreboard also indicates that global competitors – particularly those from China – are rapidly catching up ([73]). Indeed, China currently leads the global race for innovation in battery electric vehicles and is also dominating global supply chains in this new technological domain ([74]). Detailed monitoring of innovation and employment is also available at the regional level, forecasting changes arising from the move to net-zero technologies, such as battery electric vehicles ([75]).

Data shortcomings: challenges in and policies for the acceleration phase

This data presents a solid basis for informing policymakers of ongoing trends at the industry, regional and company levels, but falls short on two accounts. First, it does not fully capture the breadth of the new challenges European automotive manufacturers and suppliers face in light of the new phase the transition to e-mobility has entered, with battery electric vehicles having emerged as the dominant design beginning to enter mass markets. Second, it offers limited evidence for assessing the role of policies in these transformative change processes, such as the interplay between climate and industrial policies, or between EU and foreign policies. Therefore, timely evaluations of changes to the real-world policy mix are hindered by insufficient evidence to determine their impact on driving the transformation of Europe's automotive industry. For example, little quantitative evidence exists that

([71]) do Prado et al., 2025
([72]) Confraria et al., 2024.
([73]) Nindl et al., 2024.
([74]) IEA, 2025.
([75]) Hindriks et al., 2024.

could inform the debate about the role of EU phase-out policies, such as the heavily debated and recently relaxed carbon dioxide (CO_2) emission standards for new vehicles.
However, future-proofing Europe's automotive industry requires well-informed policies that support the industry in staying competitive in the net-zero future. Such policies must drive trajectory-changing, multisystem innovations that bridge traditional sectoral silos, thereby harnessing electrification and digitalisation to enable the decarbonisation of transport. They also need to provide clear guidance and investment security to support the reorientation of business activities towards the emerging net-zero technology and its future markets. To address these shortcomings, it has been suggested that a community acceleration survey (CAS) be introduced to strengthen Europe's evidence base for creating effective clean industrial policy mixes for successfully navigating the ongoing transformation of the automotive industry.

Community acceleration survey: the automotive industry and its potential extensions

The CAS proposed to be introduced in EU Member States with a strong automotive industry presence includes five dedicated question blocks, with, among others, one on the clean industrial policy mix and another on investments in innovation and production capacity. This additional monitoring would provide a much-needed, up-to-date, complementary evidence base that policymakers can harness to effectively navigate the transformation of the European automotive industry to meet its competitiveness and decarbonisation objectives. More precisely, it would address a gap in micro-level, sector-specific evidence on transformative business activities and the effectiveness of policy in the acceleration phase of ongoing net-zero transitions.

This novel survey instrument should also include further aspects of importance in the acceleration phase of the net-zero transition. For example, given the global nature of the industry and the ongoing innovation race, dedicated attention should be given to international dynamics in technology, markets and policy. Also, while the current focus of the suggested CAS is on providing evidence to policymakers striving for European competitiveness in a net-zero future, the survey does not explore the challenges and opportunities related to digitalisation, such as those linked to automated and connected driving. However, the proposed CAS could easily be extended to capture this dimension in greater detail.

Outlook: a broader rethinking of our interconnected energy–mobility systems

Ultimately, the societal challenges of our times – from climate change and rising inequality to geopolitical tensions – demand not only the successful transformation of Europe's automotive industry, but also a broader rethinking of our interconnected energy–mobility systems. To capture wider net-zero transitions, the CAS could be designed for a broader range of sectors and actors. For now, however, the European automotive industry provides a suitable starting point for gaining initial experience and building a foundation for potential future expansions.

The (global) supply chain of chips: chips in the European supply chain

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Introduction

The strategic importance of electronic circuitry is hardly news. In the 1980s, the United States was already fretting about a major competitor threating their vital national security interests by outperforming them the semiconductor industry (Japan). Even 30 years earlier, in the mid 1950s, the United States had already imposed limits on the import of transistors (the predecessors of integrated circuits) from Japan.

Despite its perceived strategic importance, the global semiconductor market (including all stages of production) amounts only to about 0.5 % of world's gross domestic product (GDP) – and this percentage has not increased over the past 20 years. The data presented by Yeung et al. (2023) suggests that it might actually have fallen slightly compared to 2000.

The overall economic importance of chips is thus often vastly overstated. However, in individual countries, the chips industry can be vital. Taiwan provides an extreme example, as its exports of electronic circuits amounted to USD 180 billion in 2022, worth over 25 % of its GDP. In most other countries, very few jobs depend on their production. However, chips are indispensable for many products and many jobs would be at risk if chips were no longer available. Paying attention to the chips sector is thus justified on grounds other than jobs in producing chips or inputs for chips.

This paper concentrates on two specific issues:

- How has the supply chain for producing chips evolved over the past few decades?
- What role(s) do chips play in European supply chains?

Chips in the European supply chain: what kind of chips are needed in Europe?

Different types of chips fulfil very different functions and are thus not really substitutes for each other. As their name indicates, memory chips serve only to store information. Logic chips are the type of chip at the centre of the United States–China chip war, as they perform the billions of calculations needed in data processing, AI and consumer electronics. The chips in high-end smartphones and data centres need extremely fine patterns, called nodes (3–5 nm nodes are now standard), that absorb as little current as possible.

The chips used in other consumer electronic devices are based on older designs and have wider nodes. The automotive sector, which dominates the European demand for chips, has different requirements for chips than the consumer electronics industry ([76]). Consumer electronic chips are designed to work at room temperature. Chips for cars must work between – 25 °C and + 120 °C. Semiconductors for cars are expected to work for at least 15–20 years (versus 5 years for those in consumer electronics) and the failure rate tolerance is one in a billion (while it is one in a million for consumer electronics).

([76]) Lawrence et al., 2019.

There exists a curious transatlantic dichotomy regarding the motives for supporting the domestic chips sector. In the United States, the main motive is to reshore some of the production of the most advanced chips from Taiwan and to prevent China from acquiring the latest chip-making technology. In the EU, the main reason for the European Chips Act was to support the European automotive sector by increasing the domestic supply of the chips needed by European car makers.

The globalisation of the supply chain: from integrated to fabless manufacturers

Over the past few decades, the supply chain of chips has become global, with a small number of very specialised companies providing different essential inputs, thus creating potentially strategic choke points, as is well described by Miller ([77]). This applies particularly to the most advanced logic chips. Concentration and choke points are much less of an issue for legacy and automotive chips.

A key aspect of this globalisation of the supply chain has been the bifurcation of production and design, with the latter now dominating the value chain.

The increasing importance of design

Policymakers tend to focus on the hardware, namely how and where chips are produced. This might be the wrong approach. Recent data suggests that more than half of the total value added in the semiconductor industry now comes from software/design ([78]). Wafer fabrication creates less than one fifth of the total value added.

A generation ago, the largest firms completed all steps, from design to wafer fabrication. However, this changed over time as the capital outlays necessary for the most advanced node fabs rose exponentially, starting the early 1980s. Start-ups with innovative ideas for chip design, which are key for logic chips, could not afford these costs and thus opted to have their design produced elsewhere. The design stage requires a different corporate culture than the fabrication stage, which requires long-term planning and disciplined capital expenditure. The best illustration of the increasing importance of the design stage is Nvidia, whose stock market valuation has increased significantly. It is a fabless 'chip maker', meaning that it does not produce chips, it only designs the circuits and then has the chips produced by others, such as independent foundries like the Taiwan Semiconductor Manufacturing Company (TSMC).

The difference in the cost structures of integrated and fabless manufacturers can be illustrated using Nvidia and Intel, which are the most prominent examples. Over the past three years, these two companies have had similar revenues, Intel's has been around USD 60 billion (but declining) and Nvidia's around USD 50 billion (but increasingly rapidly). For Nvidia material inputs were worth less, around 12 % of its revenue, versus around 33 % for Intel. Operating expenses accounted for less than 20 % of Nvidia's revenue in 2023, while they were 40 % of Intel's revenue.

([77]) Miller, 2022.
([78]) Palma et al., 2022

The difference in capital intensity is even larger between a fabless company like Nvidia and a (contract) manufacturer like the TSMC. The capital expenditure of the TSMC is equivalent to almost 50 % of its revenue, while it is only 8 % of Nvidia's revenue.

The movement towards 'fabless' semiconductor companies started naturally in the United States because that is where most of the integrated manufactures initially were. But the fabs themselves mostly arose in Asia. This is often ascribed to short-term management incentives in the United States. However, the real fundamental force driving the movement of fabs towards Asia is the availability of capital. Asian economies like Japan, Korea and Taiwan had then, and still have today, much higher savings and investment rates than the United States. It was thus natural that the newest and most expensive fabs should be constructed where capital was most abundant.

During most of the 1980s, Japan had the highest savings rates relative to the United States, and its chip production grew rapidly to dominate the global market. By 1990 Korea had even higher savings rates than Japan, and in the early 2000s Taiwan caught up. It is not a coincidence that this was also the period during which leadership in the production of chips shifted towards Taiwan and Korea. By 2020 there was only one European company left among the top 10 semiconductor companies (while there were three in 2000), but this one (Infineon) does not produce the advanced logic chips that dominate the headlines.

Another reason for fabs to migrate to Asia is that this region dominates the production of the goods that require chips, such as smartphones and consumer electronics in general. In contrast, Europe has a strong automotive industry. It is thus natural that the few European fabs mainly produce chips for that industry.

The dominance of the United States in the design phase of chips seems natural in light of the fact that US companies dominate investments in research and development in software industries ([79]).

Chip manufacturing equipment

Part of the increasing cost of fabs is due to the rise in the cost of the ever more sophisticated machinery needed to produce the most advanced chips and their ever smaller nodes (another important part of the cost is the need for even cleaner 'clean rooms' to protect the wafers from impurities). This machinery constitutes another important part of the supply chain that is so critical that the US administration has pressured the leading EU producer of these machines, ASML Holding N.V. (known as ASML), to stop providing its most advanced models to China.

The industry leader, ASML, would alone have a market share of about 20 % given its global sales of over EUR 20 billion in 2022 (Rosati et al. (2023) estimate that the EU's overall share of the chips manufacturing equipment market is 20 %). Most of ASML's sales are in Asia, with almost nothing in Europe.

([79]) As documented by Fuest et al. (2024).

In this sector, the EU has a strong advantage, with exports at close to USD 28 billion and imports of around USD 8 billion. The EU surplus on chip-making machinery is larger than its deficit on chips. Moreover, exports of this type of machinery have increased steadily over the past decade, while imports have remained steady. It is somewhat surprising that support for the prominent position the EU has in making this type of machinery barely figures in policy discussions.

Chips in the European supply chain

Chips are used in many different products. Smartphones are a ubiquitous example, but the movement towards the 'internet of things' has meant that more and more basic consumer goods also incorporate chips. The chips required for the internet of things usually have only rudimentary functionality and thus do not need to be based on the smallest nodes, as is the case for smartphones. The chips required for massive data centres are again different as they must be programmed for specific tasks.

Chip shortages?

The chips shortage of 2021/2022 is often used to show the key role of chips in the European automotive supply chain (see Rosati et al. (2023) for a survey). It is thus useful to briefly summarise its genesis. Its stems from the decision of European automobile producers to cut their orders for chips when the COVID-19 crisis hit in early 2020. The chips producers then sold the production no longer required for long-term orders from the automotive industry to the electronic consumer goods industry. When car demand recovered in 2021, the automotive industry no longer had a priority claim on the remaining capacity.

This example is supposed to show the key importance of chips in the European supply chain. The European Automobile Manufacturers' Association (ACEA) called for more EU-made semiconductors to be produced ([80]). A study by the European Central Bank shows that the dip in automotive production during the chips shortage period was specific to Europe ([81]). The production of cars actually increased in other major markets.

From an economic perspective, the concept of a 'shortage' would mean that prices should increase when production is disrupted. But the claim that there was a physical 'shortage' of chips in Europe causing a fall in automobile production (and other goods) is difficult to square with the fact that imports of chips increased (in value) throughout 2021 and 2022 (from USD 32 billion in 2020 to USD 54 billion in 2022). The evidence of a shortage in the sense of a fall in supply is thus weak, although an increase in chip prices might of course have overcompensated for a fall in the quantity of imports. The US Bureau of Labor Statistics publishes a semiconductor price index that shows a dip in early 2020 followed by an increase in 2021/2022. But the increase in the US import price index from the dip in 2020 is only about 10 % and thus not indicative of a strain on global supplies and certainly not sufficient to explain the 66 % increase in the value of imports of chips over during this period. Another element that is not compatible with a shortage is that extra-EU exports of chips outside of the EU also increased by 40 % during this period.

([80]) Director General of ACEA, 2021.
([81]) De Santis et al., 2022.

The increase in exports was also possible because major European chip manufacturers increased production, and the US-based Semiconductor Industry Association reports an increase in global capacity utilisation rates over this period ([82]). All in all, the evidence does not suggest a general COVID-19-related supply disruption, but rather a sectoral shift in demand. The problems in Europe might have been caused by a simple miscalculation of the European car producers, who were used to having monopsony power over their suppliers and discovered only too late that this was not the case when consumer demand was booming.

Conclusions

The key trend over the past few decades has been the rising importance of design and software, as producers have packed ever more elements into a single chip. European firms are present in the physical aspects of the global supply chain, mostly through the near-monopoly position of the Dutch producer of advanced lithographic machines, which are essential for the most advanced chips. But most production takes place in Asia, while the design and software come from the United States. European fabs produce mostly mature node chips that are needed in manufacturing, mainly the automotive sector. This constellation confirms the more general finding of Europe being stuck in a 'middle tech' trap ([83]).

Strengthening the EU's presence in the chip 'ecosystem' requires addressing this fundamental weakness through support for software development and research and development in the critical elements of the supply chain. Even these modest steps would require additional resources. Little will be gained by just shifting funding from other areas.

In terms of the 'national' security of the EU, China is not the key problem in the chips sector. The dominance of Taiwan in advanced chips is a global issue, but one which affects the EU relatively less than it does others. Moreover, the increasing importance of software, especially for AI-related chips, gives the United States additional leverage. Strengthening the EU's position in both the physical and the software parts of the supply chain seems more promising than heavily subsidising a small number of large fabs.

([82]) SIA, 2022.
([83]) Fuest et al., 2024.

2. European policy and place-based industrial competitiveness

Combining place-based industrial transformation with centrally coordinated industrial policy in the EU

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The European Union's industrial policy has undergone significant changes in recent years. The challenge is to develop a goal-based policy that recognises the need to deliver on multiple objectives, including social and environmental goals. This shift has led to the need for a renewed focus on place-based innovation, with policymakers seeking to leverage local strengths and capabilities to drive industrial transformation.

This report aims to contribute to this ongoing debate, exploring the relationship between place-based innovation and EU industrial policy. It seeks to identify the key challenges and opportunities arising from this interaction and to propose new approaches to addressing these issues. By examining the policy context, background and key issues at stake, this report aims to provide a solid foundation for understanding the complex relationships between place-based innovation, EU industrial policy and sustainable development.

EU industrial policy may have increased or decreased in importance over the past few years, but it did not necessarily fall backwards. EU policymakers are called on to address problems that have emerged during the implementation of the Green Deal and bring more coherence and directionality to all EU policies. In this respect, the Draghi report offers a gravitas and sense of urgency that could, and should, be leveraged by launching an ambitious new agenda that is centred around industrial transformation and place-based innovation and experimentation (aspects that Draghi could have emphasised more) and that is oriented towards sustainability, resilience and security. Without coherent effort to meet this goal, Europe may not be able to achieve the responsiveness and dynamism needed to catch up with other global powers, who continue to massively rely on industrial policy and have a broader and more powerful set of policy tools and spending capacity.

This paper looks at enhancing coherence between place-based innovation and industrial policy, yet it also proposes a broader lens through which to look at the future approach of EU institutions to the sustainable, resilient and secure development of Europe. Underlying the proposed approach is the recognition that one-dimensional approaches to industrial development (e.g. decarbonisation pathways) are unlikely to deliver prosperity and well-being, which stand as the ultimate goals of the European Union; a multidimensional approach aimed at addressing key trade-offs from a comprehensive perspective on EU policy is much more suitable for such an enterprise. This, inevitably, is likely to make things more complex for EU policymakers, which is why this paper suggests, that the EU fully embraces economic complexity when looking at its geography and that of the rest of the world.

Embracing economic complexity

To embrace economic complexity and move towards more integrated, coherent industrial policy, EU institutions would need to significantly reform the policy cycle used for industrial transformation. This would include the approaches that are summarised in Table 1 and in the points below.

- **Goal-based rather than purely growth-based policy.** The complexity of, and interplay between, intermediate policy goals such as resilience/economic security, competitiveness, territorial cohesion and decarbonisation warrants an approach oriented towards the pursuit of a number of goals and decision-making tools that account for possible trade-offs. The 'superposition' and 'entanglement' of policy impacts in this respect inspired a recent talk, in which I made reference to new frontiers in public policy in the era of complex choices as the dawn of 'quantum policymaking' ([84]).
- **Mission-oriented rather than prescriptive and unidirectional policy.** This implies a rather new approach to polycentric governance in the EU, with less prescriptive rules for local and regional communities but directionality still provided to all levels of government, creating a cohesive plan for Europe's sustainable industrial transformation. At the moment, smart specialisation serves the goal of enabling local development. In the future, it will also have to create a consistent set of local contributions to a more integrated, resilient, sustainable, fair and competitive European Union.
- **Evidence- and foresight-informed policy, rather than one-size-fits-all policy.** Modelling based on economic complexity can shed light on the potential future trajectory of each and every portion of EU territory (see the findings of the Directorate-General for Research and Innovation's Expert Group on the Economic and Societal Impact of Research and Innovation on combining regional strengths to tackle the innovation divide) ([85]). At the same time, this approach would need to be complemented by adequate foresight and horizon scanning, as well as the identification of domains and technologies where European specialisation is needed, not because of pre-existing specialisation, but because of the need to boost economic security and technological sovereignty (e.g. in general-purpose technologies such as AI or quantum technology).
- **Linked to polycentric rather than single-level governance.** The interplay between multilevel governance and transnational governance, including by non-state actors, leads to the EU having a polycentric governance structure ([86]). This has consequences when it comes to developing a coherent innovation ecosystem that must be simultaneously decentralised to reflect local specialisations and centrally orchestrated to leverage economies of scale and scope. In particular, polycentricity is deeply linked to the interplay between public and private actors in local innovation ecosystems and to the ability of future EU policymakers to trigger enhanced cooperation and collaboration among innovation hubs, which are very often located in a limited number of EU cities, as elaborated on in the abovementioned Expert Group on the Economic and Societal Impact of Research and Innovation report.
- **A whole-government approach rather than a siloed one.** A common approach to industrial transformation should be shared across institutions and levels of government and clearly and systematically permeate each spending instrument the EU deploys in support of industrial transformation, from structural funds to Horizon Europe, framework programme 10 and InvestEU.
- **Flexible and experimental.** The 2024 Draghi report also emphasised the need for policy experimentation, provided that it is adequately coordinated and leads to policy learning across regions in Europe. The work done by the Joint Research Centre on Partnerships for Regional

([84]) Renda, 2024.
([85]) European Commission: Directorate-General for Research and Innovation, 2024.
([86]) Renda, 2019.

Innovation, particularly on policy experimentation, should now be brought to the EU level to enable central coordination and mutual learning.

Table 1: Old v new approaches in EU industrial policy

Old approach	New approach	Recommended policy reforms
Growth-based, prescriptive	Goal-based, mission-driven	• Reorienting all EU policies towards a coherent set of intermediate, integrated and indivisible goals (research and innovation, framework programme 10, industrial pathways, the net-zero industry action plan, the Green Deal, etc.). • Changing the better regulation agenda to monitor the alignment of entire policy domains with specific economic, social, environmental and political/security goals. • Mapping the European economy at the NUTS 2 level to define technological specialisation, relatedness and possible future frontiers and to define systemic transformation pathways for industry in each ecosystem and European region. • Incorporating systemic transformation pathways that go beyond general and sectoral (e.g. chips) industrial policies to embrace cohesion policies, the European semester, skills policies, etc.
Evidence-based	Evidence- and foresight-based	• Using accurate stocktaking and modelling tools to inform medium-term policies and goal-setting, including resilience to possible shocks and the preparation of response plans in case of massive unforeseen disruptions. • Fully integrating foresight into the better regulation agenda; the scenarios adopted as baselines for the assessment of the incremental impacts of select policy options should be discussed as alternative futures, not as an extrapolation of the present. • Defining industrial transition pathways (possibly renamed systemic industrial transformation pathways), with specific attention paid to their resilience to possible alternative future scenarios, including the likely, but also plausible, future evolution of the European ecosystem in terms of technology, geopolitics and geoeconomics. • Making foresight a multilevel exercise that is possibly aided by advanced computing and AI, in which each region of the EU is given a frontier towards which it should try to progress with the help of targeted cohesion policy measures. This multilevel foresight could be carried out with the participation of stakeholders from the affected regions.
Subsidiarity-inspired smart specialisation	Polycentric smart specialisation	• Providing substantive directionality through cohesion and structural funds, recovery and resilience funds (or their successor) and the European semester to regional reforms, including on skills, research and innovation, and industrial support measures. • Giving regions goals to achieve through funding, including socioeconomic, environmental and territorial security-related goals, while leaving them relatively free to choose how to achieve those goals, including their degree of experimental governance and portfolio management (in the spirit of mission-oriented policymaking). Compared to a purely subsidiarity-inspired approach, in this case goals are made consistent with the EU's overall vision for industrial transformation and

		the modelling of the development of industrial ecosystems across the EU in the medium term. • Rather than using a voluntary set of initiatives, make the *Partnerships for Regional Innovation Playbook* ([87]) part of negotiations for the implementation of smart specialisation initiatives aimed at reaching the frontiers jointly determined by and consistent with EU-level industrial policy. • Jointly involve the EU, national, regional and municipal levels of governance in a coherent exercise aimed at ensuring the security, sustainability and competitiveness of the European Union, inspired by the principle of 'leaving no one behind'.
Siloed	Whole-government	• Besides incorporating foresight, the better regulation agenda should also specifically model trade-offs and territorial impacts and plans to avoid the combination of policies implemented in the European Commission's annual work programme neglecting specific regions, generating or exacerbating possible discontent. • Implementing *ex post* fitness checks and performing resilience stress-testing of entire policy domains. This is particularly relevant for multilevel initiatives on systemic transformation of European industrial ecosystems, which would further ensure regions are not overlooked. • Embedding an Industry 5.0 approach into all EU policies, including the Green Deal, the agenda for skills and jobs and digital policies including those on AI. • Making framework conditions for the uptake of innovation and embracing systemic industrial transformation a cross-cutting priority in EU programmes and policies (e.g. in NextGenerationEU or its successor). Such conditions may include broadband connectivity, the digitisation of public services, the reduction of unnecessary administrative burdens, the availability of skills support and upgrade services, digital innovation hubs, and data stewardship programmes.
Linear/waterfall	Experimental/agile	• Giving regional authorities involved in a pan-European industrial transformation plan the chance to experiment with alternative pathways to reach the goals they have jointly set with the EU. This may entail deciding together on possible options in the principles for responsible investment, such as sandboxes, test beds, pilots and other experimental governance approaches aimed at testing specific solutions that may prove effective with respect to the set goals. • Embedding foresight into research and innovation, the Green Deal and systemic industrial transformation policies to enable meaningful place-based innovation, which implies that policies implemented at the local level should also be course-corrected whenever a shock (or a combination of shocks) emerges. This, in turn, requires that the choice among alternative pathways at the regional level reflects a degree of resilience to possible shocks, as this is also an element of territorial security.

([87]) Pontikakis et al. 2022; For more information, see also Innovation in territories – The Joint Research Centre: EU Science Hub.

The pursuit of competitiveness and the high stakes of territorial myopia

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Europe stands at a crucial juncture. Long viewed as a titan of global trade and industrial prowess, it now grapples with a seismic shift in economic and political power towards China and the United States. The 2024 Draghi report lays bare the continent's productivity woes: flagging growth, spiralling energy costs and a creeping sense of geopolitical irrelevance, which is being exacerbated by the second Trump presidency in the United States. Yet its proposals, however well intentioned, tread a perilous path: the pursuit of development in precisely those areas where Europe lags the furthest behind. In seeking to catch up to Silicon Valley's tech dominance and Shenzhen's manufacturing prowess, the European Union may, ironically, deepen its own competitiveness gap.

What if instead of looking at Europe's weaknesses relative to the rest of the world, Europe's diagnosis centres around what it already has? This implies a change of perspective: Europe is not playing catch up, but harnessing its considerable potential and strengths and using technology generated elsewhere in the world to (1) make sure that it continues to excel at sectors in which it still holds a global leadership and (2) facilitate the adaptation and reinvention of its existing potential and strength, leveraging Europe's dynamic sectors and considerable human capital to make sure that Europe's competitiveness is enhanced.

For decades, Europe's dynamism has come from its multiple entrepreneurial ecosystems ([88]): Germany's *Mittelstand* machine tool experts; Denmark's wind energy pioneers; and France's aeronautical clusters, to name a few. Rather than imposing a one-size-fits-all approach to industrial policy and technological adoption, a more nuanced path beckons; one that builds on the continent's endogenous capacities, using emerging tools like AI, digitalisation and automation as catalysts for reinvention, rather than mere instruments of catch-up. This paper argues that such place-sensitive strategies ([89]) offer a more robust trajectory for sustaining Europe's economic future. By doubling down on existing strongholds in, among others, pharmaceutics, chemicals and aeronautics, while simultaneously rethinking how traditional sectors might evolve, Europe can carve out a path that is at once globally competitive and intrinsically resilient.

The stakes could not be higher. Clinging to the idea of uniform convergence in a continent riven by divergent histories, institutions and capabilities is not just misguided. It is potentially self-defeating. Recent scholarship suggests that a blind chase after sectors in which Europe is already on the back foot may well produce diminishing returns, exacerbating, rather than narrowing, inequalities both within and between EU Member States ([90]). Tellingly, the very diversity that policymakers sometimes view as Europe's Achilles' heel might in fact be its most potent weapon. Harnessing it calls for a paradigm shift in how we conceptualise competitiveness, guided by evolutionary economics, path dependence and place-sensitive strategies. Through this blend of frameworks, we can chart a future that maximises Europe's inherent strengths and leverages the transformative power of new technologies, without

([88]) Stam, 2015.
([89]) Iammarino et al., 2019.
([90]) Boschma, 2023; European Commission, 2024c.

succumbing to the territorial myopia that risks not only bypassing Europe's economic potential ([91]) but also exacerbating the galloping discontent currently gripping the continent ([92]).

Europe's choice is clear: persist with a monolithic, catch-up agenda that may drain resources in an unwinnable race against our competitors or recognise that its future lies in the polymorphic strengths of its diverse territories. Territorial myopia is the real economic and political danger. If Europe becomes fixated just on where it lags and attempts to shoehorn every region into the same mould, the economic and political risks will only mount up. A more promising path would be to channel investment in new technologies into the places where they can thrive and trust that Europe's inherent diversity will prove an asset, not a hindrance.

By doubling down on core sectors – such as pharmaceuticals, chemicals and aeronautics – and incrementally transforming current industries using new technologies such as AI and automation to increase their performance and complexity, Europe can foster a new wave of competitiveness. This approach must be underpinned by a nuanced cohesion policy that targets place-based potential rather than uniform catch-up, alongside governance structures that facilitate cross-regional knowledge exchange. The stakes go beyond economics. In a climate of rising Euroscepticism, a policy that rewards endogenous strengths and does not abandon many European territories to stagnation ([93]) may help mend the fractures threatening European unity.

Ultimately, the question is not whether Europe can out-scale China or outspend the United States in raw technological terms. Rather, it is whether the EU can harness its internal variety to produce a competitive edge that is both durable and equitable. Leveraging local strengths need not mean ceding leadership in emerging sectors; rather, it can mean allowing each region to serve as a laboratory of innovation, collectively pushing the frontier of what is possible in AI, green energy, automation and beyond. If Europe embraces this path, it can reinvent its industrial destiny not by imitating Silicon Valley or Shenzhen, but by harnessing its distinct heritage to lead on its own terms.

([91]) European Commission, 2024c.
([92]) Rodríguez-Posé and Dijksta, 2024a.
([93]) Diemer et al., 2022.

Innovation and entrepreneurship: advancing place-based growth and networking ecosystems

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In times of profound change to the global economic system and overlapping crises – of peace and prosperity, of trust in institutions and treaties, and of shared values and systems – innovation and entrepreneurship remain the essential drivers of growth that is based on technological progress, economic competitiveness and wealth creation ([94]). The resilience of the European single market, and by extension the sustainability of the European welfare state model, depends on its capacity to harness these drivers in a strategic and inclusive way. In today's shifting geopolitical landscape, innovation and entrepreneurship have moved even more than before to the forefront of both public policy and business strategy. The Draghi report marks a turning point in European economic governance, placing competitiveness – rooted in innovation capacity – at the heart of a new growth agenda. Even when not named explicitly, innovation and entrepreneurship underpin the logic of Europe's emerging strategic framework for managing a multi-crisis reality.

For EU Member States, innovation policy is no longer just an economic and social tool – it is a cornerstone of their political future. The 'geography of discontent' maps a worrying trend: regions that lag in innovation capacity are increasingly becoming strongholds for political extremism ([95]). This pattern suggests a systemic risk to the European project. In complex systems – of which the EU is a prime example – small, peripheral shocks can trigger cascading failures, a phenomenon known as the butterfly effect. When regional stagnation is left unaddressed, it creates not only economic drag but also political destabilisation that can reverberate across the continent. The implication is clear: closing the innovation gap is a democratic imperative as much as an economic one ([96]).

The accelerated pace of socioeconomic transformation in the digital age can be explained through what network science refers to as 'network logic'. Enabled by information and communication technologies, this logic concentrates resources – capital, talent and opportunity – into a limited number of global hubs. These hubs become self-reinforcing engines of growth, while peripheral regions risk being left behind unless networked with the global innovation system ([97]). Public policies, including industrial policy, and the current trade war amplify these effects. In this context, the integration of the European single market emerges as both a necessity and an opportunity. To respond, EU policymakers must craft a new generation of innovation policies – both defensive and transformative – aimed at accelerating the development of regions with emerging innovation, while protecting vulnerable regions by networking them to prepare for future shocks.

Strengthening dynamic regional innovation hubs, while connecting high-performance ecosystems across regions or countries, offers a pragmatic path forward. Instead of thinly distributing resources across the EU, a more focused and evidence-based strategy is needed – one that invests in regions with a demonstrable capacity to nurture entrepreneurial firms and attract entrepreneurial talent and finance. No longer can we afford to deal with the European 'innovation paradox'.

([94]) Aghion and Howitt, 1992.
([95]) Rodríguez-Posé, 2018; European Commission, 2024a.
([96]) Heitor et al., 2025.
([97]) Tataj, 2015.

This policy brief explores the dynamics of innovation ecosystems in times of polycrisis. It uses several sources of statistical data, such as the European regional innovation scoreboard and global rankings, to help identify where superior capabilities lie ([98]).

The reality is that, contrary to expectations, the European Union does not have many innovation hotspots compared to other regions. Only a few of its larger metropolitan areas can be ranked as outstanding in terms of innovation. Yet, the continent has many ecosystems that can support such innovation hotspots and offer very different innovation and growth dynamics. Therefore, a special focus is put on central and eastern Europe. This is because strategic priorities such as technological sovereignty, security and defence put these regions at the forefront of change. They are good test beds in which to experiment with radically new competitive policy approaches for a combination of reasons, such as harsher competition for resources, an emerging 'make-or-break' culture and an empty playing field – some policies, mechanisms and infrastructure are simply not there yet.

A place-based innovation ecosystem can be defined as a geographical concentration of innovation resources and a capacity to leverage these local assets, capabilities and stakeholders to drive innovation and economic development that are tailored to that specific region's unique context ([99]). Successful innovation ecosystems, such as Silicon Valley, Oxbridge or Shenzhen, share common features. A number of innovation frameworks have analysed these common features and the conclusions can inform policies aiming to accelerate competitiveness, especially in central and eastern Europe. Although research has led to substantial evidence on what these features are, EU policies have so far had a limited impact. In Europe, 64 EU regions perform below 70 % of the EU average. Additionally, this phenomenon is even more prominent in central and eastern Europe, where the innovation gap widens, with some notable exceptions.

Thriving innovation ecosystems rely on a shift from linear knowledge transfer models to networked co-creation models, where triple and quadruple helix dynamics dominate. This interdependence is crucial for effective regional smart specialisation strategies, which require deep engagement among stakeholders to align local capabilities with broader EU missions. However, in many Member States, including those in Central and Eastern Europe, collaboration remains fragmented or top-down, limiting the potential for innovation. The concept of the 'entrepreneurial state' created by Mariana Mazzucato ([100]) reframes the public sector as a market-shaping actor that sets the direction for innovation through mission-oriented investments, which can 'crowd in' private capital and build confidence in emerging markets.

Research on innovation ecosystems shows that innovation flourishes in environments where resources are densely concentrated and interconnected, including physical infrastructure, talent, social capital and entrepreneurial finance. The concept of relatedness density provides a powerful analytical framework for identifying regions with latent potential for transformation and guiding investments towards adjacent technological opportunities. By prioritising investments in domains where innovation is most likely to succeed, regional strategies can avoid past inefficiencies and create

([98]) European Commission, 2023a.
([99]) Renda, 2019.
([100]) Mazzucato, 2013.

virtuous cycles of innovation. This approach can help regions in central and eastern Europe to overcome the ‘innovation paradox’ and their structural weaknesses by providing entrepreneurial talent, finance to innovation and by concentrating resources in areas with high potential for growth and innovation.

A strategic pivot from cohesion-driven equity to competitiveness is essential. EU innovation policy must evolve to support the selective, evidence-based concentration of investment in regions that show strong relatedness indicators, particularly in sectors critical for the EU’s strategic autonomy – such as AI, cybersecurity, defence technologies and clean tech, as outlined in the 2024 Draghi report.

In many regions – including those across Central and Eastern Europe – the rise of AI, automation and platform labour is reshaping the demand for skills at a pace that existing educational and training systems struggle to match ([101]). These transformations are structural realignments that call for equally structural policy responses ([102]). Education systems must foster green and digital competences at all levels, while innovation funding must incentivise projects to embed sustainability and inclusivity into their core ([103]). Circular business models, for example, often rely on localised production and maintenance systems, which can anchor economic activity in regions that were previously bypassed by globalisation. This makes circularity not just a climate imperative, but also a territorial development strategy ([104]).

Generally, the high rankings of Member States in various global rankings can be largely attributed to their substantial investments in research and human capital and their strong performance in patent applications, high-tech exports and sustainability (in terms of environmental protection, renewable energy and green technologies). However, the EU underperforms in its ability to translate innovation into high-growth firms. A key obstacle is the limited availability of venture capital investments, which, in combination with a risk-averse culture, affects the growth potential of start-ups. Furthermore, over-regulation and the fragmentation of national innovation policies across Member States also negatively affect overall innovation performance and competitiveness.

Innovation ecosystems are fundamentally based on a high degree of interaction and collaboration among diverse stakeholders, which tends to concentrate in specific geographical areas. Therefore, analysing innovation ecosystems at the subnational level can provide a more detailed picture (see Table 2). The rankings of cities and larger agglomerations at this level reveal a different perspective on the EU’s global standing. Notably, according to three separate rankings, only one EU city – Paris – is ranked into the top 10 global ecosystems, with the rankings otherwise dominated by cities from the United States and Asia. The best-performing global ecosystems are led by cities such as San Francisco, New York, London, Los Angeles, Beijing and Boston.

([101]) ESIR, 2017.
([102]) Heitor et al., 2024.
([103]) Draghi, 2024.
([104]) Pontikakis et al., 2022.

Table 2: Leading global innovation ecosystems, according to different rankings

Ranking	Global Innovation Hubs Index 2024	Global Startup Ecosystem Report 2024	Global Startup Ecosystem Index 2024
1	San Francisco Bay Area, United States (7.8 M)	San Francisco Bay Area, United States (7.8 M)	San Francisco Bay Area, United States (7.8 M)
2	New York, United States (19 M)	London, United Kingdom (9.5 M)	New York, United States (19 M)
3	Beijing, China (21 M)	New York, United States (19 M)	London, United Kingdom (9.5 M)
4	Boston, United States (4.9 M)	Tel Aviv, Israel (4.3 M)	Los Angeles, United States (15 M)
5	London, United Kingdom (9.5 M)	Los Angeles, United States (15 M)	Boston, United States (4.9 M)
6	Guangdong (*), China (86.6 M)	Boston, United States (4.9 M)	Beijing, China (21 M)
7	Shanghai, China (26.3 M)	Singapore (5.9 M)	Shanghai, China (26.3 M)
8	**Paris, France (11 M)**	Beijing, China (21 M)	Bangalore, India (12.3 M)
9	Tokyo, Japan (37.8 M)	Seoul, South Korea (23 M)	Tel Aviv, Israel (4.3 M)
10	Baltimore area, United States (2.8 M)	Tokyo, Japan (37.8 M)	**Paris, France (11 M)**

Sources: Compiled by the authors. Index rankings for the Global Innovation Hubs Index 2024, Global Startup Ecosystem Report 2024 and Global Startup Ecosystem Index 2024 were sourced from https://www.nature.com/articles/d42473-024-00457-w, https://startupgenome.com/report/the-global-startup-ecosystem-report-2024/introduction and https://www.startupblink.com/startups respectively.

Note: The population sizes of the cities or areas are presented in brackets. Estimations are for 2023 (sources: www.demographia.com; www.statista.com; www.metropolis.org).

(*) The full ecosystem is the Guangdong–Hong Kong–Macao Greater Bay Area.

France has a very centralised innovation ecosystem and Paris stands out among other EU cities in having top-level research institutions with a high output of new knowledge and patents, with leading universities contributing to a wide pool of talent ([105]). The city has an integrated start-up support and incubation ecosystem. Furthermore, Paris has demonstrated a remarkable ability to attract venture capital, with notable successes in emerging sectors such as AI, and it boasts strong market connectivity, facilitating the growth and scaling of innovative businesses. However, its investment in start-ups from the public sector is relatively high compared with other ecosystems ([106]). The next tier of EU cities in the ranking includes Munich, Amsterdam, Dublin, Copenhagen and Stockholm, which follow closely behind the leading cities in terms of their innovation ecosystem performance.

All listed cities are very large ecosystems, with the Baltimore metropolitan area being the smallest, with 2.8 million inhabitants. Of course, not every big city or agglomeration of cities is a globally important innovation ecosystem, but size matters, especially in terms of the market. The EU single market is lagging behind the US market. In 1993, the two economic areas were of comparable sizes. However, while gross domestic product (GDP) per capita in the United States increased by almost 60 %

([105]) Nature Research Intelligence et al., 2024.
([106]) StartupBlink, 2024.

from 1993 to 2022, in Europe the increase was less than 30 % ([107]). In comparison, China's GDP increased by more than 100 % in the past decade alone.

The EU has the potential to develop its own network of 'Silicon Valleys', leveraging regional strengths and fostering collaboration. By addressing structural barriers, targeting high-potential sectors and enhancing network externalities, Europe can unlock the full potential of its innovation ecosystems. The expertise of the Joint Research Centre (JRC), particularly in its Directorate B, offers a valuable foundation for achieving these goals. The insights from JRC point to some of the necessary revisions or changes in assumptions to be made for innovation policy.

First, the ranking of global ecosystem competitiveness makes it clear – market size matters. Fast growth requires immediate access to a broad and unimpeded market. The EU needs to continue work on the single market with a vision, as stated in the Letta report. The further growth and frictionless singularity of the market is essential for EU ecosystems' competitiveness and for the growth of innovation.

Second, one would assume that increased digital interconnectedness and streamlined networking would reduce the importance of physical agglomerations of infrastructure, people and capital, enabling a more widespread and dispersed presence worldwide. However, the evidence suggests that this is not the case. It is important to be a part of a big physical ecosystem and simultaneously to have access to digital networks.

Third, the question of whether financial resources follow talented individuals, or individuals migrate to areas with an abundance of financial resources remains unanswered. However, the evidence suggests that the latter is more often the case – venture capital is a crucial ingredient for a thriving ecosystem, and its presence tends to attract top talent and drive growth. The top-ranking European and EU ecosystems have large amounts of venture capital available. Nevertheless, ecosystems from China and the United States have significantly more venture capital available to them.

Fourth, the EU is a global scientific powerhouse and is actively participating in the attraction of research talent. But in addition to that, the EU must also look for the entrepreneurial talent that could start and scale businesses using the EU's excellent existing research base. The European Innovation Council (EIC) could play an important role in this. The EIC is already tasked with the important role of spotting, funding and scaling innovative ideas in the EU, and especially with looking for breakthrough 'deep tech' innovations. Through its three-tiered funding scheme – EIC Pathfinder for early, high-risk research; EIC Transition for technology maturation and business-case development; and EIC Accelerator for bringing start-ups and small and medium-sized enterprises to market via grants and equity investments – it supports projects from concept to commercialisation ([108]). In addition to this, the EIC could contribute to the attraction of entrepreneurial talent from abroad with instruments like matching grants (financial and non-financial) for people with ideas and some initial funding.

([107]) Letta, 2024.
([108]) For more information on the EIC visit the EIC's website: https://eic.ec.europa.eu/.

Finally, the growing demand for policy experimentation, particularly with a place-based approach, positions regions in central and eastern Europe as ideal testing grounds for innovative solutions to competitiveness challenges. Their advantage, compared to the mature innovation ecosystems, is their unique environment, characterised by versatile regulatory practices, different dynamics among the innovation ecosystem participants, intense competition for resources and existing regulatory virtual and physical spaces for completely new approaches, which makes them an attractive setting for piloting novel and radical competitive policy approaches.

In conclusion, improving Europe's innovation capacity requires a reinforced commitment to developing a cohesive and competitive network of innovation ecosystems across the EU. This should be achieved by integrating selected hotspots in the most advanced countries with the most dynamic hotspots in countries labelled as emerging innovators by the EU regional innovation scoreboard. This entails deepening the single market and enhancing access to different types of entrepreneurial finance (from seed capital to venture capital and private equity) but also fostering the mobility of entrepreneurial talent. Some existing instruments which have demonstrated their effectiveness, such as the EIC, which provides critical funding for scaling-up companies, should receive significantly larger budgets. And the innovation hotspots of Central and Eastern Europe, which offer unique conditions for piloting innovative, place-based policy interventions, should be used to carry out a sandbox approach and develop new EIC-type competitiveness instruments. By aligning these two perspectives – augmenting the supply of entrepreneurial finance in the most advanced ecosystems and encouraging experimentation in dynamic, emerging hotspots in central and eastern Europe – the EU can move forward leveraging both strengths and opportunities.

3. European innovation dynamism: the challenge of creative destruction

Breakthrough science – from 'framework programme' to European Research Fund

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Introduction

The European Union has always been a union of relatively small countries with only a few exceptions: Germany, France, Italy and Spain. The integration that happened after the Second World War was all about integrating strategic sectors (coal and steel), reaping the benefits of trade within the single market while ensuring competition, enabling labour mobility and sharing research. The large differences between EU Member States were central to the way in which the free mobility of goods and services, workers and citizens, and knowledge would bring about advantages to the EU as a whole. The benefits of such integration were of course much more significant for smaller Member States than for larger Member States. This is true of defence and security as it is of research. Indeed, the absolute size of the national public research and development (R & D) budgets varies greatly between individual Member States ([109]).

This leads us to a central question: does the EU as supranational entity have a less effective R & D spending system than the United States?

The European research system: from complementarity to overlap

Over the years and alongside European integration, a European R & D system has grown and been 'consolidated' through different treaties, providing a strong legal base for the management of R & D at both the European and national levels, making this an area of shared parallel competence.

Initially, at the start of the European integration process, the complementarity between national and European R & D policies was clearly defined: European policies would primarily focus on the R & D needs most of the smaller European countries would be confronted with, which at the beginning of the European 'community' was the Benelux countries and also Italy. It was, for example, difficult for such countries to pursue nuclear research independently. These countries saw great added value in a European approach that would share the overheads of technological research, ensuring less duplication of efforts and avoiding suboptimal levels of activity. Thus in 1954, the European Organisation for Nuclear Research (CERN) was created, and during 1959–1961 four joint research centres were set up. Later many other large European scientific instruments were set up ([110]).

([109]) See, in particular, RISE group of experts (2019).

([110]) The first legal basis for developing science and technology at the European level was actually established by the Council of Europe in 1949 (its objectives included scientific cooperation). This was subsequently picked up by the Treaty of Paris, which established the European Coal and Steel Community in 1952 (research and development of technology in coal and steel), and by the Treaties of Rome, which created the European Economic Community in 1957 (agricultural research) and the European Atomic Energy Community (Euratom) in 1958. Later, in 1971, science and technology became institutionalised with the creation of a new committee of the Council of Ministers, European Cooperation in Science and Technology (COST), and

In the 1970s, the focus of European research policy gradually moved to strengthening European industrial competitiveness. The narrative of a 'technology gap' with the United States represented a major incentive for the development and design of technology and industrial support policies for industries such as space and civilian aviation, which again could benefit much more from a European-level, as opposed to a national-level, approach. Thus, Airbus was created in 1970 to reap the benefits of economies of scale and compensate for the lack of a common European market, just as the European Space Agency (1975). It is worth observing that the defence sector, which is heavily dependent on R & D, was left out of EU development and remained supported by only national policies.

In the early 1980s, the policy focus was still on benefiting from European scale, which was the main factor behind the further expansion of the notion of industrial competitiveness to technological competitiveness with the Esprit initiative of the Commissioner for Industry in the European Community. This initiative brought together Europe's largest information technology firms and invited them to create the first European 'framework programme', (111) organised around five principal themes in what was called 'pre-competitive research and development': advanced microelectronics, software technology, advanced information processing, office systems and computer-integrated manufacture. In 1986, with the Single European Act amendments to the Treaty of Rome, this framework led to a list of Community-specific responsibilities for strengthening 'the scientific and technological basis of European industry', which were translated into a variety of new programmes (and new European acronyms!) describing various industrial policy support measures, including the subsequent framework programmes. Discussions are currently under way on the design of the 10th such programme, for 2028 to 2035.

The amendments gradually eroded the old complementarity of the two-policy approach – which combined a European policy and 27 national ones – with increasingly overlapping European and national support policies now competing with each other for proposals. This is characteristic of Europe's research and innovation system and ultimately acknowledged in the Lisbon Treaty, which defines this area as one of shared parallel competence. The provisions of the Lisbon Treaty implied a strong and growing emphasis on the need for more and better collaboration between Member States and the European Commission in the design of their R & D and innovation support programmes.

At the same time, the academic community has brought to the fore the intrinsic value of European collaboration on basic and fundamental research between universities and public research institutions located in Europe and even beyond. This led in 2010 to the creation within the framework programmes of the European Research Council, which has become one of the showpieces of independent, purely excellence-based, breakthrough science funding in the EU. It is now a major component of Pillar I of the current Horizon Europe framework programme. The successful enlargement of European technological competitiveness to fundamental research and breakthrough science raises the question, now more than ever, of the appropriate level of management and of overlapping governance. From

the appointment of the first Commissioner responsible for Industry, Research and Technology, Altiero Spinelli. In 1978, the European community spent nearly 70 % of its research budget in the field of energy.

([111]) A framework programme can be defined as follows: a broad, overarching structure or plan that provides a set of guidelines, rules, and principles for a specific area of activity, often involving research, innovation, or development. This definition highlights the emphasis on guidelines, rules and principles.

an upstream subsidiarity perspective, in many research areas closely linked to scientific infrastructure, governance at the European level is likely to be more effective qualitatively and more efficient cost-wise.

The fragmentation of research in Europe

For most European countries, public R & D budgets are insufficient to cover all relevant research fields. For the four to six medium- to large-sized European countries, this might be less the case, but overall it could be argued that fragmentation is what characterises the European research system.

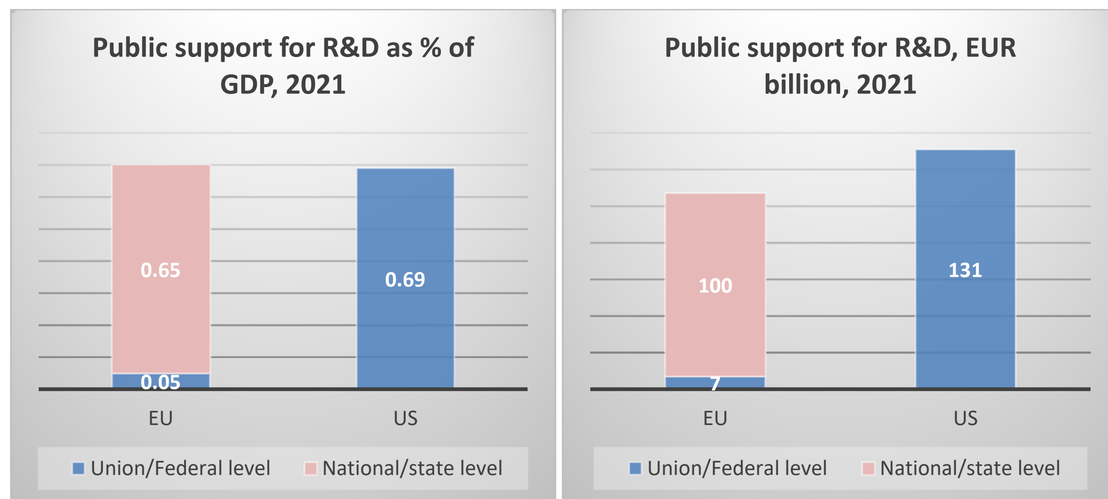
The point is well made in the Draghi report, where it was noted that, apart from the large and growing gap between private R & D funding in Europe and that in China and the United States, it is the fragmentation of European public R & D funding which is particularly striking. As Draghi noted:

> *Public R & D spending in the EU is comparatively high. Public spending on R & D stands at 0.74 % of [gross domestic product] in the EU Member States compared with 0.69 % in the US, and 0.5 % in both Japan and China. There is significant heterogeneity among EU Member States. Public spending on R & D ranges from 0.94 % in Germany to a mere 0.15 % in Romania, and many other Member States suffer from low and highly volatile R & D investment expenditures ... In the US, the vast majority of public R & D spending comes from the federal budget. In the EU, it largely comes from the budgets of the 27 Member States, complemented by a smaller amount of EU-level resources* ([112]).

In short, Draghi highlights that public R & D spending in the EU 'is highly fragmented across Member States, not consistently directed towards EU-wide priorities, and often difficult to access ... R & D spending at the EU level mostly comes from Horizon Europe, the EU's Framework Programme for [research and innovation]. Other EU-level resources come from the structural and cohesion funds and the European Defence Fund. All the EU-level funding of public R & D accounts for around one-tenth of the overall public spending on R & D in the Union [see figure below]'. That figure has been reproduced as Figure 2 here.

([112]) Extract from the Draghi report (Draghi, 2024), 'Part B – In-depth analysis and recommendations', pp. 235 and 236.

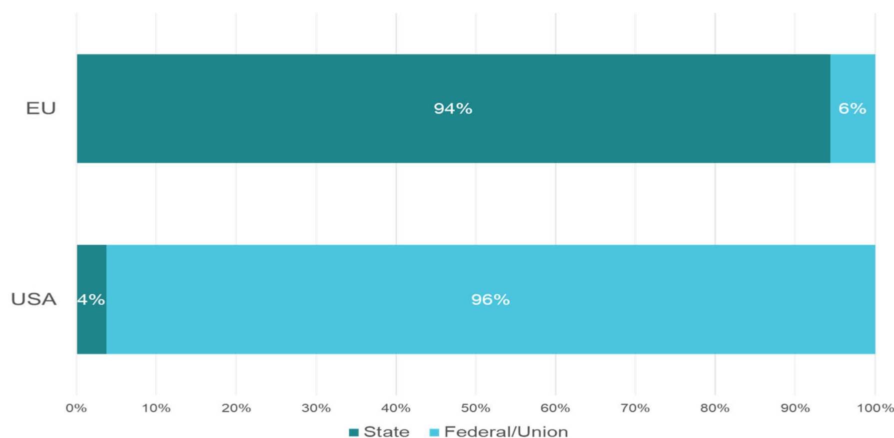
Figure 2: Union/Federal versus National/state sources of R&D funding in the EU and the United States



Source: European Commission, 2024. Based on Eurostat and the Organisation for Economic Co-operation and Development.

Similar conclusions were drawn by Steeman, Peiffer-Smadja and Ravet (113) and are presented in Figure 3.

Figure 3: State versus federal R & D funding in the EU and the United States for 2021, as a percentage of total governmental funding of R & D



Source: Reproduced from Steeman et al. (2025). Based on Eurostat data (EU) and National Center for Science and Engineering Statistics data (United States).

Note: For the EU, Union funding is funding from the European Commission, while state funding is from EU Member States. For the United States, federal funding is funding from the federal government, while state funding is funding from state and local governments. Depending on the data year used, the percentage of Union level funding in the EU may be higher, potentially close to 10 %.

([113]) Steeman et al., 2025. In our own interpretation, the United States has a highly centralised public R & D funding system. Of all public R & D funding, 96 % comes from the federal budget, with 4 % of public R & D funding coming from 'state' (and local) resources. This stands in stark contrast to the situation in the EU. According to the available Eurostat data, public R & D funding predominantly comes from the budgets of the 27 Member States (94 %) and is complemented by a small amount of EU-level resources (6 %).

It is interesting to observe that the calls made in both the Draghi report and the Heitor report for a doubling of the public funds devoted to R & D at the EU level do not address this fragmentation. Doing so is the core recommendation made here.

From framework programme Pillar I to a European Research Fund

There is currently an urgent need to directly address the European fragmentation of public research funding (especially the funding of fundamental research and groundbreaking science) between European funding as embedded in Pillar I of the framework programme and the national funding of such research in the Member States. The timing, in line with the Draghi report, is also ideal, given the current discussions on the next framework programme (FP10), which will be part of the next multiannual financial framework for the EU budget.

More precisely, we make the following recommendations.

More public funding for fundamental research (or breakthrough science) should be allocated at the EU level.

- Fundamental research (for breakthrough science) should become the prime responsibility of the EU. This would allow the discussion on the framework programme to focus more on questions of content again, such as those below.
    - How can Europe continue to be a global leader in independent research, including science for policy research, adhering to principles of open science, open access, findable, accessible, interoperable and reusable (FAIR) data, etc.?
    - How can Europe guarantee independence in research in the context of increasing political interference in academic research (see the current Trump administration’s attempts to influence US universities’ research on, among others, the debate on vaccinations, its reduction of environmental data collection, its attack on measures supporting ‘diversity and inclusion’, its withdrawal from the Paris Agreement on climate change, etc.)?
    - Much fundamental research is curiosity-driven and unburdened by immediate security or defence considerations. Its contribution to European security will therefore be first and foremost indirect, safeguarding excellence, openness and independence. This will ensure Europe’s long-term capacity to generate knowledge that may eventually have defence and security applications.

    Explicit security research falls primarily within the realm of applied and mission-oriented research, rather than fundamental science research. The main point of contact between the two is the question of knowledge security – how to maintain the principles of open science while preventing misuse, foreign interference or the unintended transfer of sensitive dual-use knowledge.

  In short, and following larger subsidiarity arguments, fundamental research should be organised in a transnational, European setting, not a national one.

At a practical level, we recommend that Pillar I of the Horizon Europe programme become known as the European Research Fund (ERF).

- This fund would include, in addition to EU funding through the current Pillar 1 budget of EUR 25 billion (EUR 3.6 billion a year), public funding from Member States on (fundamental) research. This funding will be on a voluntary basis. The financial principle of *juste retour* will be applied to ensure that each Member State gets back in approved research contracts/grants what it has contributed to the ERF in terms of its national public funding ([114]). While the basic principles governing research are broadly similar among Member States, the advantages of allocating research funds at the EU level include reduced administrative costs and less fragmented research.
- The individual Member States' research budgets, which would become part of the ERF, will be excluded from the regular European semester assessments of Member States' fiscal deficits. With the transfer of responsibility to the EU level, these national research budgets, given their long-term impact, would be exempted from the economic and monetary union's criterion that Member States' fiscal deficit stays within 3 % of their gross domestic product ([115]).
- National research councils from Member States would be in a position to fully participate in the ERF, benefiting from similar *juste retour* principles. In doing so, the ERF would overtake US public R & D funding and be a global guarantor for independent, high-quality research that shares the values of open science and open access and adheres to the principles of findable, accessible, interoperable and reusable (FAIR) data.

In short, we propose that the EU reconsiders the 'framework' of its research and innovation policy. In cases of fundamental research and breakthrough science, it should take on full responsibility; in other cases, it should share responsibility with the Member States.

This new responsibility would be a good fit with the EU's role as a supranational democratic entity and global guarantor of the international values of open and independent science and research. This is a role that is increasingly needed in the current geopolitical environment of disinformation, and one that is under further pressure because of (gen)AI.

([114]) The principle of *juste retour* is meant here as a guarantee that each Member State's national research funds that are being outsourced to, for example, the European Research Council, will result in research grants going back to that Member State (but not necessarily to researchers in that Member State), thus ensuring that the principle of grant transportability is applied to these funds. This would ultimately lead to more research specialisation, including the scaling up of research. The Draghi report pointed to the striking fragmentation of public research funds in Europe but did not provide any solutions (Draghi, 2024).

([115]) This was the proposal made by Commissioner Philippe Busquin at the Lisbon summit in 2000.

New ideas for funding scientific research in areas of societal relevance – analysing the co-evolution of research methods and financial tools

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Introduction

In a recent article in *Nature*, Hill (2023) emphasised the need to mobilise new financial instruments to fund scientific research, and in particular fundamental research conducted in the public research system. The goal is to improve the current model by attracting private investors to this area, which has long been the prerogative of the Swiss government due to potentially high spillovers to society, high fixed costs, large uncertainty and poor short-term profitability prospects. In particular, Hill argues that research impact bonds (RIBs) – bonds that provide the investor with a larger return if the research project is successful – can be used to finance research, not only enlarging the pool of available financing, but also improving the current model by promising 'strong accountability, no risk to the funding organization and a direct demonstration of impact'.

Indeed, in the current model, the funding mechanism used by most national science foundations is the research grant. This mechanism pays for research inputs, not outputs. As a result, the risk of failure is fully supported by public agencies: in cases of success, the problem is solved and the government has funded the advancement of knowledge, perhaps leading to huge social benefits; in cases of failure, the public has paid for 'nothing', and this does not seem to be a very smart use of public money ([116]). As emphasised by Hill (2023), this seems to suggest that there may be a need for new solutions that improve the efficiency of research financing.

Such solutions may come from the finance industry, which is highly innovative [117]; one can see a proliferation of the financial engineering (FE) tools used to solve difficult funding problems when projects are highly desirable from a societal point of view but uncertain, risky and extremely expensive. Hull et al. (2019) identify a market failure here. As mentioned by Hill (2023), the aim of using innovative FE tools is to attract new sources of financing to projects that might not otherwise receive funding or to improve the conditions under which this financing is realised, notably by leveraging financial markets' ability to share risk.

In this paper, we investigate the scope of applicability of such tools to finance research, and particularly public research that is oriented towards the sustainable development goals. After describing three tools from the financial engineering toolbox, we discuss the scope of applicability of RIBs in more detail and use them as an example to illustrate the co-evolution of research methods and financial tools.

([116]) This is not entirely true since failures also provide information for future research (David et al., 1992).
([117]) Lerner et al., 2023.

The financial engineering toolbox: three examples of tools

Several tools have been proposed in the academic literature on finance as innovative ways to finance research. Here, we explore three of them and discuss their scope of applicability: megafunds, advance market commitments (AMCs) and impact bonds (IBs).

Megafunds are innovative financing mechanisms that consist of pooling together similar projects with uncorrelated outcomes. This mechanism aims at financing projects that can be qualified as **long shots** ([118]), namely projects that have the potential to generate large benefits for society, but which are too risky for any private investor to invest in due to the huge amounts of capital required, long development times and/or low probability of success. Such projects may be the development of a new drug to cure cancer ([119]), alternative energies, nuclear fusion or space exploration ([120]). The fundamental principle on which this mechanism works is that of diversification. Indeed, when a single project's risk is so high that it becomes unattractive to potential investors, one way to mitigate this is diversification across projects whose outcomes are uncorrelated. While funding only one project is not an attractive prospect for private investors, funding a portfolio of 150 projects dramatically changes the risk–return profile of their investment, making mega-investments much more attractive. In this case, the risk of the portfolio of projects (the megafund) is less than that of a single project, because the likelihood that a few projects will succeed and cover the losses of the other projects is higher than the probability of a single project being successful. Megafunds therefore seem to be an interesting option for financing research projects where diversification is possible and the projects have a direct commercial potential (e.g. the development of a new drug to cure cancer), generating what can be thought of as a sustainable financing model.

The rationale underlying AMCs is very different from that underlying megafunds. The idea here is to cope with the problem of asymmetric information by paying for the outcome of a project, not for the input. By doing so, there is a transfer of risk from the financer (e.g. the government, via research grants) to those who are performing the research (academic teams, corporate research and development (R & D)). Transferring risk to the researcher aims to generate a set of incentives that will enable them to provide the adequate level of effort. AMCs were proposed by Michael Kremer in 2001. He suggested the creation and design of artificial markets to incentivise firms to undertake research in areas such as vaccines for tropical diseases, where profit expectations are very poor. The thinking behind AMCs is as follows: A government makes a legally binding commitment to buy the new vaccine at a high price. However, the government will pay only if the vaccine is invented and meets performance criteria which were specified *ex ante*. The commitment is not about subsidising the inputs but about buying the output. Thus, money changes hands only if the research is successful and has generated a real innovative product, thereby transferring risk from the public agency to the researchers and investors. Such an approach sends a strong signal to the market (stronger than fragmented companies making net-zero commitments) while potential investors are still uncertain about what kind of solutions will be selected by the market. Another great advantage is that this signal can be sent right away, despite the fact that the products are not yet ready. This will enable the acceleration of development processes and the creation of appropriate framework conditions for 'crisis innovations', by giving industry the

([118]) Hull et al., 2019.
([119]) Fagnan et al., 2013.
([120]) Hull et al., 2019.

confidence it needs to begin building new capacities and capabilities right away. However, an AMC scheme will only work (as suggested by Kremer) for product innovation, such as the development of an innovative vaccine, agricultural innovations or a carbon removal solution, where success can be clearly identified. It does not work for basic research where success is very uncertain and difficult to measure. For such projects, public grants still seem the most obvious funding mechanism.

Like AMCs, IBs aim to share risk, moving risk away from the public sector to the private sector. The main difference however is that with IBs, the risk is not borne by the researcher but by private investors. IBs are a specific type of bond whose return depends in part on the outcome of a given project. The return for the investor is larger (or smaller) if the project succeeds (or fails). Because part of the risk of IBs depends on the risk of the project (and part on market fluctuations), they are an interesting investment opportunity for investors looking to diversify their portfolio. By changing the risk–return profiles of potential investments, IBs facilitate the funding of projects that are socially desirable. IBs have proven to be very useful and effective for social policies or infrastructure projects aiming at, for instance, reducing recidivism or adapting a city or a rural area to climate change. Hill ([121]) argues that they can also be used to finance research projects via RIBs.

The scope of applicability of impact bonds in research: the case of research impact bonds

While new FE tools offer promising opportunities, public grants will remain an essential mechanism of funding. This is due to the economic fundamentals of scientific research, which remain intact because research is still about generating knowledge – a non-rival and partly non-excludable (public) good – in the context of unhedged uncertainty.

Financial engineering can help attract private investors, but this will work only for rather small portions of the entire portfolio of research projects. Indeed, the fundamental problems arising from the transposition of IBs to research funding are threefold.

- First, because R & D is strongly subject to asymmetric information, the investor cannot monitor the level of effort that is put in by the researchers. This issue is a well-known market failure in the economics of R & D called **unhedged uncertainty**.
- Second, it is much more difficult to delineate clear criteria for success in scientific research than in the development of physical infrastructure. But the need to define (and agree upon) **clear success and failure criteria** is a crucial for using IBs.
- Third, by nature, IBs require the establishment of detailed contracts – to determine the conditions and criteria upon which payments will be made – which may generate **significant transaction costs**. As a result, the use of IBs may be confined to expensive, large-scale projects where such costs are likely to be an insignificant part of the total cost.

RIBs might find some relevance in

- speculative science and curiosity-driven research (funded through public grants);
- some types of basic research and development (funded through a megafund mechanism when risks are diversifiable, meaning that a very large number of projects can be run in parallel) ([122]);

([121]) Hill, 2023.
([122]) Lo, 2021.

- applied research that leads to product development (funded through an AMC) ([123]).

RIBs are applicable to a certain class of projects – projects where researchers can credibly commit *ex ante* to a precise methodology, milestones and deliverables – thereby solving the problem of unhedged uncertainty. Also, the preregistration approach ([124]) allows for the partial adaption of the inherent unhedged uncertainty of research to financial market requirements (including the possibility of assigning probabilities to a project's success or failure).

Research impact bonds as a case of co-evolution between research methods and financial tools

The confluence of some research approaches (preregistered research) and new financial engineering tools such as RIBs provides a fascinating example of the co-evolution of research and finance. It is beyond the scope of this paper to discuss whether such co-evolution has been generated by design or by accident, but this co-evolution is a fact and offers new opportunities for funding certain types of research.

However, this funding process also has limitations. It is almost a truism to say that this new funding instrument requires its users to have excellent research capabilities and a high capacity in managing research funding. This implies that new funding opportunities are not equally distributed across research systems. Exploiting them involves the enhancement of organisational capacities and R & D capabilities, as well as the adoption of a new research culture (preregistered research), which might be beyond many research organisations and universities, particularly in less advanced countries within the EU. This is an intrinsic limitation of RIBs that could create even more inequality between the top national research systems in Europe, which would gain access to even more resources, and others. An obvious solution involves the creation of EU programmes to train scientists in the new culture of research and parallel programmes for training university managers to use these new financial engineering tools.

Conclusion

To conclude, we would like, when all is said and done, to return to the economic fundamentals of scientific research ([125]). Scientific research fundamentally aims to produce a public good (knowledge), and in most cases unhedged uncertainty and an absence of the clear determination of success and failure will dominate. In such cases, it seems impossible to try to attract private investors (with a few exceptions). It eventually leads to a choice which society must make knowingly: that of bearing all the risks research entails.

([123]) Kremer, 2001.
([124]) Nosek et al., 2018.
([125]) Nelson, 1959; Arrow, 1962.

Breakthrough innovation – open strategic autonomy through defence innovation? Lessons from the US defence innovation system

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Russia's war of aggression against Ukraine and the Trump administration's erratic foreign and security policy have given clear contours to what European policymakers understand as open strategic autonomy and technological sovereignty. While these concepts emerged from concerns about declining economic competitiveness and increased technological dependence ([126]), reshaping the security landscape has brought defence capabilities to the heart of open strategic autonomy and technological sovereignty concerns. In the changing geopolitical landscape, the EU faces enormous pressure to rethink its defence policy, particularly its defence research and development (R & D), and how defence relates to its other key policy agendas, such as the twin transitions, cohesion policy and mission-oriented policies ([127]). The EU Member States spend ca 17 times less on defence R & D than the United States ([128]) and they lack a relevant public institutional and organisational ecosystem to deal with increased demands and spending.

Edler et al. define technological sovereignty as the capacity of a state or federation to provide the technologies it deems critical for its welfare, competitiveness and ability to act, either by developing them internally or sourcing them without one-sided dependencies ([129]). Their definition emphasises resilience and strategic autonomy over complete self-sufficiency, acknowledging the importance of international collaboration and avoiding over-reliance on external entities. In terms of this framing, Europe's well-known and documented weak defence R & D quite significantly impacts its quest for technological sovereignty in four ways.

- First, Europe is dependent on external suppliers. The EU's reliance on foreign inputs for knowledge, components and raw materials in critical sectors like semiconductors, AI and cybersecurity has long been highlighted as a vulnerability.

- Second, the defence market is strategically and operationally fragmented. Divergent national specifications and procurement processes lead to inefficiencies and hinder the development of interoperable systems.

- Third, the defence market is politically fragmented. Differences between national authorities and bureaucratic systems have created multiple competing authorities and demands when it comes to framing defence problems, identifying defence priorities, and justifying their involvement in defence R & D processes.

- Fourth, and perhaps the most obvious challenge, is insufficient investment in R & D. Compared to its global competitors, Europe lags behind in research and development, impacting its innovation and technological advancement.

([126]) For further discussion, see Edler et al., 2023; Bria et al., 2025.
([127]) European Commission: Joint Research Centre, Kattel et al., 2024.
([128]) European Commission: Joint Research Centre, Kattel et al., 2024.
([129]) Edler et al., 2023.

However, the nature, structure and orientation of the development of the EU's R & D capacity remain in question. While the defence landscape is changing, the nature of industrial requirements to respond to such a new landscape is also changing. Historically, the importance of defence R & D and innovation has been well documented ([130]). R & D and innovation related to and resulting from (US) defence missions play a crucial role in Mazzucato's entrepreneurial state and the new generation of mission-oriented policies focused on grand societal challenges ([131]). Deleidi and Mazzucato argue that public expenditure on defence R & D has the highest multiplier effect, which they call the supermultiplier, and the crowding-in effect of any public expenditure ([132]). Thus, the case for supporting and spending money on defence R & D and innovation is very clear. Much less clear is how and in what areas this increase should occur. The increase in spending will be necessary, but the how of these new policies will also be pivotally important.

Thus, while the EU and its Member States must build their capacity to pursue new defence-related R & D to support novel directions and a capacity for turning programmes into rapid structural change and capacity development, such as in the energy and cyber sectors and their related physical infrastructure, it is much less clear how they should go about it. However, it seems increasingly clear that developing and conserving open strategic autonomy in the 21st century increasingly relies on pursuing transformative policy actions, which rely on both critical R & D capacity and the ability to develop and scale industrial capacity from R & D developments.

To build a transformative R & D capacity, individual Member States and the EU have often turned towards the example of the US innovation system. In particular, the Defense Advanced Research Projects Agency (DARPA) is framed as an example of the kind of institution the EU needs to centralise its transformative R & D capacity and develop collective autonomy. This essay focuses on the key lessons from the US defence innovation system, particularly on public-sector capabilities developed and deployed for high-risk, high-reward defence R & D and innovations. We intend to highlight some key lessons for European policymakers on expanding and deepening defence R & D in Europe. In what follows, we first briefly summarise the EU's defence R & D challenges and the solutions typically proposed; then, we take a closer look at DARPA's history and its capabilities; and finally, we draw up lessons for the European defence R & D ecosystem's development.

In the quest for open strategic autonomy and technological sovereignty, the EU faces significant challenges in its defence R & D landscape. Its stark comparison with the United States, particularly in terms of the operations and impact of DARPA, underscores the gaps in the EU's funding, integration and innovation. We argue that merely replicating the DARPA model is insufficient and may not even be feasible. Rather, Europe needs to cultivate its own distinct approach, tailored to its unique geopolitical, economic and institutional context.

The existing EU defence R & D structure is marked by fragmentation, insufficient investment and a reliance on external suppliers. These vulnerabilities necessitate a comprehensive overhaul that moves beyond incremental improvements to transformative policy actions. Addressing these challenges requires a multifaceted strategy encompassing enhanced funding, improved market consolidation,

([130]) Mowery, 2010.
([131]) Mazzucato, 2013; Mazzucato, 2018a.
([132]) Deleidi et al., 2021.

deeper policy integration and a focus on socioeconomic impact. The literature we reviewed consistently highlights the need to close the transatlantic R & D gap, foster dual-use technology transfers and encourage collaborative R & D efforts.

Learning from the United States' experience with DARPA provides valuable insights, but direct replication is not the answer. DARPA's success is not solely attributable to its organisational structure but also its operational environment and political support. Instead of striving for a singular, monolithic institution, Europe should aim to build a diverse and interconnected ecosystem of agencies, each with specialised strengths and capabilities. This ecosystem should be underpinned by robust governance in the form of a network of defence R & D programme managers, support infrastructure and active engagement with broader societal agendas, such as the twin green and digital transitions.

Five key lessons emerge for the development of the European defence R & D ecosystem. First, the EU must create multiple high-risk, high-reward programmes focusing on disruptive innovations and anticipating future technological surprises. Second, fostering a culture of 'strategic amnesia' within these programmes can encourage risk-taking and the pursuit of novel solutions. Third, these agencies should be surrounded by specialised support structures to navigate bureaucratic inertia and enhance agility. Fourth, annual defence R & D challenges must be established to broaden awareness, foster community engagement and forge connections with broader societal goals. Fifth, the ecosystem should ensure policy coherence at a high level, aligning defence R & D priorities with other strategic domains, such as the green and digital transitions and social cohesion.

In conclusion, the path to open strategic autonomy through European defence innovation requires a paradigm shift. Rather than copying other models, Europe must craft its own distinct approach.

European security in a changing geopolitical context – from the European research area to the European defence research and innovation area

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The past decade has seen a significant change in the global geopolitical context in which the European Union operates. The wave of socioeconomic and technological disruptions and geopolitical tensions could even be said to be shaking the foundations of the EU itself.

For an institution that received the Nobel Peace Prize for demonstrating how openness in trade and economic integration among individual nations would not just bring economic growth and welfare but also peace, this change represents a fundamental challenge, and even an existential threat. In his 2012 Nobel Peace Prize acceptance speech, José Manuel Durão Barroso, the president of the European Commission at the time, highlighted the role of openness: 'As a successful example of peaceful reconciliation based on economic integration, we contribute to developing new forms of cooperation built on exchange of ideas, innovation and research. Science and culture are at the very core of the European openness: they enrich us as individuals, and they create bonds beyond borders.' ([133]).

The core principle of openness, upon which the EU was built, reflected the primacy of economics in international relations, both internally within the EU and externally in its relationships with the outside world. Internally, openness led to the gradual expansion of single market principles, not just in the trade of goods but also the trade of services, capital, labour and – as highlighted by Barroso – knowledge. Externally, openness became an intrinsic part of the European values of democracy and transparency towards the outside world.

The focus on openness fitted within an international, multilateral system in which Europe was at the forefront of setting up international exchange standards through its own free trade agreements ([134]). These represented typical 'soft power' instruments that could be expanded to include broader, global welfare principles such as human rights and, in more recent times, sustainability, which has become an integral part of trade policy and, as a result, an exclusive competence of the EU.

Behind the priority given to openness was the central assumption that the EU's internal and external economic relationships could be ring-fenced from the interference of geopolitics. Such an assumption appeared logical given the success of the European economic integration project with the acceptance of many eastern European countries into the EU following the collapse of the Soviet Union. With hindsight, it can be argued that the EU's enlargement in the 21st century has been a political and security project that has been carried out predominantly through economic policy ([135]).

([133]) The text of his speech is available here: https://www.nobelprize.org/prizes/peace/2012/eu/lecture/.

([134]) In 2011, the free trade agreements were enlarged with the inclusion of a trade and sustainable development chapter; for a brief discussion, see Blot (2023).

([135]) Caroline de Gruyter, a journalist from the Dutch newspaper *NRC*, recounted an evening during the euro-area crisis in 2011 on which she discussed with a top Finnish civil servant at a bar in a Brussels hotel why, for Finland, all proposed solutions to the crisis were out of the question. She finally asked him 'If you criticise and shoot down everything, why are you a member of the eurozone in the first place?' She recalled: 'I have lost this man's name. But I have never forgotten his answer, because it made it clear that the Finns know where they stand in the world. He looked at me sternly, was silent for three seconds for maximum effect

Current events in Ukraine and in Georgia have shown how and why such a view of security no longer works. And, as recent European and domestic elections have shown, security concerns have again become important drivers of political debates. How can we understand the positions of EU Member States in the overall shift in priority towards military and defence investments? Has 'security' been a missing element in Europe's notions of competitiveness, sustainability and social welfare? To what extent can science and research be organised in Europe to contribute to greater feelings of security? What does security imply for Europe's international collaboration in science?

Major events on the continent and heightened geopolitical tension between China and the United States have forced the EU to face these security challenges. Both China and the United States have been able to integrate their economic, technological and security agendas relatively easily ([136]). As we will show below, such integration is, by design, much more difficult for the EU and its Member States.

The EU's core principles and agreements are unlikely to be changed in the current climate, particularly given the fact that not all countries view security threats, and even partnerships, in a similar fashion. Accordingly, it is of pivotal importance for the European Commission to lead the way in finding forms of institutional innovation that enable the integration of economic, technological and security agendas across the EU. We propose that such an institutional innovation could be a **European defence research and innovation area** (EDRIA), which would build on the successes of science and innovation on the one hand and cohesion policies on the other.

In the first section, we discuss how the current change in mindset being seen in Europe developed slowly over the past 10 years. While the changes in Europe's external environment following Russia's unprovoked invasion of Ukraine certainly played a major role, the perception of the European integration project as a peace project also implied that the EU did not act as a geopolitical power. Nor did it internally address the elephant in the room of noneconomic European integration: the defence sector. However, as argued here, herein lies perhaps the key danger: that the EU and its Member States will view defence as a 'sector'. Instead, defence should be viewed as a distributed and complementary capability that helps tackle Europe's core challenges and achieve its missions, as captured in current and future strategies. In the simplest of senses, security should complement the EU's strategic agenda surrounding the twin transitions.

In the second section, we turn to the implications for European research and innovation policy. The way the EU has addressed common policies in research, technological development and space exploration appears particularly useful insofar as it represents a 'shared parallel competence', not just

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and said with a rolling r: "Se-cu-ri-ty." … The official began to explain like a schoolteacher that Finland's border with Russia is over 1 300 kilometres long. That it had been peaceful there for decades after a couple of terrible wars and that Finland wanted to keep it that way. If there were any hassle with Russia, he said, Finland would immediately be "in the shit". A phenomenal, geopolitical shit. That border, he said, was Finland's Achilles heel. Everything Finland did remained focused on not provoking Russia and, at the same time, covering itself in case it did. Even after 60 years of peace. "That's why Finland has the euro. Not because we like it. Or because, like you, we wanted to get rid of those eternally turbulent exchange rates of European currencies. No, we have the euro because of security. We participate in everything in Europe because it gives us cover. Every layer of European integration is another layer of security for Finland"' (de Gruyter, 2024).

([136]) See, for instance, the discussion in Weiss, 2024.

a ‘shared competence’. This means that Member States can create national science and research policies (including legislation) in parallel to the EU, regardless of whether the EU legislates or not. In areas of ‘shared competence’, Member States can do this only where the EU has not exercised its competence or has explicitly ceased to do so. In short, what we have here called an EDRIA could be developed under a similar system of ‘shared parallel competence’ that does not question individual Member States’ national responsibility concerning security but, at the same time, allows for the emergence of a parallel European competence, which exists alongside the membership of most, but not all, Member States to NATO.

In the third section, we discuss opportunities to more closely link the construction of such an EDRIA to the European Commission’s two core civilian priorities: the European Green Deal and the digital agenda. The opening up of these two priority areas to dual-use opportunities (i.e. the development of the military use of civilian research and the development of civilian applications for military research as proposed in the White Paper ‘On options for enhancing support for research and development involving technologies with dual-use potential’ ([137])) is likely to incentivise the innovation dynamics associated with implementation opportunities in Europe’s large internal market. Civilian–military separation has prevented Europe from reaping the full benefits of spillover from European military procurement, with the latter having been constrained to national procurement initiatives. This explains why, contrary to China or the United States, innovation-led procurement and domestic lead market initiatives found in many areas of the European Green Deal and the digital agenda have, despite the huge amount of public resources made available, had such difficulties taking off in Europe: the economic incentives to rapidly scale up through the existence of a large internal market were missing.

European policymakers face difficult trade-offs in increasing economic growth and industrial competitiveness, increasing efforts made in the green and digital economies, and coming to terms with new security realities that require increased investments. As the European and several national elections in 2024 have shown, this is not an easy task to accomplish, particularly as domestic political conditions are often challenging for incumbent governments.

It is even more important that the EU develop a coherent and overarching approach to security investments and aligns this with its green and digital agendas.

This reflection paper proposes fundamental shifts in Europe’s unique, long-standing and (to different degrees) relatively successful policy frameworks.

This is the case for the area of research and innovation policy where the nature of the multilevel governance between the EU and its Member States has been one of ‘shared parallel competence’. It would be an area that can be easily expanded to include more explicitly defence-focused research. In short, as argued in this full paper, the European research and innovation area should be broadened to an EDRIA. These shifts would allow:

- first, for market expansion and integration in security and defence-related national expenditures (e.g. through much broader dual-use allowances in research and development and procurement);

([137]) European Commission, 2024.

- second, governments to advance their green and digital growth agendas by introducing conditionalities to such investments;
- third, governments to address regional imbalances in their societies by integrating territorial development goals into defence programmes.

The reflections presented here are likely to raise many questions and debates, not just among European and Member State policymakers but also within the science, technology and innovation community itself. These may include philosophical and ethical questions concerning the need for and nature of the shift from spending Europe's peace dividend from its 'open science, open innovation and open to world' knowledge system to a more security- and fairness-focused 'Europeanisation' of research and cohesion ([138]).

Hopefully, the reflections presented here will also contribute to broader discussions on how to integrate security into the economic narrative of European integration – a narrative that has historically been dominated by industrial and technological competitiveness and more recently dominated by sustainability and digitalisation, but that is today in need of a broader perspective that includes fairness and, therefore, security.

([138]) The response from universities and different public research organisations, who are the main public stakeholders in the European framework programmes, to the consultation launched by the European Commission in 2024 following its White Paper on 'options for enhancing support for research and development involving technologies with dual-use potential' accurately illustrates the complexity of the issues that would emerge after the exclusive focus on civilian research in the current Horizon Europe programme is removed. These range from ethical assessments of the possible risk of military misuse of research to the human rights of individual researchers wishing to retain the ability to prevent their research from having military applications, to even a restriction on the participation of many German universities (a total of 70 or so) that have civilian clauses in their statutes in the programme. See the overview of responses to the White Paper by Martin Greenacre (2024) in *Science|Business*.

Can Horizon Europe help to close the competitiveness gap?

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Introduction

Competitiveness has once again risen to the forefront of the European Union's policy agenda. The European Commission's competitiveness compass, launched in early 2025 and drawing heavily from the Draghi report, stresses that the productivity gap between the EU and the United States does not stem from traditional manufacturing, where both regions are broadly comparable, but from the dominance of the United States in high-tech sectors. These sectors combine faster growth with higher productivity, making them decisive drivers of long-term economic performance. Consequently, the EU is now debating the creation of a new competitiveness model centred on innovation-led productivity, where research and development (R & D) is positioned as the critical lever.

However, Europe has long struggled to meet its ambitious targets for R & D spending. Since the Lisbon agenda of 1999, which called for 3 % of gross domestic product (GDP) to be devoted to R & D, progress has been minimal. By 2023, the EU's R & D spending had reached only 2.2 % of its GDP – around EUR 380 billion – of which the private sector accounted for about 70 %. Over the past decade, this percentage has grown by barely 0.15 percentage points, while in the United States the equivalent measure rose by nearly a full percentage point, widening the transatlantic gap. This suggests that decades of exhortation and programmes have failed to move the needle.

The difference largely reflects the state of business R & D, which surged in the United States but stagnated in the EU. Public support is similar in both economies, but EU spending remains overwhelmingly national in character. Horizon Europe, the EU's flagship R & D program, distributes about EUR 13 billion annually – less than 0.1 % of the EU's GDP and only a fraction of the total public spending on R & D. This makes it a relatively small player in absolute terms, though its design and effects warrant closer scrutiny. The Commission is now proposing a competitiveness coordination tool to better align national and EU investments. Yet such coordination has been attempted repeatedly, with limited success.

A brief history of attempts to coordinate national research and defence policies

Efforts to harmonise national science and technology policies date back to the 1970s and have little lasting impact. The European research area, created in 2000, sought to pool resources and reduce duplication, but its concrete mechanisms proved narrow in scope. Programmes like Eurostars endured, but they remained small relative to Europe's needs. Later attempts, such as the joint programming initiatives of 2008–2009, similarly fell short, while treaty-based coordination tools required EU Member States to take initiative and produced few scalable results.

The reasons are clear. R & D funding is politically sensitive and domestically contested; national governments and research institutions are reluctant to subordinate their priorities to European coordination, particularly when tangible cross-border benefits are hard to quantify. Unlike defence procurement – where joint development yields obvious efficiency gains – R & D coordination lacks immediate visible payoffs. Small Member States like Finland or Sweden demonstrate that size is no

barrier to innovation, further weakening the case that integration necessarily produces better outcomes.

If coordination remains unlikely to take off, the rationale for EU-level funding must rest not on theoretical spillovers but on practical effectiveness. One strong argument is that EU-wide calls for proposals attract a larger and more diverse pool of applicants than national schemes, increasing the chance that the best ideas receive support. This is an advantage that coordination cannot replicate, since the location of the most promising innovators is inherently unpredictable.

Horizon Europe versus national research and defence funding

While modest in scale compared to national programmes, Horizon Europe differs in character. It allocates most of its funding through competitive, project-based grants, whereas national governments devote large shares of their budgets to research-performing institutions. These bodies are valuable for long-term agendas and industry links, but competitive funding is vital for new entrants and start-ups.

Horizon Europe contributes roughly EUR 6 billion to private firms annually, which is nearly half the business-sector support provided by Member States. In less research-intensive countries, Horizon Europe calls for funding may represent the most important single source of funding for innovative companies. In this sense, Horizon Europe helps level the playing field across the EU, ensuring that firms in weaker innovation systems still have access to meaningful opportunities.

Traditional metrics of European value added emphasise cross-border collaboration. Yet oversized consortia, especially those funded under Pillar II, often become unwieldy and dilute impact. A more meaningful measurement lies in EU-wide competition itself, which exposes firms and researchers to a broader realm of ideas than fragmented national calls for funding could provide. Pillar II dominates Horizon Europe programmes in budgetary terms; private companies receive about 40 % of all Horizon Europe funding, with small and medium-sized enterprises (SMEs) and high-tech firms receiving a significant share. High-tech SMEs receive about EUR 1 billion per year. While this is small compared to total amount spent on high-tech R & D, it is significant relative to the very limited resources SMEs themselves devote to such activities.

Yet the distribution of Horizon Europe funding is very concentrated at the top (in technical terms it follows the Pareto principle): Airbus, Leonardo and Siemens together absorbed EUR 650 million in grants over the past decade – about 5 % of all Horizon Europe funding that went to companies. These firms participated in hundreds of projects, often through subsidiaries, creating an oligarchic structure. By contrast, the archetypal small innovative company participating in a single project accounts for only a minor fraction of the total funding.

The practical effect is that large incumbents secure repeated, moderate-sized grants which, though competitively awarded, rarely shift their overall trajectory. For example, Airbus invests around EUR 3 billion annually in R & D; the EUR 380 million of Horizon Europe support it has received over ten years was a negligible supplement. Unsurprisingly, studies find little evidence that such grants generate additional private R & D in large enterprises. Moreover, these large enterprises have an

outsized influence on the research topics contained within Pillar II via their influence on Member States, who determine the research agenda in relevant committees. In contrast, small firms show measurable positive responses to support, particularly when involved in smaller consortia or SME-focused single-recipient schemes.

Measuring impact

Assessing Horizon Europe's impact is challenging. When firms receive multiple grants, disentangling their effects becomes nearly impossible. However, if one combines the CORDIS database with firm-level financial records one can undertake a rigorous evaluation.

Firms that received only one Horizon Europe grant displayed temporary increases in employment and revenue during the project, but these effects faded once funding ended. This hump-shaped pattern held across multiple checks, indicating that many projects boost activity only while subsidies last. The exception came from smaller consortia and SME-oriented programmes, where growth effects persisted beyond the project horizon. The evidence of durable competitiveness gains from EU funding is thus weak. Large firms absorb substantial funds without measurable impact on their growth or R & D intensity. Collaborative projects funded under Pillar II often generate only short-lived increases in these areas. Only smaller consortia and dedicated SME programmes deliver more sustained benefits.

In summary, the EU's challenge is not a lack of ambition but the effectiveness of its instruments. To escape the middle technology trap, Europe must design funding schemes that nurture high-growth innovators rather than sustain established giants. Horizon Europe, though modest in scale, can make a decisive difference if its resources are concentrated where its catalytic effects are strongest.

Conclusions

Europe's competitiveness challenge stems less from its manufacturing sector than from lagging behind the United States in high-tech sectors, which combine high productivity and rapid growth. The European Commission's competitiveness compass calls for innovation-led productivity growth, with R & D acting as the main lever. Yet past experience shows that raising R & D spending alone is insufficient, and coordinating national policies has proven politically and practically ineffective.

Horizon Europe, although modest compared to national R & D budgets, plays a strategic role. Its competitive, EU-wide calls for funding expand the opportunities available to SMEs and firms in weaker innovation systems. Evidence shows, however, that large incumbents absorb a disproportionate share of its funds without measurable impact, while smaller firms and SME-oriented schemes deliver more sustained benefits. Most large collaborative projects boost employment and revenue only temporarily, whereas targeted programmes for small consortia and SMEs yield durable growth.

Policy priorities should therefore include (1) shifting resources from large Pillar II consortia to SME-focused Pillar III instruments, (2) simplifying the rules to limit oversized consortia, and (3) leveraging EU-wide competition rather than relying on the unrealistic coordination of national R & D. Europe's ability to compete with places like the United States will come from supporting high-growth innovators across the EU, not subsidising established giants.

Sustainability

Introduction: sustainability and growth

The emergence of the need to achieve sustainability gives rise to a much more complex set of triangular relationships than the one Schumpeter identified between capitalism, socialism and democracy. The pursuit of sustainability creates tensions with respect to both capitalism and democracy. Particularly in the EU, these tensions are reflected in major social, territorial and political frictions that surfaced when the European Commission and the EU Member States started to implement the key building blocks of the European Green Deal. These building blocks include the Climate Law, the European environmental action programme, the Corporate Sustainability Reporting Directive, the Ecodesign for Sustainable Products Regulation and the Nature Restoration Law. While the choice of instruments may be questioned, climate and biodiversity science clearly point to the urgent need for policy action in the areas of climate and sustainability. Furthermore, the long-term economic costs to producers and consumers – but also to society, in terms of welfare and well-being – of the failure to achieve sustainability and combat climate change are significantly higher than any potential short-term gains that may be reaped from pursuing unsustainable policies.

The tension between capitalism and sustainability has been at the forefront of much policy debate ever since the Meadows report – *The Limits to Growth* – was published half a century ago. At the time of its publication in 1972, the report put a lot of emphasis on the intrinsic Malthusian limits to growth in a context of exploding population growth, resource depletion, food shortages, capital investment and pollution. There was no specific talk about climate change in the report, but it could have been included in a relatively straightforward way in the section on pollution.

Most of the critique on *The Limits to Growth* came from the economics community and the science, technology and innovation research community, invoking, on the one hand, the self-regulating power of markets and rising prices in reducing demand for non-renewable resources (e.g. fossil fuels and minerals) and inducing the search for new supplies ([139]) and, on the other hand, the role of technological progress in increasing the efficiency of material and resource use and in enlarging the supply of finite resources through geological discoveries ([140]). In contrast to the fixed assumptions underlying the different scenarios in the Meadows report, critics argued that the endogenous capacity of society to regulate itself either economically through behavioural changes or technologically through innovation would allow the world to continue to grow despite the demographic explosion of the 20th century ([141]).

Looking back, technological development produced significant productivity and material efficiency gains. However, it also ushered in, particularly in its interaction with information and communications technology and design, a new era of innovation-led mass-consumption-based growth ([142]). Following

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([139]) Arrow (1994), for example, considered the absence of rising prices for both fossil fuels and raw materials one of the most striking paradoxes of the renewed phase of high growth in the 1990s.

([140]) See, for example, Freeman, 1973.

([141]) From 1.65 billion to 6 billion in the 20th century. At the time of writing of *The Limits to Growth*, the world population was 3.9 billion; today, it is 8 billion.

([142]) Higgs (2014), writing on the 40th anniversary of the publication of *The Limits to Growth*, provides a nice historical overview of consumerism and the relentless search for new wants as an engine for economic growth. See also Higgs, 2021.

the early decades of the rapid post-war catching-up of productivity growth in Europe, described in the previous chapter as *les trentes glorieuses*, growth in the Organisation for Economic Co-operation and Development world was driven primarily by dramatic improvements in digital, information and communications technologies ([143]). Regarding demand, it resulted in a similarly dramatic increase in the variety of services and consumption patterns. This coincided with a general trend of high-income consumption aspiration patterns diffusing across the globe, triggered by, among other things, access to rapidly increasing opportunities for digital wireless communication. Consumer variety in digital goods and services became one of the core driving forces for innovation-led economic growth.

Modern capitalism and sustainability

Indeed, when 'population' is replaced with real future global consumption aspirations in the old Thomas Malthus hypothesis that 'the power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race', the Malthus quote takes on a more intriguing 21st-century twist. The quote then points to the intrinsic tendency of consumer capitalism to accumulate indefinitely. In short, by enabling the continuous expansion of the demand for new consumer goods, the invention and innovation of goods and services contributes indirectly to the global unsustainable development that we are witnessing today ([144]). It is interesting, in this context, to reread Keynes's 100-year-old publication *Economic Possibilities for Our Grandchildren*, less for his future predictions than for his framing of what he called the 'economic problem' ([145]):

> *If, instead of looking into the future, we look into the past – we find that the economic problem, the struggle for subsistence, always has been hitherto the primary, most pressing problem of the human race – not only of the human race, but of the whole of the biological kingdom from the beginnings of life in its most primitive forms.*
>
> *Thus we have been expressly evolved by nature – with all our impulses and deepest instincts – for the purpose of solving the economic problem. If the economic problem is solved, mankind will be deprived of its traditional purpose*.

If Keynes were alive today, he might have difficulty considering economic growth in highly developed, rich countries as purposeful.

And yet, as Erik Brynjolfsson points out, the current digital transformation of society and in particular the global speed of the diffusion of generative AI illustrates that '[a]ugmenting humans with technology opens an endless frontier of new abilities and opportunities' ([146]). He explains, 'inventing tools that augment the process of invention itself promises to expand not only our collective abilities, but to accelerate the rate of expansion of those abilities', and goes on to say, 'most of the value that our economy has created since ancient times comes from new goods and services that not even the

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([143]) See, for example, Freeman et al., 1994. From this perspective, it is rather ironic that the innovation gap identified by Draghi, 2024, in his report *The Future of Competitiveness* is first and foremost a digital gap.
([144]) Soete, 2009.
([145]) Keynes, 1930.
([146]) Brynjolfsson, 2022.

kings of ancient empires had, not from cheaper versions of existing goods'. The costs to sustainability of such AI-inspired 'augmentation' of purpose and usefulness is what is at the core of the current analysis.

At the same time, modern capitalism has the technical potential to combine economic development with sustainability, as illustrated by the notion itself of a European Green Deal. In this context, Europe attempts to develop a sustainable capitalist model that is different from that of China or the United States. As pointed out by Éloi Laurent in this report, the ongoing European debate on sustainability and competitiveness, as highlighted in particular in the Draghi report on the productivity gap between the EU on the one hand and China and the United States on the other, is mainly informed by standard economic indicators such as gross domestic product per capita. As Laurent writes, Draghi identifies that 'the EU's approach has delivered outstanding outcomes in terms of governance, health, education and environmental protection'. It is therefore important for EU institutions and Member States to discuss the current state and future of European prosperity from a broader well-being perspective, rather than only in terms of the traditional, standard economic indicators. Recent research by the Joint Research Centre points in the same direction ([147]).

Sustainability in a changing capitalism

The relationship between sustainability and the evolution of capitalism is at the centre of the discussion on the purpose and usefulness of further economic integration in the EU. In many of the capital- and energy-intensive manufacturing sectors, the economic advantages of the single market became the growth engine, or sometimes even the survival mechanism, of many of the large successful European incumbents of the 1980s and 1990s. By contrast, in many of the similarly capital- and energy-intensive public utility sectors, such as energy provision, telecommunications and rail transport infrastructure, the economic benefits of a more integrated European market have never been fully realised, and many of these currently privatised public utilities continue to operate primarily within their national home markets.

As a result, the structural change involved today in achieving 'sustainability' has become a particularly complex task, hindered by both economic and political constraints. In some areas, large incumbent firms are confronted today with huge, past large-scale sunk capital and investment costs, reducing their adaptability, and as a result rendering the costs of the sustainability transition much higher. In many cases, there are significant obstacles to relocating for firms hoping to benefit from easier or cheaper access to renewable energy sources (148). As a result, and as already discussed in the previous section in the context of the feasibility of industrial policies, incumbents in particular industries may strategically prefer to delay structural transitions as long as possible, as seems to be the case for the shift of the European motor vehicles industry towards electric vehicles. At the same time, to the extent that foreign competitors are either state supported (as in the case of China) or no longer clearly committed to decarbonisation (as in the case of the United States), delaying strategies have become not just economically more attractive, but even existential survival strategies for many energy-

([147]) When measuring welfare beyond gross domestic product, the EU often surpasses the United States due to its lower income inequality and better overall population health (Da Costa, 2025).

([148]) For example, firms may relocate to be close to wind farms or solar power plants and thereby reduce energy costs or even ensure price-efficient energy autonomy (see Soete and Stierna, 2023a).

intensive sectors in Europe (e.g. (petro)chemicals), with the gap in energy costs with foreign producers undermining their international competitiveness.

At the level of citizens, what is most noticeable is the tension between sustainability and democracy. The increasingly complex, multilevel European policy governance with respect to sustainability has become characterised by over-regulation, or 'gold-plating', as the Draghi report called it: countries and/or regions competing to outdo each other by implementing stricter (and sometimes more cumbersome) sustainability regulations. This competition illustrates the tension between sustainability and democracy from a territorial perspective, particularly in view of the traditional 'space-blind' nature of most European policies and economic integration principles, as already highlighted in the previous section and in our earlier publication ([149]). Can the EU's social cohesion and regional policies contribute to reducing the growing territorial tensions between capitalism, sustainability and democracy? We come back to this issue in the next chapter, on democracy, and the contribution of Pete Lunn ([150]), on understanding discontent. Some political factions and leaders are tapping into citizens' concerns about their livelihoods by either denying flat out that climate change and the biodiversity crisis are concerns or even real, or by claiming that tackling them will not require any significant changes in production, consumption or energy generation. Interestingly, today social-media-based democracy seems to provide no effective protection against such claims. In the field of renewable energy deployment, ignoring the place-based nature of the decarbonisation and biodiversity challenges could even be said to have undermined democracy and given rise to neo-nationalist narratives, which pit local or national burdens against private profits or public, transnational European decrees.

The helicopter view taken within the European Green Deal was based on an expected synergy between, on the one hand, the scientific community and the businesses world, uniting around green industry targets, and, on the other hand, trade unions supporting climate policy by linking job security to long-term sustainable production. However, ignoring the place-based challenges involved in the green transition came at a particularly high price for democracy, particularly for transnational economic entities such as the EU. Today, certain localities are likely to lose large amounts of industrial activities, with no prospect of being provided with credible green alternative opportunities for employment and income any time soon. Moreover, rural places far from economic centres are suddenly being confronted with large increases in mobility and production costs. As we discuss in the democracy chapter, it should come as no surprise that, in both industrialised and rural regions, industrial workers and farmers are today opposing the Green Deal and turning to support the far right as the cost of the energy transition directly threatens their livelihoods.

The 'climate coalition', as argued by Pierre Charbonnier in 2025 ([151]), today consists primarily of 'strategic transition actors' such as scientists, engineers and planners, along with 'engaged consumers' and educated city dwellers, who benefit from sustainable infrastructure; participants are a largely professional and technocratic elite, not people with low incomes or rural communities, whose livelihoods or jobs are most directly affected by the effects of the transition.

([149]) Schwaag Serger et al., 2023.
([150]) Lunn, 2025.
([151]) Charbonnier, 2025.

The search for economic sustainability concepts

There has been a gradual recognition that capitalism, regardless of whether it occurs in systems in which citizens contain or keep in check the power of the state (democracy) or in which the state curtails or constrains the freedom of citizens (autocracy), has been at the global level 'extractive' with respect to nature. Hence, a new conceptual consensus is emerging between ecologists and economists ([152]) on the need for capturing in countries' national accounts the costs of both the extraction of nature and its maintenance, as highlighted in the contribution of Dominique Foray, referring to, among others, the work of Partha Dasgupta and Kevin Levin ([153]). As these authors put it:

> *The revised economic grammar we now need sees economic life as requiring us to manage our assets. We may have enjoyed unprecedented improvements in living standards in the Anthropocene; but … we have done so by accumulating produced capital and human capital while depreciating natural capital.*

Of central importance to the various Fair and Sustainable Economy contributions is the fact that capitalism, in interaction with sustainability, has also been accompanied by growing inequality. This inequality is observed not so much in income from work but rather in the possession of wealth, including, and in some ways reminiscent of, private access to unspoiled, unique spots of nature (as mentioned above). When combined with increasing energy costs and a decline in affordable housing, as have been observed in Europe in recent years, it is not surprising that both capitalism and sustainability are viewed as undermining – or blamed for the decline of – social cohesion, fairness and, therefore, democracy.

We argue that overcoming the abovementioned tensions requires that the Schumpeterian dynamism of 'creative destruction', which we described as one of the missing features in the context of European integration in the chapter on capitalism, should now be embedded in and adapted to the challenge of sustainability. Both the paper by Arnold Tukker ([154]) entitled 'The role of circularity in European strategic autonomy' and the one by Dominique Foray ([155]) entitled 'Smart specialisation strategies need to enter a third historical phase to promote truly sustainable development in regional economies' provide inspiration for a new situation in which creativity is not just driven by profits, and destructive processes respect nature.

On the one hand, one could think of the notion of creative resource efficiency acknowledging the need for smart prioritisation through an entrepreneurial discovery process, as Foray emphasised, and which has been introduced in regional smart specialisation strategies. On the other hand, resource efficiency could be considered to point to the need to reuse resources in the most effective way, as highlighted by Tukker, now fully endogenising any extraction of materials from nature, whether physically from

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([152]) See the study regarding the European Parliament's conference Beyond Growth, on new economic models (European Parliament, 2023). The conference was organised jointly by the Club of Rome, the Directorate-General for Research and Innovation, the Joint Research Centre and the Directorate-General for Employment, Social Affairs and Inclusion.

([153]) Dasgupta et al., 2023.

([154]) Tukker, 2025.

([155]) Foray, 2025.

land or sea or involving land or sea use, such as agriculture or fishing. In a post-growth world, innovation, unlike the simple notion of 'destructive creation', would, as a factor in creative resource efficiency, have to serve first and foremost, as highlighted by Frank Aggeri, to facilitate 'the transformation of lifestyles, as opposed to their expansion'; to anticipate 'pollution transfers through lifecycle analysis and eco-design'; to 'scale [up] effects that … [focus] on innovations' global diffusion impact'; to prioritise 'sufficiency by developing innovations that reduce material and energy intensity', and hence the re-territorialisation of 'value chains to regain control over supply systems'; and to embrace 'programmed durability instead of planned obsolescence' ([156]). In short, innovation should foster growth, resilience and well-being within limits.

The different Fair and Sustainable Economy contributions in this section can be grouped into three categories. The first comprises those focused on the way in which sustainability can now be considered an economic opportunity for the EU, and includes two papers written by Luke Georghiou. The second category, to some extent mirroring contributions to the capitalism chapter, relates to security. The field of security offers potentially even more sustainability opportunities, as it is driven by not only economic but also political considerations: energy security, as highlighted in the contribution of Paula Kivimaa ([157]); open strategic autonomy, as discussed in a joint publication of Paula Kivimaa and Karoline Rogge ([158]); and strategic autonomy with respect to critical raw materials, as discussed in the contribution of Arnold Tukker ([159]). The third category, again in a similar fashion to the previous section, covers the role of place-based sustainable development, with contributions from Dominique Foray ([160]), on how smart specialisation strategies need to be revised; Philip McCann, Matthijs Janssen and Johan Stierna ([161]), discussing opportunities for local missions; and Pete Lunn ([162]), discussing the relationship between fairness and the green transition.

European opportunities for sustainability

Turning now to EU policy, the relationship between capitalism and sustainability could be considered to have been the main focus of the previous European Commission, particularly during its first period of oversight, between 2019 and 2022. As already hinted at above, it could be argued that policymakers assumed as a starting hypothesis the existence of a positive relationship between sustainability and growth dynamics, with the European Green Deal as Europe's new Keynesian growth engine ([163]).

Today, three years later, with the new US administration stressing the role of fossil fuels in its own future development, it could be argued that Europe is ideally positioned to take the lead in both the

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([156]) Aggeri, 2023.
([157]) Kivimaa, 2025.
([158]) European Commission: Joint Research Centre, Kivimaa et al., 2024.
([159]) Tukker, 2025.
([160]) Foray, 2025.
([161]) European Commission: Joint Research Centre, McCann et al., 2024.
([162]) European Commission: Joint Research Centre and Lunn, 2024.
([163]) This requires comprehensive science for policy, and an understanding of the reforms needed in the transformation of integrated systems, for example in the ongoing transformation of the energy–mobility and energy-efficiency systems. The Joint Research Centre is developing an ambitious modelling tool enabling, for the first time, the quantitative measurement of system transformation in real industrial settings (Pontikakis et al., 2025).

production and the use of clean tech products and services, albeit in fierce competition with China. At the same time, and as reviewed in the introductory part of this section on sustainability, five years after the launch of the European Green Deal, the EU now has an ambitious legal rules-based system, with high sustainability standards.

From a demand perspective, the EU's current position suggests at first sight its significant potential to become the world's largest and strongest market for innovation and sustainable industrial development. It also offers foreign producers making cheaper clean tech products – such as those coming from China, including photovoltaic cells and electric vehicles – major opportunities to invest in Europe by exploiting the large harmonised single market in the field of clean tech. However, as emphasised in some of the Fair and Sustainable Economy contributions in this chapter, the policy challenge, in particular with regard to multilevel policy governance, is formidable. As Luke Georghiou ([164]) put it:

> *The necessary conditions for a lead market [to] span the remits of government portfolios and coordination is a necessity. It is encouraging that the Project Group on the Clean Industrial Deal is cross-Commission and has the direct support of the President but this task-focussed approach needs to be maintained and, very importantly, cascaded down to all operational levels. Success will lie in the ability to implement a coordinated policy mix, also extending to Member States.*

Andrea Renda makes similar comments in his paper with respect to budgetary fragmentation and the need for much more agility and possibilities for adaptation ([165]).

Nevertheless, convergence between capitalism and sustainability, as outlined in the European Green Deal, could be said to be a driver of European reindustrialisation, including technological efforts targeting decarbonisation as emphasised in the Draghi report ([166]). It will, however, need stable framework conditions and the maintenance of a long-term vision, acknowledging, as Luke Georghiou put it, the tension between regulations that restrict short-term competitiveness but offer major potential for enhancing long-term competitiveness:

> *To win the long game industrial partners need to be brought on board with this concept. It may be the case that incumbents have the most to lose from the short-term situation while growing challengers may have a clearer line of sight to winning in future markets. Industrial and innovation policy should take note of which actors to support.*

Up to now, the Chinese government has succeeded better than the EU or its Member States in achieving a long-term strategic advantage.

Whether and how firms will embrace sustainability will be a central determinant of societies' ability to tackle the global sustainability challenge, resisting the temptation of greenwashing or geographically

([164]) Georghiou, 2025.
([165]) Renda, 2025.
([166]) The Joint Research Centre has shown the potential for EU-based energy production, including in rural areas (European Commission: Joint Research Centre, Dijkstra et al., 2024).

relocating economic activity to less rigorous jurisdictions. Governmental actions at the national or EU level, as Luke Georghiou emphasises ([167]), should incentivise firms to choose:

> *strategies that align with sustainable pathways and accelerate their progress along this while, at the same time, continuing to meet other policy objectives that are more traditionally aligned with corporate (and political) goals, principally those of maintaining value creation and competitiveness. If that fails, the policy path may pivot to an approach which facilitates creative destruction of resistant incumbents and growth of a new generation of companies who have integrated sustainability into their core values and actions. The challenge for Europe is that historically it has lagged in the ability to renew its industrial base at the expense of underperforming incumbents.*

This brings us back to the inability of Europe, and the EU in particular, to incentivise Schumpeterian creative destruction, as we discussed above when proposing the concept of creative resource efficiency. Such efficiency would be much more attuned to Europe's economic and social fabric than the old Schumpeter Mark I concept of creative destruction underpinning the US financial venture capital market. It would become embedded in the EU's legal framework as part of the European Green Deal; unrelated to a need for large capital investments; and likely to involve primarily new organisational principles, as in the case of business opportunities in the circular economy. A central question would be whether such creative resource efficiency could be as effective as creative destruction or powerful enough to aid the necessary transition to sustainability while maintaining the capitalist dynamic.

The central weakness in Europe's realisation of the sustainability transition as an economic opportunity is the supply–demand match. On the supply side, the fact that China combines a larger and more integrated home market for products such as batteries with public procurement that favours domestic companies, along with other direct and indirect support (subsidies, barriers to entry for foreign firms, etc.) creates unfair advantages for Chinese companies. The large, high-income European single market is a welcome arena for Chinese and other Asian firms, outcompeting European companies in a broadly similar fashion to how US digital firms once did, by fully exploiting the advantages and their experience of dealing with a large domestic market. European firms based in small domestic markets have not been able to respond effectively to competition from China and the United States, and are in the process of being wiped out. The European Green Deal failed from this perspective to align supply with demand. Many firms that opted to improve sustainability could not identify a real demand quickly enough, as reflected in price signals. It could even be argued that one of the main remaining market incentives keeping sustainability as an economic opportunity for European firms today is the EU's emissions trading system.

All this highlights the need to consider another, more politically inspired, element of sustainability: security.

([167]) European Commission: Joint Research Centre and Georghiou, 2024.

Sustainability and security

Central to the sustainability transition is, of course, the production and distribution of renewable energy. As highlighted by Paula Kivimaa[168]:

> *Sustainable energy transitions can be thought of from two perspectives. The first is an internal (i.e. domestic or European) perspective, focusing on transitions that will make society more energy efficient and improve quality of life (e.g. housing, environment) and boost local employment and create affordable solutions (via heating solutions, SMEs, boosting local consumption for efficiency and renewable solutions). … The second one is an external perspective which is focused on how sustainability transitions link with competitiveness of countries, their international relations, security and export industries. Following the Draghi report, [the] latest public discussion in the EU has very much focused on the external dimensions and competitive benefits that the energy and cleantech sectors can generate … It is imperative that we include both internal and external dimensions in future discussions and decision making that link to the clean energy transition and try to find alignment and synergies between these two viewpoints on the energy transition.*

In this context, a paper by Paula Kivimaa and Karoline Rogge[169] adopts a systemic perspective on the trade-offs and synergies between sustainability transitions and open strategic autonomy. They show that, in fact, there are important synergies to be explored, potentially creating win–win situations at the EU and national levels.

However, security has, of course, other dimensions too, such as becoming less dependent on the foreign supply of critical raw materials. As Arnold Tukker investigates in his paper[170], a central question is how Europe can now use circular economy strategies to support strategic autonomy in the short and long terms.

In many ways, these internal and external dimensions of achieving sovereignty with respect to (renewable) energy provision or critical raw materials are also visible with regard to territorial security. The internal dimension was part of individual European countries' focus on territorial physical protection, often reflected in defence facilities in border regions. As the Joint Research Centre project Regdualos ([171]) illustrates, there is a remarkable geographical spread in Europe of defence facilities and 'cohesion regions'. The current volatile international geopolitical environment propels the EU to develop the external dimension of security; critically, this includes integrating security issues into European regional policies as an expression of intra-regional European solidarity. In short, expanding current cohesion policy to cover European territorial security policy. As argued by Soete and Foray, the European cohesion policy framework may, in the current context, be Europe's secret weapon ([172]).

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[168] Kivimaa, 2025
[169] Kivimaa and Rogge, 2024
[170] Tukker, 2025
([171]) Sillero Illanes, 2025.
([172]) Soete and Foray, 2025.

The broadening of the notion of sustainability to include security opens the door, first, for market expansion and the integration of aspects of security and defence-related national expenditure in sustainability investments through, for example, much broader dual-use provisions for research and development and procurement. Second, by introducing conditionalities to such investments, including life-cycle costs or 'buy European' criteria in public procurement, governments can further advance their green and digital growth agendas. Third, by integrating territorial development goals into defence programmes, governments can more directly address regional imbalances in their societies. This brings us to a third domain in which sustainability needs to become more fully integrated in European multilevel policy governance: territories and localities.

Place-based sustainable development

As we have already hinted, place-based policy articulation is essential for the successful delivery of the European Green Deal. In Pete Lunn's contribution ([173]), he highlights challenges to the local construction of wind and solar farms, implementing new farming methods or using sustainable vehicles that have resulted in protests in many places across the EU. Protesters often admit that climate policy is good, but they compare the adjustment costs they must bear with those of other places or social groups.

> *Affected communities or sectors complain that they are being singled out for harsher treatment. Or protestors insist that policymakers have misjudged the scale of damage that a policy will inevitably cause. Or small businesses point to big businesses that seem to have a better deal.*

Pete Lunn stresses that EU and national policy must better consider the dynamics of perceptions of fairness.

> *Additional understanding of when and why green policies are seen as fair or unfair will be helpful, perhaps even essential, if we are to achieve the scale and speed of change that are required.*

Therefore, sustainability poses today some fundamental challenges with respect to current regional development strategies, as created in the EU. As Dominique Foray ([174]) argues:

> *It is now time to change perspectives and to introduce the theory and practices of Smart Specialisation Strategies into the Dasgupta's world … In such a new world, Nature becomes internal to the strategy – a capital asset which requires careful management as the other types of capital assets. Then, Smart Specialisation Strategies will become truly sustainable – based on an integral vision of regional development … [This new perspective] involves changing our definition and vision of what is … 'sustainable regional development': transmitting to the next generations a regional productive base, including manufactured, human and natural capital, which is at least as large as the present one.*

([173]) European Commission: Joint Research Centre and Lunn, 2024.
([174]) Foray, 2025.

An alternative place-based strategy, linking economic development with sustainability challenges, is to implement what Philip McCann, Matthijs Janssen and Johan Stierna call ‘local missions’ ([175]). These are bottom-up initiatives mobilising creativity and collective initiatives of local communities and actors, potentially diminishing the dynamics of perceived unfairness. Mission-oriented policy at the community, city or regional level is ‘likely to place more emphasis on experimentation, adoption and integration – activities that are less focused on generating genuinely novel knowledge, but more on combining and applying knowledge’. In this sense, local missions could be combined with national or EU-wide missions, both ensuring feasible delivery and influencing from the bottom up the scope of broadly formulated (supra)national missions.

In conclusion, it can be argued that sustainability in principle fits into the framework of European capitalism. However, to have an impact, it will have to be based on a global, rules-based system. The EU has introduced a consistent, sophisticated legal framework in the EU broadly in line with its comparative advantage in the field of soft power. It has been competing with China in developing green technologies and has introduced trading systems such as the emissions trading system and the Carbon Border Adjustment Mechanism ([176]), in line with the long-term decarbonisation aims agreed within the framework of the Paris Convention of the United Nations in 2015. However, as we argued in our previous publication ([177]), the space-blind nature of the European Green Deal, and in a broadly similar fashion of the Draghi report, needs to be addressed urgently, because it is one of the factors in the emergence of regions of discontent, potentially undermining democracy. We will discuss these regions in the next chapter. That space-blind nature explains the failure of sustainability to become a supply-and-demand-driven opportunity for domestic European firms. Fortunately, security has emerged as a common strategic aim, not necessarily in a military/defence sense, but in terms of resilience and strategic autonomy. However, policy-related challenges remain in combining long-term sustainability with long-term competitiveness – and doing so in the context of democracy. A policy regime that is today more than 200 years old finds itself confronted with new inequalities in profit and in the sharing of costs of sustainability efforts. Democracy is the central issue addressed in the third chapter of this report.

([175]) European Commission: Joint Research Centre, McCann et al., 2024.

([176]) The EU’s Carbon Border Adjustment Mechanism is a tariff on carbon-intensive products imported to the EU. It entered into force in May 2023 through a regulation of the European Parliament and the Council of the European Union and is planned to take effect in 2026.

([177]) Schwaag Serger et al., 2023.

1. Europe's opportunity for competitive sustainability

Lead markets for clean tech

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Introduction

At the start of 2025, the President of the European Commission established a Commissioners' project group on the clean industrial deal ([179]). The deal is intended to accelerate the decarbonisation of EU industry while strengthening its competitiveness, as set out in the president's speech to the World Economic Forum ([180]) and in her re-election speech, when she stated that the deal would 'help create lead markets in everything from clean steel to clean tech' ([181]). The announcement was followed by the publication on 26 February 2025 of a communication from the Commission setting out the clean industrial deal in the form of a roadmap for competitiveness and decarbonisation ([182]). The roadmap is framed by stressing the importance of Europe's industrial base in the face of rising geopolitical tension, slow economic growth and technological competition, meaning that a competitiveness and decarbonisation strategy is also necessary for security and that, given this, three challenges – the climate crisis, competitiveness and economic resilience – must be addressed simultaneously. Even before the full extent and consequences of the mercantilist tariffs announced by the Trump administration were known, it had become clear that urgent action was needed to secure European industries with underpinning productivity growth. The document is presented as a transformational business plan making the case for industry to make large investments in climate neutrality in two closely linked sectors, energy-intensive industries and clean tech. Key elements of the plan include ensuring access to affordable energy, stimulating public and private investment and securing access to materials and resources. In this essay, the focus will be on a fourth pillar (mobilising the demand side), associated with boosting clean supply and demand in lead markets.

The sequence of policies leading to the clean industrial deal were based on several other initiatives and analyses. The aim here is not to provide a historical account but only to note three of particular significance to the application of demand-side policies in this context. The first key element is the Green Deal. The associated industrial plan ([183]), put forward in 2023, acknowledged (albeit briefly) the need to further stimulate the demand for net-zero products on a large scale, stating that 'various forms of public action such as public procurement, concessions and incentives to business and end users to use net-zero technologies based on sustainability and circularity can play a big role'. To ensure clear

([178]) The author would like to acknowledge valuable comments from Johan Stierna and Jakob Edler on an early draft.

([179]) Decision of the President of the European Commission on the establishment of a Commissioners' project group on the clean industrial deal, P(2025) 2 of 7 January 2025, https://commission.europa.eu/document/download/b600cc41-3fce-4d6d-946d-1a11c93e50fa_en?filename=Decision%20on%20the%20establishment%20of%20a%20Commissioners%27%20Project%20Group%20on%20Clean%20Industrial%20Deal.pdf.

([180]) Special address by President von der Leyen at the World Economic Forum, Davos, 21 January 2025, https://ec.europa.eu/commission/presscorner/detail/en/speech_25_285.

([181]) European Commission, 2024.

([182]) European Commission, 2025a.

([183]) European Commission, 2023.

eligibility for promotion, the plan indicated that the Commission would define sustainability characteristics and possible requirements for net-zero products, using available legal tools and existing EU standards. Against this background, it would become feasible to set out uniform and well-understood sustainability requirements.

Draghi report and demand-side policy instruments

As the EU pivoted towards integrating competitiveness with the commitment to decarbonisation, a major guidepost was the report *The Future of European Competitiveness*, written by the former Italian prime minister and President of the European Central Bank, Mario Draghi ([184]). The report proposed a new industrial strategy for Europe, putting forward three areas of action. Its aim was to reignite sustainable growth and address the productivity gap with competing nations by closing the innovation gap with China and the United States, especially in advanced technologies such as AI; increasing security and reducing dependencies; and implementing a joint plan for decarbonisation and competitiveness. Lead markets as such are not prominently featured in the Draghi report, although they are referenced in a list of measures appropriate for energy-intensive industries. The report provides the following recommendation:

> *Stimulate demand for green products by promoting transparency (e.g. by defining EU standards, such as labelling, for measuring and communicating Product Carbon Footprints (PCFs)). Introduce standardised low-carbon and environmental sustainability criteria for public procurement* (Part B).

Public procurement (a key element of demand-side policy), by contrast with lead markets, is frequently mentioned in the context of both green procurement, for which the introduction of mandatory non-price sustainability criteria (potential local production) is recommended, and innovation procurement. In the Draghi report, this is specified in particular with regard to acting as a launch customer for infant industries.

Most recently, the publication by the European Commission of the competitiveness compass set out its response to the Draghi report's recommendations in the form of a five-year strategic framework for 'a new competitiveness model based on innovation-led productivity' (185). Along with a wide-ranging set of pro-innovation reforms and initiatives, the business case for clean production states clearly that the EU needs to develop lead markets and policies to reward early movers by harnessing the power of the EU's domestic market. Specific measures flagged to increase demand for low-carbon products include signalling through benchmarking and labelling; using the public sector as a source of lead customers for innovations by mandating or preference in public procurement; and implementing financial incentives through contracts for difference to provide long-term price stability for suppliers. These measures involve substantial regulatory change, for example a review of public procurement directives, flagged for 2026, to introduce a European preference in public procurement for strategic sectors and technologies in a more general context of reinforcing technological security and domestic supply chains and simplifying rules of access, particularly for young and innovative companies. Also

([184]) Draghi, 2024.
([185]) European Commission, 2025b.

mentioned in the Draghi report is the aggregation of demand at the EU Member State level, which in principle creates sufficient critical mass to persuade innovating businesses that the market is worth investing in.

As with all demand-side measures related to the stimulation of innovation, in this case for decarbonised products, the underlying rationale is to de-risk business investment by assuring businesses that there will be a demand for their products. From a policymaker's perspective, there can be multiple aims, including scaling up a sector to a level at which it is globally competitive, with consequences for growth and employment. This is an exercise both in achieving economies of scale and in creating a space in which innovation may develop with the benefit of manufacturing experience and customer feedback, such that a sequence of improvements will place products in a position to compete with others on the market in terms of price and user benefits. The motive for states to promote innovation may be economic, but, as in this case, may also involve the achievement of societal benefits through decarbonisation and steer new sectors in a desirable direction.

Conclusions

This essay has discussed the implications of adopting a lead market approach as part of a consistent strategy for transforming the EU's industrial structure. Demand-side policy measures are highly topical in the context of the discourse around the EU's clean industrial deal and the wider goal of pursuing strengthened competitiveness in tandem with accelerating the decarbonisation of EU industry. Rationales for related demand-side policies have been explored, bearing in mind that innovation and industrial development may not be the originally intended main goals of interventions. Attention is currently focused on generating lead markets for clean tech, which are typically promoted through a policy mix of demand- and supply-side measures, as befits the nature of markets.
The following conclusions can be drawn.

The clean tech sector is in principle fertile ground for the application of lead market measures, particularly in business-to-business sectors. The lead market approach has become closely associated with innovation in clean tech, probably because of the strong role of regulation and, to a lesser extent, of public procurement in the sector. Its potential to underpin competitiveness is by no means confined to this sector, and it should also be noted that the concept emerged in markets for product innovations that were most clearly linked to consumer demand. Clean tech spans both the business-to-business and business-to-consumer sectors, with the former being of greater interest in this context. Thus, market factors of relevance include efficiency, return on investment, regulatory compliance, the potential existence of fiscal or other incentives, consistency with corporate sustainability strategy, compatibility with existing systems, contracting and financing structures, and in general longer and more complex sales and investment cycles. All have some relevance to lead markets.

Timing is crucial if a lead market is to be beneficial to domestic industry. The advantages of lead markets are clearly time dependent (hence the significance of the term 'lead'), and as such the implementation of lead markets in policy requires agility in areas that are not always known for that characteristic, particularly new regulation and public procurement. Streamlined policymaking and implementation are necessary, along with the ability to adapt to change as technology and

market conditions evolve. As emerges from the review above, timing is crucial: incentives must be created early enough for domestic firms to benefit but not so soon that international rivals whose products are more advanced can dominate the market.

Regulation is itself subject to international competition, and a limiting factor is the global importance of the EU market for specific areas of clean tech. Regulation is an area of competition between geographical and economic entities, but the nature of that competition is complex, and timing is a key factor. On the one hand, a lead market advantage can be dissipated if rival entities imitate or adopt a favourable regulation too soon, but, on the other hand, once a domestic innovation is well established and ready for export, it is highly advantageous to influence regulation in other jurisdictions. A limiting factor is the scale of the EU market as a share of global demand. The current position is that the EU market is important but not dominant in most areas, with the largest shares in heavy industrial areas such as wind turbines ([186]), green hydrogen, heat pumps and carbon capture (in the range of 20–35 %), and it is a minor market for mass consumer products such as solar panels and electric vehicle batteries. Regulatory influence is likely to be proportionate.

Pro-lead-market policies may be drawn into current tariff disputes. At the federal level, the United States appears to be moving away from pro-sustainability regulation. China, by contrast, has been substantially strengthening environmental regulation (and reportedly its enforcement). The risk for the EU is that one major export market will attempt to suppress exports of clean tech through tariff barriers, while another maintains its lead in some key sectoral technologies while also moving into a leading (or at least comparable) position on regulation. At all times it is also beneficial to seek to prevent regulations elsewhere from blocking future product pathways. The situation is complicated by recent moves to consider regulations that exist for sound domestic reasons as a form of non-tariff barrier. The potential breakdown of international trade conventions increases the risk here but could also be seen as an opportunity for regulatory regimes to expand. However, it cannot be ruled out that regulation may be relaxed, delayed or even reversed if emergency measures are needed to support business, for example in the face of the tariffs crisis that began in April 2025.

The policy mix required for a lead market demands coordinated governance both horizontally and vertically. A significant risk to a successful lead market approach is silo thinking. The necessary conditions for a lead market span the remits of government portfolios, and coordination is a necessity. It is encouraging that the Project Group on the Clean Industrial Deal is a cross-Commission team and has the direct support of the president, but this task-focused approach needs to be maintained and, very importantly, cascaded down to all operational levels. Success will lie in the Commission's ability to implement a coordinated policy mix, extending to Member States. As the experience of the Lead Market Initiative showed, the engagement of Member States is a key challenge and requires a clear mechanism to be put in place from the start with channels

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([186]) We have not yet established good techniques for recovering materials from wind turbine blades, although it should have been clear decades ago that blades would be a problematic product at the end of their life. In contrast, EU projects (e.g. sustainable recovery, reprocessing and reuse of rare-earth magnets in the circular economy) have already developed advanced recovery techniques for end-of-life traction motors and generators with neodymium magnets.

to those empowered to enact the necessary measures. A positive factor in this case is the ongoing incorporation of the regulatory body from the Green Deal into national laws.

There is a trade-off between short-term and long-term effects of regulation in support of lead market creation, with implications for the distribution of support between large-scale incumbents and more agile new entrants, typically those scaling up. In the specific case of clean tech, an observation of the literature is that there is tension between regulation, resulting in the restriction of short-term competitiveness and the potential to enhance long-term competitiveness. To win the long game, industrial partners need to be made familiar with this idea. It may be the case that incumbents have the most to lose from the short-term situation, while growing challengers may have a clearer line of sight to winning in future markets. Industrial and innovation policy should take note of which actors to support. Europe's share of clean energy deal value in venture capital is somewhat flat, falling from 28.6 % in 2023 to 26.4 % in 2024, but is still healthy. As with the wider start-up sector, the challenge will become apparent at the scale-up stage. Furthermore, if competitive position is dependent on scaling up, the time required to do so is critical, given the need to align with the lead market window.

There is unlikely to be a one-size-fits-all policy mix for lead markets. Approaches tailored to particular sectors are needed. The experience of the LMI (and case studies in the literature) suggest that each sector needs to implement measures through a tailored approach. Among the variables determining this will be the degree to which standards and supply chains are internationalised. The market shares mentioned above are also relevant.

vi) **Being locked in to idiosyncratic user needs poses a significant risk to lead market policies. This can be mitigated by early support for multiple approaches.** To avoid the problem of 'picking winners' prematurely, support should at least initially be open to rival solutions and avoid locking in to particular approaches, particularly if this is a result of lobbying by vested interests. Lead market approaches can be over-specific, resulting in solutions that may be well attuned to the needs of the domestic market at that point in time but do not have the potential to become global standards or even reach export markets beyond their borders.

The EU has the potential to benefit from demand-oriented policy, with the vital caveat that this policy must be coordinated with and supported by the supply-side policy (as per Alfred Marshall's scissors of supply and demand). With the EU's extraordinary regulatory competences, which have internalised cross-border issues, and with 14 % of gross domestic product spent on public procurement, powerful tools are at its disposal. Clean tech is a good place to start.

Corporate transition pathways from a policy mix perspective

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Introduction

It is widely recognised that a transition to a fair and sustainable economy will require substantial changes to take place in Europe's industrial base, including but not confined to transitions in the technological base and the business models within which current processes are embedded. To some extent, such transitions are likely to rely on the emergence and growth of new businesses founded on more sustainable solutions. Databases such as **EU-Startups** (187) indicate that around one in four European start-ups are focused on environmental sustainability, in areas such as renewable energy, sustainable materials and waste management. The Horizon Europe programme supports this trend.

Nonetheless, the principal challenge if significant progress is to be made on meeting climate neutrality targets lies in achieving transitions by large-scale incumbent firms. Firms on this scale dominate the most carbon-intensive sectors, such as energy production, transport, and heavy industries producing cement, steel and chemicals. They have, in principle, the investment capacity and capabilities (more broadly complementary assets) to adopt green technologies. As Geels points out, these incumbents are highly invested in existing systems and regimes and may resist, or at least be unlikely to pioneer, sustainability transitions. However, their subsequent adoption of innovations could substantially accelerate the pace of change ([188]). They also have the purchasing power to influence their supply chains in the direction of sustainable practices ([189]).

The challenge addressed in this paper is to consider ways in which governmental actions at the national or EU level would incentivise firms to choose strategies that align with sustainable pathways and to accelerate their progress along these while, at the same time, continuing to meet other policy objectives that are more traditionally aligned with corporate (and political) goals, principally those of maintaining value creation and competitiveness.

It will be argued that the technologies are integrated with deeply embedded business models, which, in turn, have developed in the context of market and regulatory structures that operate (not always consistently) at the national, EU and global levels. In addition, typically multiple policies and policy instruments operate alongside one another, raising issues regarding how they work in combination and how they address different parts of the system.

After considering the policy context in the EU and beyond, some implications of the existence of a policy mix are identified. The next step is to identify influences on firm behaviour to foster the transition of business models and technology and to catalogue the instruments and frameworks that could aid progress. Conclusions are drawn about potential interactions between policies, and the need for greater knowledge about the most effective systemic frameworks conducive to innovation and the diffusion of green technology, and the challenges they pose.

([187]) https://www.eu-startups.com.
([188]) Geels, 2011.
([189]) Klassen et al., 2012.

Policy context

The EU has developed a comprehensive set of measures to promote corporate sustainability transitions, combining regulation, financial incentives, reporting obligations and support for research and innovation. The European Green Deal provides the overarching framework, aiming to make Europe the first climate-neutral continent by 2050, with an intermediate target of reducing greenhouse gas emissions by 55 % by 2030. An array of supporting strategies has been deployed, along with a sustainable finance framework, to channel investment into green activities.

At a point of inflection for EU policy thinking, the Draghi report ([190]) calls for a new industrial strategy to reconcile decarbonisation with competitiveness. It identifies three priorities: lowering energy costs, capturing industrial opportunities in clean technologies and levelling the playing field against global competitors. It also delivers a warning that, without coordinated policies, ambitious climate targets may undermine growth and competitiveness.

Industry voices echo these concerns. The Antwerp Declaration ([191]), signed by major firms and associations, calls for an industrial deal to complement the Green Deal, citing rising costs, reduced demand and investment flight to other regions. It proposes regulatory simplification, investment support, improved infrastructure and better access to raw materials. The Chairman of INEOS, Jim Ratcliffe, has warned of 'sleepwalking' towards industrial offshoring, raising fears that stringent regulation without sufficient incentives could drive firms overseas. These perspectives frame the challenge as a balance between innovation-driven approaches and compliance-driven regulation.

International comparisons show the EU competing with ambitious programmes elsewhere, notably the Biden administration's Inflation Reduction Act in the United States, which committed EUR 369 billion over 10 years through tax credits and subsidies to clean energy, industrial decarbonisation and domestic supply chains. Similar strategies exist in China, India, Japan, South Korea and other advanced economies, often combining sustainability targets with industrial policy goals. The scale of these initiatives underscores Draghi's call for a coordinated European response that positions the green transition not only as an environmental imperative but also as a platform for industrial competitiveness and strategic autonomy.

Policy mix approaches

Given the multiple elements that comprise efforts to influence systems in transition, it is very likely that the simultaneous action of multiple policy instruments would be needed to drive a socially desirable transition. Thus, the solution relates to the policy mix. Key points emerging from the literature and the experiences it analyses are as follows.

i) The coexistence of policy instruments often reflects their origins in different policy objectives (a normal situation in government). Any given instrument can have effects (spillovers) in domains other than that for which it was originally intended.

([190]) Draghi, 2024.
([191]) Abascal et al., 2024.

ii) Even when they address the same objectives, the application of multiple policy instruments can both enhance the effectiveness of a given policy through synergies and inhibit it through antagonistic interactions.
iii) The policy mix is significant at different levels of granularity, including the environment in which policies are performed and the process followed, the mix of policy instruments, and the means and effectiveness with which they are implemented.
iv) In a European context, the mix is also affected by multilevel governance, with policies and instruments formulated and/or implemented at the EU, national and regional levels.
v) Temporal differences in the origin and applicability of policies or instruments in any particular mix may influence their effectiveness. Existing measures often persist while new ones are introduced.
vi) Policymakers and analysts should caution against the assumption of Olympian rationality, suggesting rather that they operate in conditions of bounded rationality and ambiguity.

Influencing firms' behaviour

When designing policies to influence firms' behaviour and hence in this case to accelerate corporate sustainability transitions, it is important to clarify what outcomes they seek. At the most extreme, transitions may result from market displacement, when incumbent firms lose ground to rivals offering more sustainable products or processes, often because their rivals have superior technology or due to resource constraints. However, intentional transition is usually the goal. Even in the first context, policy intervention may need not only to induce change but also, in some cases, to mitigate negative social or regional effects, as seen in the EU's Just Transition Mechanism.

A useful way to frame potential interventions is through the acronym RICO, which represents four broad categories of action.

1. Provision of **resources**. Financial support – provided through grants, loans, equity or subsidies – can make sustainable innovation or adoption economically viable. This can be linked to broader missions or directionality.
2. Establishment of **incentives**. Both positive incentives (e.g. favourable taxation, public procurement creating lead markets or support for diffusion) and negative incentives (e.g. penalties, carbon taxes, tariffs or regulatory enforcement) steer firms towards sustainability.
3. Support for **capabilities**. Many firms, particularly small and medium-sized enterprises, lack the skills, information or organisational capacity to transition. Training, education, labour market interventions and improved information diffusion can strengthen their capabilities and overcome lock-in.
4. Provision of **opportunities**. Policies can expand the technological and strategic options available by funding research and innovation, enabling shifts such as moving from fossil-based to bio-based economies.

However, firm-level interventions are insufficient without addressing systemic dimensions ([192]). Transitions often depend on complementary assets beyond a firm's control, such as infrastructure and supply chains. For instance, electric vehicle adoption relies on charging networks, while battery production depends on secure mineral supply chains. These systemic gaps represent coordination failures requiring cross-sectoral policy solutions. Grand challenges and mission initiatives can help

([192]) Smits and Kuhlmann, 2024.

frame coordinated responses, but their effectiveness is often constrained by siloed governance, especially when they originate within research or innovation ministries.

Policies can aim to have immediate impacts or enable longer-lasting transformations. The concept of behavioural additionality, emerging from evaluation studies of innovation programmes, captures this longer-term effect ([193]). Traditional measures of additionality focused on inputs (increased resources) and outputs (deliverables and outcomes), which often dissipate once funding ends. By contrast, behavioural additionality reflects changes in firms' strategies, culture and long-term practices, such as greater collaboration, openness to systemic programmes or increased risk appetite ([194]). These sustained shifts are essential for embedding sustainability in corporate DNA.

In particular, large corporations are often conservative and risk-averse, limiting their responsiveness to sustainability challenges. Policies that foster behavioural change – encouraging collaboration across ecosystems, building tolerance for risk and supporting strategic reorientation – can therefore be critical levers for transition. The durability of behavioural additionality means it can have a greater long-term impact than one-off subsidies or compliance-based measures. Ultimately, achieving the corporate transitions envisaged in the European Green Deal requires not just financial and regulatory tools, but interventions that have an enduring effect on firms' behaviour, strategies and capabilities. The challenge is to design policy mixes sensitive to national contexts that integrate firm-level action with systemic coordination and long-term behavioural transformation.

Principles of a taxonomy of policy instruments and measures

Corporate sustainability transitions are influenced by a wide array of policy instruments that can be grouped into broad categories beyond the RICO framework. The principles of a taxonomy for these policy mechanisms include supply-side, demand-side, regulatory and systemic instruments, each targeting different dimensions of firm behaviour and market transformation.

- Supply-side instruments resemble 'technology push' measures, supporting investment in green solutions. They include fiscal incentives, research and development funding and subsidies aimed at de-risking innovation and adoption. Crucially, they also address capabilities, including training, education and mobility schemes, to overcome shortages in green skills, ensuring regional equity. Supply-side measures often use informative instruments to enhance trust, reduce greenwashing and provide scientific validation for policy incentives.
- Demand-side instruments, or 'demand-pull' measures, stimulate markets for sustainable products or make unsustainable ones less attractive. Subsidies lower the cost of green solutions, while taxes increase the prices of polluting alternatives. Public procurement plays a major role by creating lead markets for green technologies, helping them scale to competitiveness. Private demand is also shaped through corporate supply chains and sustainability requirements.
- Regulation and standards reshape competitive dynamics by constraining unsustainable activities and directing both corporate and consumer behaviour. Effective regulation relies on robust scientific and economic information to set achievable, credible targets.

([193]) Buisseret et al., 1995.
([194]) Clarysse et al., 2005; OECD, 2005.

- Systemic instruments address structural interdependencies that lock industries into unsustainable practices. Drawing on innovation system theories, they focus on sectors, clusters, supply chains or regions, recognising complementarities and cross-sectoral linkages. Broader systemic approaches, such as grand challenges and missions, seek to align technology, regulation, skills and societal attitudes to achieve transformative change. Their success depends on mediating between high-level goals and actionable, granular measures, often supported by foresight and strategic deliberation.

Overall, this taxonomy highlights the need for a balanced, multidimensional policy mix to drive corporate sustainability transitions effectively.

Conclusions

The aim of this review was to explain ways in which governmental actions would incentivise firms to choose strategies that align with sustainable pathways while maintaining value creation and competitiveness. Most policymakers around the world share the desire to ensure firms can do both simultaneously. Arguably, the rise of green strategies has increased competitive pressure and thus returned competitiveness to the front line of policy rationales.

A wide variety of policy initiatives have been put in place seeking to drive transitions, but the literature on the policy mix suggests that they are not part of a coordinated policy framework, and hence insufficient attention has been paid to ways to enhance complementary action and to minimise contradiction or omission.

While the solution seems to be systemic policies, little evidence is available of how these have been driven to a conclusion or what their lasting effects have been. If we accept that corporate transition is a key part of meeting the global sustainability challenge, we need to better understand and evaluate the best way to achieve this, avoiding the traps of greenwashing or the geographical displacement of economic activity to less rigorous jurisdictions. Ultimately, evaluations must determine which combination of resources, incentives, capabilities and opportunities will induce changes in the business models and underlying routines of firms in key sectors and hence achieve behavioural additionality. If that fails, the path may change to an approach that facilitates the creative destruction of resistant incumbents and the growth of a new generation of companies that have integrated sustainability into their core values and actions. The challenge for Europe is that historically it has lagged in its ability to renew its industrial base at the expense of underperforming incumbents.

2. Sustainability and security

The role of circularity in European strategic autonomy

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Introduction

Geopolitical relations are changing at lightning speed. China, Russia and even long-standing ally the United States are developing themselves as major competitors of Europe. We seem to have entered an era in which the existing geopolitical balance is finding a new equilibrium. The only way that Europe can maintain its traditional values, such as being a society based on general human rights and the rule of law, is to be a strong, strategically autonomous power.

Strategic autonomy requires a reasonable level of independence in several fields. In part based on the Draghi report, we identified the following areas for attention: (1) closing the innovation gap with China and the United States; (2) ensuring an accessible, low-cost and low-carbon energy supply; (3) increasing security/defence and reducing dependencies; (4) developing a robust digital infrastructure under the EU's own control; (5) protecting domestic politics from manipulation through social media and other means; and (6) protecting the EU's monetary system from manipulation.

This essay mainly focuses on a point related to area (3): which resources and value chains Europe needs to control to realise strategic economic autonomy, and how circularity strategies can support this goal. Circularity, of course, is also relevant for another reason. Humans extract more than 80 billion tonnes of natural resources each year ([195]). Under a business-as-usual scenario, this will increase to 160 billion tons in 2060 ([196]). Studies suggest that material extraction and use drive a wide variety of environmental harms, including around 25 % of greenhouse gas emissions, increasing to almost 50 % if food products are included. At this point, only 8.6 % of global resource use is covered by secondary materials ([197]). A circular economy can contribute greatly to keeping the impacts of the global economy within planetary limits.

Against this background, this paper first describes several strategic 'stranglehold technologies' that Europe needs to control to stay a strong, independent entity. From there, it analyses which supply chains and critical raw materials are crucial. It then analyses to what extent circular economy approaches can support European resilience in terms of supply chains of critical materials and components.

([195]) Wiedmann et al., 2015; UNEP, 2016.
([196]) UNEP, 2024.
([197]) Circle Economy, 2021.

Strategic technologies

Various countries and organisations have developed lists of technologies that they see as crucial for future strategic autonomy. The EU has developed a list of critical technologies ([198]). Other lists have been developed by the strategic technologies for Europe platform ([199]) ([200]), while the Draghi report of 2024 mentions several crucial economic sectors in Europe. In 2015, China developed a list of 35 stranglehold technologies – technologies that China should master to avoid being dependent on countries abroad ([201]). Examples include photolithography machines, and light detection and ranging. The McKinsey Global Institute identified 18 'big arenas of competition' that will in future contribute most to gross domestic product, such as cloud services, electric vehicles and semiconductors.

It appears that the list of technology areas critical for the EU's economic security provides a good summary of the critical technology lists from different sources. Table 1 combines this list with 15 technologies listed in a Joint Research Centre report that discusses their material demands and supply chains ([202]). These 15 technologies give a good representation of what is needed in critical technology areas. The exception is biotechnologies, but these seem unrelated to critical and strategic raw materials supply.

Circularity to alleviate critical material demand

The Joint Research Centre study by Carrara et al. mapped which CSRMs are used in the supply chains of the 15 technologies critical for the EU's economic security. They conducted further analysis of the extent to which the EU is involved in different steps in the supply chain of such technologies (raw material extraction, material processing, component production, assembly production, and super-assembly and system production). Carrara et al. concluded that there are significant vulnerabilities. These exist particularly in the material extraction stage, while the EU has a much stronger presence in the manufacturing stage. For five technologies, almost the full supply chain is dominated by non-EU players (batteries; photovoltaic systems; data storage technologies and servers; smartphones, tablets and laptops; and drones). To a certain extent, circularity strategies can alleviate such extra-EU supply chain dependencies. However, situations can differ significantly depending on the product and material involved, as the following examples illustrate.

Electrical and electronic equipment (EEE). For most EEE, such as smartphones, tablets and laptops, but also photovoltaic systems, a sizeable stock of in-use products has already built up, from which a substantial flow of end-of-life products arises. In such cases, harvesting the urban mine can recover significant amounts of critical materials. However, while Europe probably has the most advanced EEE

([198]) Commission recommendation on critical technology areas for the EU's economic security for further risk assessment with Member States, C(2023) 6689 final of 3 October 2023.
([199]) https://strategic-technologies.europa.eu/be-inspired_en#paragraph_313.
([200]) Proposal for a regulation of the European Parliament and of the Council establishing the strategic technologies for Europe platform ('STEP') and amending Directive 2003/87/EC, Regulations (EU) 2021/1058, (EU) 2021/1056, (EU) 2021/1057, (EU) No 1303/2013, (EU) No 223/2014, (EU) 2021/1060, (EU) 2021/523, (EU) 2021/695, (EU) 2021/697 and (EU) 2021/241, COM(2023) 335 final of 20 June 2023, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023PC0335.
([201]) CSET, 2021.
([202]) European Commission: Joint Research Centre, Carrara et al., 2023.

waste recovery systems globally, on average only 52 % of the expected waste output is collected. And often metal recovery is concentrated on the big and valuable flows (e.g. copper, gold), while the small amounts of other CSRMs (e.g. indium, neodymium, niobium) in waste are not recovered ([203]).

Table 1: Illustrative technologies related to the EU's critical technology areas for the EU's economic security (as specified in the Annex to COM(2023) 6689 final)

<table>
<tr><th></th><th>Area</th><th>Technologies listed by European Commission: Joint Research Centre, Carrara et al. (2023)</th></tr>
<tr><td>1.</td><td>Advanced semiconductor technologies</td><td rowspan="5">Data transmission networks
Data storage technologies and servers
Smartphones, tablets and laptops</td></tr>
<tr><td>2.</td><td>Artificial intelligence technologies</td></tr>
<tr><td>3.</td><td>Quantum technologies</td></tr>
<tr><td>5.</td><td>Advanced connectivity, navigation and digital technologies</td></tr>
<tr><td>6.</td><td>Advanced sensing technologies</td></tr>
<tr><td rowspan="2">9.</td><td rowspan="2">Robotics and autonomous systems</td><td>Drones</td></tr>
<tr><td>Robotics</td></tr>
<tr><td>4.</td><td>Biotechnologies</td><td></td></tr>
<tr><td>7.</td><td>Space and propulsion technologies</td><td>Space launches and satellites</td></tr>
<tr><td rowspan="7">8.</td><td rowspan="7">Energy technologies</td><td>Electrolysers</td></tr>
<tr><td>Fuel cells</td></tr>
<tr><td>Wind turbines</td></tr>
<tr><td>Photovoltaic systems</td></tr>
<tr><td>Heat pumps</td></tr>
<tr><td>Traction motors</td></tr>
<tr><td>Lithium-ion batteries</td></tr>
<tr><td rowspan="2">10.</td><td rowspan="2">Advanced materials, manufacturing and recycling technologies</td><td>Additive manufacturing</td></tr>
<tr><td>Hydrogen-based direct reduction of iron and electric arc furnaces</td></tr>
</table>

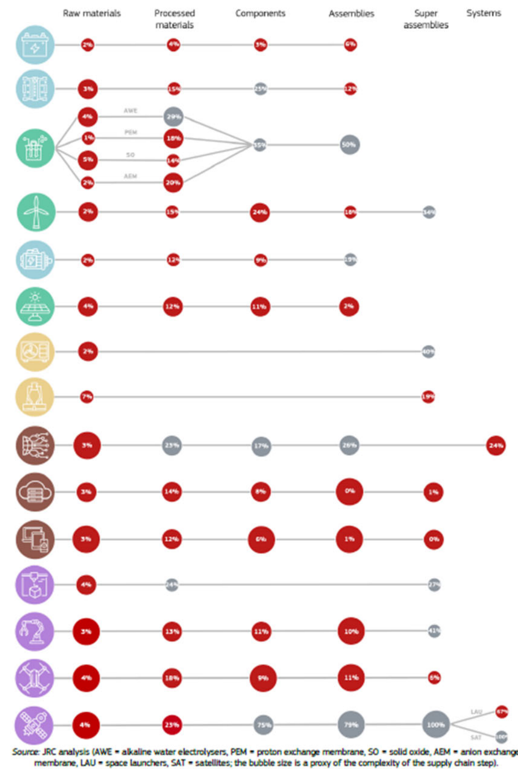
Electric vehicle batteries. Electric vehicle batteries are an example of a fast-growing market (with a global increase in capacity from less than 0.5 TWh in 2020 to 6 TWh in 2050) for long-life products (these batteries can last some 15 years). Xu et al. calculated that only by 2040–2050 could the primary need for 50 % of battery materials, such as nickel, cobalt and lithium, be covered by secondary materials; before then, there will simply not yet be sufficient spent batteries available as waste [204].

Copper. Copper is an example of bulk material with a mature market, with a limited rise in demand in Europe. It is used in a highly diverse set of end-use sectors (building and construction, electrical and electronic products, industrial machinery and equipment, transport equipment, consumer and general goods). Ciacci et al. ([205]) did a dynamic material flow analysis of all copper applications in Europe. They found that in 2010 recycled copper could only cover 40 % of the EU's needs, mainly since only 60 % of copper waste was recovered. In the future, this percentage could almost double if a collection rate of

([203]) Cf. Wagner et al., 2023.
([204]) Xu et al. 2020.
([205]) Ciacci et al., 2020.

90 % and recycling efficiency of 90 % are realised (i.e. an overall rate of collection and recycling of 81 %).

Figure 4: Supply risks in different stages of the global production chain of strategic technologies for the EU



NB: Bubble size is a proxy for the complexity of the supply chain step. Red indicates high risk; grey indicates low risk. AEM, anion exchange membrane; AWE, alkaline water electrolyser; LAU, space launcher; PEM, proton exchange membrane; SAT, satellites; SO, solid oxide.

Source: European Commission: Joint Research Centre, Carrara et al., 2023, p. 7.

Conclusions

We see from the analysis that circular economy strategies can contribute to strategic autonomy in the short and long terms, if one considers the following.

Strategic technologies are usually innovative and hence not widely deployed. If they rely on critical components or materials, they often cannot yet be harvested from current waste related to such technologies – the market is still growing and hence at this point still needs primary input. Yet circularity strategies are crucial to consider even for these technologies. In several cases, critical and strategic raw materials may have been used in significant quantities in the past in products other than novel critical/stranglehold technologies. For instance, neodymium magnets were common in computer hard disks, which have now largely been replaced with solid-state drives. If recovered, these can be a source of neodymium for other technologies.

The long term should not be overlooked: once markets are in a steady state (as in the case of copper), circularity can help strategic autonomy enormously by promoting the harvesting of materials from

end-of-life products. It is therefore crucial to ensure that new technologies and equipment put on the market are designed with circularity in mind.

The options for circularity in the current situation are vastly underused. For instance, electronics already provide a vast waste outflow containing significant amounts of CSRMs. But collection lags and recovery are focused only on major or high-value material flows. Rare earths and other CSRMs used in small volumes are lost. Even for major (strategic) materials such as copper, reuse and recovery can be significantly improved, and thereby strategic autonomy enhanced.

Europe produces a limited supply of batteries, photovoltaic systems, data storage technologies and servers, smartphones, tablets and laptops, and drones. This is a vulnerability but also makes implementing circularity measures difficult. Lifetime extension is mainly determined by designers and producers abroad. Components for reuse will have to go to producers abroad. Only product reuse, refurbishing and material reuse (in other value chains) will enhance Europe's autonomy.

This analysis leads to the following recommendations.

1) In line with the conclusions of many earlier reports for the European Commission, it is important that the EU develops resilience in supply chains of products containing critical materials. This will require a combination of supply diversification, strategic partnerships with reliable mining and refining countries, and probably stimulating the build-up of the EU's own capacity for the production of batteries, photovoltaic systems, data storage technologies and servers, smartphones, tablets and laptops, and drones.
2) Though the EU is probably one of the most advanced regions in the end-of-life management of waste products, significant improvements can be realised. The recovery of critical raw materials from waste EEE is a clear case in point. But even for major metals such as copper, reuse and recovery can be improved. Implementing the circularity strategies envisaged in the EU's Circular Economy Act, expected to enter into force in 2026, could be an important step in enhancing the EU's strategic autonomy.
3) Many of the new products and infrastructures containing strategic and critical raw materials are in place today. It is crucial that these are already designed for circularity. Such demands could be included in (public) purchasing procedures or legislation such as the Ecodesign Directive. For products or components that cannot be designed for circularity and for which no good end-of-life treatment exists, research should be conducted to address these issues.
4) Foresight studies such as the one by Carrara et al. are crucial to develop comprehensive and well-founded strategies on how to ensure the strategic autonomy of the EU regarding raw materials, and to assess the role of circular economy strategies in this.

In such foresight studies it is crucial to (1) include an economy-wide view instead of focusing on specific products or materials; and (2) forecast future demand for innovative products and related materials using a dynamic material flow analysis that includes estimated lifetimes, so that the future outflow of waste products and materials can be assessed.

For instance, while tantalum is identified as a critical material used in smartphones, tablets and laptops in the Carrara study, its use in aerospace is several orders of magnitude higher. Steel, aluminium and

copper are used in much higher quantities beyond critical technologies. So non-critical products or technologies reaching their end of life may provide part of the resource needed to produce novel critical technologies. Further, many studies seem to look at requirements for primary CSRMs in EU production. But there can be an enormous imports of products containing critical materials from abroad, contributing to the in-use stock and future end-of-life availability of such materials in the EU. Imports of electric vehicles with lithium-ion batteries are a clear example.

In essence, we need a baseline assessment of all material flows and stocks in relation to production processes and products for all CSRMs for the EU territory. If information on future demand, development of the composition of components, lifetimes and the possible impact of circularity improvements related to CSRM-containing products is used, then future inflows, stocks and outflows could be estimated. The European Commission’s Joint Research Centre already has in place many elements required to conduct such analyses, for instance its raw materials information system. Combining all the above to produce a fully fledged, consistent, forward-looking dynamic multifactor analysis for all materials on the EU’s criticality list and expanding on the work of Carrara et al. in this area are very much recommended.

Opportunities and challenges in implementing EU energy policy from 2025 to 2035: a systemic perspective

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Having reached the midpoint, the 2020s has already been a turbulent decade, marked by the COVID-19 pandemic, new wars initiated in Europe and nearby areas, the acceleration of climate change and energy price crises. In addition, we have seen localised incidents threatening energy security, such as damage to electricity interconnectors between Estonia and Finland in 2024 and widespread blackouts in Spain and parts of Portugal in 2025. Looking towards 2035, the next few years do not look any less turbulent. With a new administration in the United States, Russia seeking alliances with China and North Korea, continued progression of climate change and biodiversity loss, and challenges to boosting the EU's competitiveness, the new European Commission faces a tough time in setting a course for EU energy policymaking. Such policymaking should address environmental, security and competitiveness challenges together while maintaining a socially just society for EU citizens and acting in a globally responsible way. Energy policymaking in the EU should also take a systemic approach that thoroughly considers the socio-technical nature of the energy transition that is in progress, and what kind of policy, market, organisational, institutional and cultural changes are needed in the European energy sector, besides technological advancements. At the start of 2025, the European Commission initiated new policy frameworks – the competitiveness compass and the clean industrial deal – to respond to the current global challenges. They embrace the triple challenge of tackling climate change, ensuring competitiveness and building (economic) resilience – but perhaps still place too little attention on security beyond economic aspects. In this essay, I will comment on policies from the perspective of this multi-objective challenge.

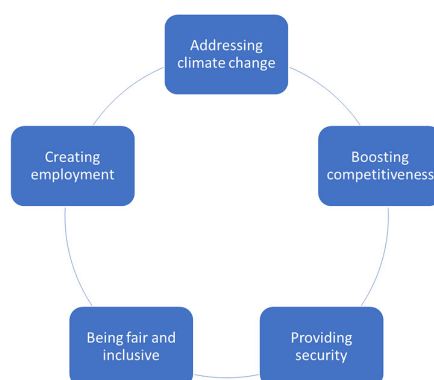
In the early 2000s, policy discussions were already focused on the policy objectives of ensuring competitiveness (leading to the Treaty of Lisbon in 2007), promoting sustainability (through the implementation of the Kyoto Protocol, signed in 1997) and maintaining security (through the implementation of the Treaty of Moscow, which required Russia and the United States to reduce their deployment of nuclear warheads by end of 2012). But the surrounding international context was different from today. In the early 2000s, energy policy in the EU was much more focused on market forces and liberalisation, with less attention paid to energy security or geopolitics ([206]). While some concern was expressed over the dependence of the EU on Russian energy imports, in particular following natural gas disputations between Russia and Ukraine in 2006 and 2009 ([207]), the market and climate change perspectives prevailed, with little concrete action on this risk.

EU energy policy has traditionally embraced the objectives of (1) ensuring energy security through the diversification of supplies, solidarity and collaboration; (2) building a fully integrated energy market enabling the free flow of energy; (3) improving energy efficiency, reducing emissions and driving employment and growth; (4) decarbonising the economy in line with the Paris Agreement; and (5) promoting research in clean energy technologies to drive the energy transition and improve competitiveness. These were endorsed by the energy union strategy (2015). The European Green Deal, launched in 2019, included a more specific policy programme for the achievement of the above

([206]) Umbach, 2010.
([207]) Wrange et al., 2019.

objectives, emphasising the importance of both decarbonisation and competitiveness. In 2022, the repowerEU plan, initiated in response to Russia's war of aggression against Ukraine, further strengthened three objectives of the energy union strategy: saving energy, diversifying supplies and quickly substituting fossil fuels by accelerating Europe's clean energy transition. Subsequently, questions around open strategic autonomy and technological sovereignty became part of EU energy policy discussions ([208]), with actions taking place such as the passing of the Critical Raw Materials Act in 2023, the European Chips Act in 2023 and the Net-Zero Industry Act in 2024, and the creation of a joint purchasing platform for natural gas (see Figure 5 for a depiction of key energy policy objectives in the EU.

Figure 5: Objectives of EU energy policy



Source: Author's creation.

The new policy developments tie EU energy policy even more strongly than before to industrial policy, which has experienced a gradual revival over the last decade ([209]) and has become a key EU policy objective especially through the new clean industrial deal. A stronger interconnection means that more focus needs to be on multisystem transitions or multisystem dynamics. This means, for example, that energy and mobility system transitions are increasingly integrated and co-evolve ([210]). Different systems may have functional or structural couplings, based on the flow of materials and other resources, or the same actors or technologies may play a role in more than one system ([211]). The energy and industrial systems have always been tightly connected through the energy use of industries. However, the tightening pressures to secure cost-competitiveness and low energy prices, along with the electrification of industries and the development of more circular systems, place the focus on ensuring closer multisystem interactions.

The EU's energy commissioner, Dan Jørgensen, has called for (1) implementing structural changes, (2) delivering tangible results fast and (3) putting people first (listening to their concerns and taking them seriously) and being inclusive. These calls match well with what research regarding sustainability transitions has posited about delivering socio-technical energy transitions in a just manner. Yet

([208]) Miró, 2023; Schmitz et al., 2023.
([209]) Johnstone et al., 2021.
([210]) Ateş et al., 2024.
([211]) Andersen et al., 2023.

delivering just sustainability transitions has become even more difficult than before. Despite supportive technological progress helping to advance sustainability transitions, global society is facing negative trends in terms of disinformation and data colonialism ([212]), the polarisation of societies, and increased risks and scale of trade conflicts and wars. Such trends have led to increasingly inward-looking and self-centred approaches by states and other actors, threatening progress in addressing the UN sustainable development goals.

In this essay, I aim to address the implementation of the energy transition in the EU and the continuation of EU energy policy in a rapidly changing context. I will draw from research regarding sustainability transitions to generate a perspective on the current challenges.

Although the energy transition has advanced in the EU, progress has been rather slow, with some EU Member States lagging in the implementation of supportive policies. The key challenges to the further advancement of the energy transition and making the energy sector more resilient include the following.

- The lack of a tradition of considering geopolitics and hard security as part of energy policymaking leads to a need for large institutional changes and significant shifts in perspectives today.
- The differing energy profiles, transition progress, technological interests and worldviews on security of Member States make it more difficult to create effective EU energy policies.
- The energy sector is facing simultaneous pressures to rapidly decarbonise, support the industrial policy and competitiveness of the EU and provide resilience through improved security and justice. Although renewable energy and electrification create synergies between these goals, there are risks pertaining to actions on competitiveness that may slow down decarbonisation or sever international relations.
- Investment and knowledge are needed to create more robust and resilient electricity systems to curtail disruptions to specific parts of the grid and avoid cascading effects, as occurred in Spain in April 2025, and to design surveillance and protection mechanisms for critical electricity interconnectors and transmission networks.
- Expanding open strategic autonomy as regards critical raw materials has negative implications for the natural environment and indigenous communities, as many mines exist in valuable natural environments and the living environments of the Sami people.

Although the slow progress of some Member States suggests a need for stronger European-level policies, the haste to speed up the issuing of permits, even in the face of negative environmental and social consequences, raises questions about the degree to which decision-making should take place at the EU level.

So what can be done, given the complexities involved in achieving just sustainability transitions in the energy sector at a rapid enough pace and in the current turbulent times?

([212]) Data colonialism refers to the normalisation of exploiting humans through data. Such data can be extracted through technology-enabled platforms, applications (e.g. for self-tracking), logistics and gamification (Couldry et al., 2019).

- It is important to give investors consistent policy signals, so the ambitions of the Green Deal regarding energy sector decarbonisation and energy efficiency should remain but be more responsive to pressures on security and competitiveness. It is also vital to openly discuss the trade-offs and potential risks associated with EU policies. For instance, measures to bolster industrial clean tech by way of protectionist policies must not jeopardise consistently moving away from imported fossil fuels and risks associated with liquefied natural gas imports.

- Clean tech tariffs should be focused on materials and technologies with genuine potential in the EU and not take a blanket approach. For example, competition possibilities in many solar components appear weak, while batteries and wind power components offer more potential. Energy efficiency should be strengthened, as it benefits all three goals, but doing so still appears unappealing in the eyes of many politicians. Improving capabilities in smart technologies and microchips is vital for the advancement of the increasingly digital energy transition and for technology sovereignty.

- There is a need for alignment between Member States and to create a more uniform picture of the EU energy sector, with the aim of implementing policies with effects across Member States and reducing Member-State-specific energy subsidies, which create unfair internal competition. Best practices associated with electricity network stability and resilience need to be shared between Member States, and EU coordination in this area needs to be increased. Internal cohesion is vital in this era, but regional differences in nature-related values, resources and innovation capabilities should also be considered.

- It is important to learn from history. The EU should not treat Russian dependencies and Russia's invasion of Ukraine as isolated matters but learn to become more anticipatory and prepared for different geopolitical and climate-based risks in the future. This does not mean the EU should close its borders; rather, it should cultivate diverse international relations and collaboration for mutual benefit and based on the principles of justice and fairness.

Sustainable energy transitions can be thought of from two perspectives. The first is an internal (i.e. domestic or European) perspective, focusing on transitions that will make society more energy efficient, improve quality of life (e.g. housing, environment), and boost local employment and create affordable solutions, including heating solutions (by supporting small and medium-sized enterprises and boosting local consumption of efficient and renewable solutions). Commissioner Dan Jørgensen has emphasised this perspective as important ([213]).

The second perspective is an external one, focused on how sustainability transitions link to the competitiveness of countries, and their international relations, security and export industries. Following the publication of the Draghi report, the latest public discussion in the EU has very much focused on the external dimensions and competitive benefits that the energy and clean tech sectors can generate – also addressed by the new competitiveness compass, launched by the European Commission in January 2025. Yet the internal perspective is also vital to address issues put forward by

([213]) European Parliament, 2024a.

Commissioner Jørgensen: achieving tangible results, putting people first and obtaining social justice. It is imperative that we include both internal and external dimensions in future discussions and decision-making that link to the clean energy transition and that we try to find alignment and synergies between the two perspectives of the energy transition.

So what does this mean in practice? It means that we need to find ways to genuinely balance pursuits of competitiveness and strategic autonomy with environmental sustainability and social justice. More specifically, new critical raw material mines, refinement facilities or battery factories – albeit desperately needed to reduce the EU's dependencies on the rest of the world – must not create substantially harmful air and water emissions, destroy the local environment or cultural heritage in the search for the 'clean tech advantage'. The decisions made need to consider less vocal groups in society, such as Indigenous people and young people, who may face more severe consequences, and the benefits arising from new developments need to be distributed fairly across the whole of society. For instance, not all profits must go to international corporations and their shareholders; new mechanisms are needed for taxing those funds and investing them in future society (e.g. by setting up funds, like the sovereign wealth fund of Norway, related to the mining of critical raw materials).

Research regarding sustainability transitions provides insights that can be useful for further policymaking pertaining to the European energy transition. Innovation policy continues to be important. Transitions persist over time, and the energy transition is far from complete. Hence, innovation-related activities, for instance, focused on energy storage, flexibility and the social aspects of the energy transition are needed (Geels et al., 2024). Such innovation activities not only have a massive need for funding but also require the development of the necessary skills and capabilities in Europe through innovation networks, active ways to seek to repurpose the capabilities of incumbent actors and the streamlining of permit-issuing processes to allow faster demonstration and scaling – but with awareness of the environmental, social and security risks involved.

Experimentation plays an important role in creating learning and in building skills and capabilities, especially in the current context of multisystem transitions. We need to learn more about the benefits of artificial intelligence and the operation of the electricity sector, and how electric vehicle infrastructure can be used to improve energy security, for example. Scaling up good practices is also needed across Member States. For instance, spot-price-based electricity contracts are not yet available to household consumers in all Member States. These should be supported, alongside traditional fixed pricing, to encourage innovation and commercialisation of different energy storage and energy efficiency services.

The ways in which future expectations are formed is vital, and to an important degree influenced by public policy and regulations, as noted above. Public policy measures are reactions to – and hence interpretations of – the broader landscape developments we are facing, giving signals to innovators and other actors that let them know how to respond. Research shows that different actors can interpret certain developments in very differing ways.[214] Science plays an important role in delivering as unbiased knowledge as possible about social, technical, geopolitical and policy developments – to help us make the best possible decisions based on our expectations.

[214] Kivimaa et al., 2024

The new competitiveness compass and the clean industrial deal aim to bolster innovation and manufacturing in the field of clean tech in Europe. Therefore, regulations are needed to create European markets for improving clean tech. Domestic production can be incentivised not only with subsidies but also with tighter protective measures, such as export controls. The downsides of this are the negative impact on international relations, the risk of escalating trade wars and the deceleration of the energy transition. Therefore, careful balancing is needed. Advanced regulation creating domestic lead markets for new advanced technologies appears perhaps the most promising alternative. There are plenty of historical experiences of similar approaches, but the necessary skills base is required for European industries to become competitive in clean tech. Competition is not only about pricing but also about performance and design; in some areas (e.g. electric vehicles), non-EU-based companies are taking leaps forward, surpassing their European competitors.

Many Member States and regions have visions building on green hydrogen and batteries. It is important to create knowledge, innovation and industrial ecosystems in a way that the different European regions avoid excessive competition but instead aim for fruitful cross-border collaborations that benefit the whole of the EU. This is vital especially in areas where there are skills and knowledge gaps. This is linked to my earlier remark about need for learning to attempt to critically analyse at what governance level (EU, national or regional) certain policy and regulatory mechanisms are best suited to promote such a sustainable, fair and resilient energy transition. Overall, global developments, and the changing context they create for Europe, support the faster implementation of the energy transition, which can, after initial investment costs, provide better longer-term possibilities for improving industrial competitiveness and advancing the sustainable energy transition. Consequently, these developments are necessary to provide sufficient economic, climate and geopolitical security for the EU. The advancement of the transition needs to be inclusive of the citizens of the EU, but feelings of inclusivity and fairness are increasingly threatened by the spread of misinformation and data colonialism, which increase societal polarisation.

Pursuing sustainability transitions and open strategic autonomy: a policy mix perspective on synergies and trade-offs

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Introduction

Open strategic autonomy (OSA) has recently received growing attention both in policymaking and in academic research on innovation and transformation. This paper argues for linking OSA as a policy objective with the policy objective of sustainability transitions (STs) – that is, making European production and consumption systems more environmentally and socially sustainable. Achieving both simultaneously requires well-aligned policy interventions to improve the resilience of societies against more turbulent geopolitical and geoeconomic conditions along with risks and threats arising from climate change and other environmental crises. In this essay, we aim to lay the foundations for a well-informed policy discourse on aligning OSA with STs.

Policy research on strategic autonomy

Strategic autonomy has been defined as 'the capacity of a country or region to pursue strategically important activities free of foreign interference'; adding 'open' to the term emphasises global interdependencies and the importance of international partnerships ([215]). In the EU, policy interest in OSA originated in defence and foreign policy, but has more recently expanded to many other sectors, including energy and industrial policy. References are frequently made to increasing domestic production and sourcing, improving resource efficiency, and diversifying international networks and making them more reliable as means of pursuing OSA. Pertaining to EU trade policy, OSA has created a shift from global openness towards the 'geo-politicisation of trade' and the consideration of 'trade as foreign policy' ([216]).

Technological sovereignty is a related concept, based on technological capabilities in Europe, and the EU's dependencies in this regard on countries outside the EU, for example in the fields of telecommunications, computers and electronics. There is also concern around other areas, where dependencies are seen as potentially too critical; these fields include the medical sector (e.g. drugs), energy (e.g. photovoltaic systems), critical materials (e.g. cobalt) and batteries (e.g. for electric vehicles).

Policy ideals, objectives and efforts related to OSA are not limited to the EU. The Organisation for Economic Co-operation and Development ([217]) has divided policies for technological strategic autonomy into protection (e.g. export control, foreign direct investment), promotion (e.g. bolstering industrial capacity, reducing reliance on foreign suppliers) and projection (e.g. science, technology and innovation alliances, technical standards). Most prominently, China and the United States, with their globally powerful positions, have been enacting new protective industrial policies, which create

([215]) Kroll, 2024, p. 4.
([216]) Schmitz et al., 2023.
([217]) OECD, 2023a.

rivalries that also affect Europe and the EU's OSA policies. Such protection measures run the risk of hindering STs by limiting international competition – a key driver of technological innovation and cost reductions – through restrictions on exporting and importing green technologies, whereas promotion and projection policies may support the greening of the economy and the formation of transformational networks.

Policy research on sustainability transitions

Over the past two decades, STs have been investigated by the interdisciplinary field of socio-technical transition studies. Initially, this research focused on how green niche innovations with the potential to improve environmental sustainability emerge, expand and develop amid the challenges they face as a result of radically deviating from existing socio-technical systems. Transitions require the breaking of rigid structures and their rules to develop novel solutions through trial-and-error approaches. Drawing on a range of interdisciplinary approaches, empirical studies have increased our understanding of historic transition processes and the governance of unfolding transitions.

The acceleration of STs requires the harnessing of forces of creative destruction in innovation policy mixes, thereby making room for the wider diffusion of novel solutions. Such policy mix approaches, supporting the new while also targeting the destabilising of unsustainable regimes, have to some degree been visible in the EU's recently created Recovery and Resilience Facility. Most recently, policy-oriented transition research has emphasised points of policy intervention that transition policy mixes should tackle to achieve transformative outcomes.

The need for a shift in innovation and industrial policy is justified by the lack of directionality in innovation policy – that is, the absence of the regulatory measures required to solve environmental and social problems in traditional innovation/industrial policies. This insight is incorporated in the move to challenge-led, transformative and mission-oriented innovation and industrial policies. Transition research is therefore increasingly used to support policymaking, especially in the EU.

Connecting sustainability transitions with open strategic autonomy

The objectives of STs and open strategic autonomy can be bridged through several connecting elements, two key examples being security considerations and green industrial policy.

Security as a connecting element. There is nascent research that connects STs to issues related to international and national security and trade. The key arguments made are that STs are shaped by developments in global geopolitics and security, and that transitions, when accelerating or gradually stabilising to form new configurations of socio-technical systems, will alter security and trade. These connections are relevant to OSA in the sense that transitions can enhance or reduce the dependencies and resilience of states in terms of geopolitics, international trade and crises. Future knowledge and research needs at the interface of OSA and STs pertain to, for instance, health and agri-food transitions.

Green industrial policy as a connecting element. Green industrial policy connects STs with OSA in a straightforward manner: targeting green technologies and industries serves STs directly, while OSA comes into play in the design of industrial policy aimed at improving the EU's self-sufficiency, security

of supply and capabilities regarding these technologies and industries. The international dynamics resulting from the adoption of green industrial policies in countries around the world can play out as potential drivers of STs but can also impede acceleration through industrial protectionism and trade disputes motivated by OSA.

Further interconnections. Differences in regional capabilities, alongside regional path dependencies, influence how STs proceed in different EU Member States. Hence, OSA may lead to the selection of slightly different key technologies and new industries for different regions. Moreover, a multitude of regions and Member States in the EU are aiming to become leaders in battery technology and green hydrogen. The focus OSA places on state-level and international relations extends the idea of network building in transitions to the international and national levels.

Exploring synergies, trade-offs and alignment between sustainability transitions and open strategic autonomy

The Green Deal and its pursuit of STs in Europe, along with the pursuit of OSA, has changed the policy context in the EU. Some policies, such as the repowerEU package, have already attempted to combine policies supporting both STs and OSA as dual policy objectives. Potential synergies and trade-offs between OSA and STs are illustrated for future policymaking in the EU, categorised by policy intervention points and transformative outcomes (see Table 3 in our full text, as given in the references). Initial propositions have been made regarding how to create alignment between these two policy objectives. The concrete means by which to promote this alignment can vary by sector.

Conclusions

The heightening importance of geopolitical risks and new security concerns poses fresh challenges to policymakers and analysts in the EU. Yet it is fundamentally important that addressing these concerns does not lead to the neglect of equally critical problems related to the exacerbation of climate change, biodiversity loss and other environmental crises – that is, the ambition to achieve STs needs to remain on the policy agenda. Hence, a combined approach to the two policy objectives of facilitating STs and ensuring OSA is needed. This essay provides some starting points for the improved alignment of both objectives.

First, improving alignment between the two policy objectives gives cross-domain policy networks and coordination an increasingly important role. For example, they would support the identification of critical sectors, key technologies, necessary capabilities and favourable international relations that benefit both OSA and STs.

Second, with regard to innovation and industrial policy focused on the development of new green technologies and industries, aligning the two policy objectives requires the integration of means often associated with OSA into sustainability policies – that is, increasing clean domestic production and sourcing, improving resource efficiency, and creating and maintaining diverse and more reliable international networks supporting sustainability objectives.

Third, established sustainability innovations (e.g. related to renewable energy, energy efficiency, the circular economy, demand–response services, plant-based proteins, mobility services) provide plenty of potential for OSA, but need to be replicated in different locations within the EU and more widely disseminated. This can be achieved by supporting the corresponding new socio-technical system configurations in areas where such innovations are available.

Fourth, combining OSA and STs also presents challenges from a human capital perspective. There is a need to improve skills, capabilities, competences and education in critical sustainability solutions across all sectors of the economy, and in public sector organisations. The alignment of OSA with STs requires active efforts from decision-makers and the public sector, together with private sector actors leading in sustainability. Policy mixes coupling OSA with STs will require:

- the development of competences related to STs and OSA (through training, education, recruitment, and networking across administrative and industrial sectors);
- research and development funding and experimental innovation policies in support of technological and service innovations that benefit both STs and OSA;
- the revision of fiscal policies to ensure they support both STs and OSA;
- international collaboration and diplomacy combining STs and OSA;
- policies to improve local resilience covering geopolitical and trade-related issues, along with climate- and environment-related risks;
- the continuation of EU policies facilitating networking between EU regions and combining just transitions with new sustainability sectors and job opportunities;
- improved and interconnected foresight and transition-oriented perspectives, resulting in new policy visions, strategies and programmes bridging OSA and STs;
- the creation of tools, models and evaluation frameworks for *ex ante* and interim assessments of the impacts of unfolding STs on OSA and the impacts of OSA policies on STs.

The essential role of place in security investment

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Introduction

Both the Letta report ([218]) and the Draghi report ([219]) have paid a lot of attention to the current need to strengthen Europe's industrial capacity for defence (and space industry). In the Letta report, the focus was on the defence industry as a missing factor in the single market. As Letta put it:

> *The fragmentation of demand, driven by national public orders to a largely domestic industry … is also evident in the division of the defence industrial and technological base (DITB) across Europe, leading to unnecessary duplication of equipment … this fragmentation prevents the realisation of potential economies of scale that could arise from pooling defence equipment production efforts across European companies. When compared to the American DITB and those of emerging defence industries like South Korea, Turkey, Iran or China the lack of integration in the European defence industry significantly diminishes its competitiveness. This represents a major, costly handicap that jeopardises European security.*

Similarly, in the Draghi report, the fragmentation of demand is pinpointed as one of the main causes of the lack of competitiveness of the defence industry in Europe. To quote Draghi:

> *The EU defence industrial landscape is populated mainly by national players operating in relatively small domestic markets …. Fragmentation creates two major challenges. First, it means that the industry lacks scale, which is essential in a capital-intensive sector with long investment cycles. As a result, if EU Member States were to ramp up defence spending significantly, a supply crisis could occur with Member States competing between each other on the constrained European defence equipment market. Second, fragmentation leads to serious issues related to a lack of standardisation and the interoperability of equipment, which have come to light during the EU's support for Ukraine.*

Both the Letta and the Draghi report emphasised the long-term implications of such missing elements in Europe's integration process. As Draghi put it:

> *Without demand aggregation among Member States, it is more difficult for the industry to predict longer-term needs and increase supply, in turn decreasing its overall capacity to meet demand and depriving the industry of orders and opportunities. As a result, defence procurement is diverted outside of the EU. Between June 2022 and June 2023, 78 % of procurement spending went to non-EU suppliers, out of which 63 % went to the US.*

And Letta noted:

> *Variations in tendering process timelines and minimal foreign company participation with the prominence of a 'captive market approach' in public contracts highlight further integration challenges. The lack of budget synchronisation, national defence industrial policy considerations, or a shortfall in national expertise within procurement and acquisition agencies*

([218]) Letta, 2024.
([219]) Draghi, 2024.

may restrict the Europeanization of supply chains. The national basis for organising DITBs limits the visibility companies have of subcontractors and suppliers within Europe, further hindering integration and collaboration across the continent's defence sector.

The focus of both reports on the missing economic and technological integration dimension of the defence industry in Europe fits well with the focus on the need for proper European industrial policy. It touches on the question of whether the EU, as a transnational union of independent European countries, can design a common industrial policy or can be successful in achieving technological sovereignty in an area that is part of more a political union than an economic union, with national sovereignty in the hands of national governments and the European Council.

Recognising the place-based nature of security

In previous work, the crucial importance of place-based innovation for achieving sustainability as formulated in the European Green Deal ([220]) was highlighted. The approaches of both Letta and Draghi with respect to security and defence suffer from the same limitation ([221]). Such policies must reflect geographical diversity and local needs. This holds also for the geographical location of defence-related production sites and/or military facilities in Europe. These were strongly influenced by the formation of European countries' different national identities over the past two centuries. Europe is a continent that witnessed both world wars. European countries built national defence capabilities as part of their industrialisation processes in the 19th and 20th centuries. Logically, the location of military production and facilities sites was often in border regions or in countries' key infrastructural locations, such as seaports.

It remains surprising that the subject of the territorial/place dimension of defence and security was not addressed in either the Letta or the Draghi report, despite their strong emphasis on the defence/security element missing from European integration, as quoted above. It is surprising, first, from a national perspective, given the very different stances on defence across European countries. In countries such as Austria, Cyprus, Denmark, Estonia, Finland, Greece, Latvia, Lithuania, Norway, Sweden and Switzerland, there is conscription for men; in Denmark and Norway, women are included. Croatia is set to reintroduce conscription in 2026. The report by Sauli Niinistö ([222]), former Prime Minister of Finland, introduced the notion of 'single security' alongside the single market, illustrating, on the one hand, the need to view security as a common European public goal and, on the other hand, the huge differences across Europe in the perception of and concern with territorial security. So it is also surprising from a regional and territorial perspective that so little attention was paid to defence and security. Introducing security as new common public goal in European integration today creates a new justification for Europe's place-based support policies; this justification is based on a common interest in security, rather than on notions of economic solidarity from a 'centre versus periphery' perspective. It is interesting that this common security goal became the first issue addressed in the 2025 State of the Union address, given by the European Commission's President, Ursula von der Leyen ([223]).

([220]) See McCann et al., 2020; Schwaag Serger et al., 2023.
([221]) European Commission: Joint Research Centre, Kattel et al., 2024; Trippl et al., 2023.
([222]) Niinistö, 2024.
([223]) https://commission.europa.eu/strategy-and-policy/state-union/state-union-2025_en.

After the end of the Cold War, the disarmament process in Europe was part of the professionalisation of military forces and of the dismantling of military facilities in many (western and eastern European) internal border regions. Many of those regions have become more central European regions; others remain, from a European perspective, peripheral: regions on Europe's outside borders. This is particularly the case for the EU's newer eastern European Member States.

From a historical perspective, the creation and development of industrial policies oriented towards national defence can be considered national cohesion policy tools *avant la lettre*. Without explicit formal recognition, European cohesion policies and national regional policies contribute to European security. It is in this sense that territorial security can be considered a new European and Member State policy aim that repositions cohesion policy as, along with having a regional structural transformation purpose, having a broader European security aim that benefits all Member States.

Industrial policies oriented towards national defence could represent an additional feature of European solidarity, now addressing the continent's territorial security. It explicitly acknowledges the place-based, territorial nature of security needs and, in doing so, justifies transfers from more centrally located Member States and regions to border and peripheral regions.

From peripheral to border regions and cohesion policies to territorial security policies

In the report *The Square: Putting place-based innovation policy for sustainability at the centre of policymaking*, for the Scientific Committee on Partnerships for Regional Innovation ([224]), it was argued that a paradigm shift was needed in the design of sustainability policies so that they could become fully integrated in Europe's existing smart specialisation strategies policy framework. Policies such as the European Green Deal cannot afford to be space and context blind; they need to connect to bottom-up initiatives and the development of regional/local ecosystems. A more territorial approach would also benefit regional diversity in sustainability challenges ([225]).

The same holds for security. The primary national prerogative of defence is likely to reinforce national industrial policy interests and, as a result, benefit primarily existing innovation hubs. Such national policies – often, for many Member States, coordinated within the NATO alliance – should be complemented with a new European territorial approach focusing on solidarity along the EU's external borders. Cohesion policy is currently the only mechanism funding European solidarity that is aimed at reducing territorial and regional disparity. While the new European territorial support approach could make use of existing cohesion policy frameworks, its purpose would be different: not only to reduce disparities, but primarily to strengthen European security, particularly in border regions.

Different approaches are feasible in this area. The one chosen in the Joint Research Centre's Regdualosa project focuses on how defence and dual-use industrial investments can be leveraged by territorial innovation policies to promote regional development within the broader framework of the EU's open strategic autonomy. Here we instead focus on the extent to which cohesion policies could be

([224]) Schwaag Serger et al., 2023.
([225]) Rodríguez-Posé et al., 2024a.

transformed into territorial security policies focusing on border regions, as examples of common single security policies.

As highlighted in the contributions of Andrés Rodríguez-Posé and Lewis Dijkstra ([226]), Europe's cohesion policy itself is directly under pressure. This finding is also noted in a report on the future of cohesion policy ([227]). Cohesion policy has, in recent times, failed to reduce economic inequality, improve social inclusion and boost regional competitiveness within the EU. As Philip McCann and Johan Stierna ([228]) highlight in their contribution, the last few decades, and particularly the period since the 2008–2009 financial crisis, have been characterised by regional divergence within Member States, and the emergence of regions of discontent. Regional divergence forms, as argued by Andrés Rodríguez-Posé and Lewis Dijkstra in their contribution within the chapter on democracy, the basis for economic polarisation and growing Euroscepticism.

Border regions' security policies

Introducing the notion of territory in any discussion on security in Europe brings to the fore the huge differences between Member States' locations with respect to the EU's external borders. On the one hand, the eastern and northern border regions of the EU have been confronted in recent years with the consequences of the Russian invasion of Ukraine. The Balkan border regions, on the other hand, have been confronted with the likelihood of the enlargement of the EU over the coming decade and the economic and political impact of this enlargement. The southern Mediterranean border regions are confronted with the pressures of asylum seeking, illegal immigration and the criminal networks involved in migrant smuggling.

The external border regions of the EU are, in other words, characterised by very different challenges, which make the process of enhancing territorial security at the borders entirely non-homogeneous. Confronted with such diversity in security challenges, each of the regions concerned will need to mobilise a unique set of competences, representing, so to speak, a new combination of smart specialisation and cohesion policy. Protecting borders that are maritime, alpine or made of gigantic forests or rivers entails very different combinations of technologies, knowledge, infrastructures and organisations. Protecting borders therefore requires decentralised and distributed capacities reflecting the unique profile of each border region, and its specific advantages and assets.

All this calls for the integration of territorial security issues at the EU's external borders within the framework of cohesion, as Europe's current policy tool. However, unlike the *raison d'être* of current cohesion policies in Europe, the security/defence aspect of the eastern and northern border regions will now also include a specific element related to European public good, namely that enhancing territorial security in one border region may have a negative impact on other eastern and northern borders, increasing their probability of being attacked ([229]). This same negative impact argument holds

([226]) Rodríguez-Posé et al., 2024.
([227]) European Commission: Directorate-General for Regional and Urban Policy, 2024.
([228]) McCann et al., 2025.
([229]) Thus, border region *x* cannot freeride on the efforts of border region *y*, which is enhancing its border security, since the efforts of region *y* will negatively affect the security of region *x* unless that region consents to making equivalent efforts to *y* to enhance its own territorial security (Trajtenberg, 2004).

for some of the southern European regions with respect to illegal immigration. In short, territorial security requires the new cohesion policy to be governed by the principle of solidarity, avoiding any 'weakest link' effects at borders.

From a science for policy perspective, it could be said that border regions' security is a public good of a particular nature – a non-Samuelson pure public good – that allows for a soft coordination regime (in contrast to security as a pure public good, requiring a hard coordination regime). It will be based on the quadruple helix, with civil society playing a central role. While there is certainly the potential danger of optimising current cohesion policy for just a single objective such as defence security, the challenge will be to evolve from a narrowly designed security strategy for border regions to a broader resilience strategy. This will require an agency to play the role of an orchestrator to incentivise technological win–wins across multiple objectives, while also dealing with potential crises.

On a practical level, one could consider shifting Interreg's portion of European Regional Development Fund funding (currently EUR 10 billion allocated to categories A, B, C and D under the 2021–2027 multiannual financial framework) to external border regions of the EU only. Interreg could then be called Borderreg. There are also good economic arguments making the case that today in the EU most cross-border policy issues are primarily regulation based and therefore cannot be solved through European subsidy funding.

Second, territorial security funding should be managed in a less bureaucratic and more agile way and implemented faster than funding from the current European Regional Development Fund. In many cases, funds will need to be implemented in synergy with national defence funds coordinated within the framework of the NATO alliance and hence be managed in different ways from those permitted by current European Commission's administration and auditing rules. Furthermore, coordination with the European Defence Fund and other funding mechanisms for dual-use technologies will impose a strong need for streamlining access to multiple national and European funding sources.

Conclusions

The claim made here is that the territorial/place dimension of security investments may well represent today the easiest entry point for designing a new European territorial security policy based on the reorientation of European cohesion policy. Cohesion policy currently provides the main, or, when viewed within an international perspective, the only European solidarity funding mechanism aimed at reducing territorial and regional disparity.

In short, cohesion policy could in a way be described as Europe's 'secret weapon' ([230]). While the aim of the proposed European territorial support will now be different (with the goal of contributing to European security), the approach could be embedded in the current framework of the EU's cohesion policy. Unsurprisingly, in Europe, military facilities often map on to cohesion regions. In the current insecure international geopolitical environment, the integration of security issues into European regional policies therefore represents a logical expression of intra-regional European solidarity, expanding current European cohesion policy to form a European territorial security policy.

([230]) See European Commission: Joint Research Centre, Kattel et al., 2024.

3. Place-based sustainable development

Perceived fairness and the green transition

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European leadership is essential if the world is to avoid catastrophic climate change and biodiversity loss. The EU contains rich nations, whose historic actions have contributed disproportionately to the environmental crisis that we face. The EU must demonstrate to the rest of the world that we are both willing and able to decarbonise; we must show how it can be done. Yet many EU Member States are experiencing a backlash against environmental policy – a 'greenlash'. Farming methods, car choices, heating systems, wind and solar farms, speed limits and more have been the focus of protests. These are sometimes stoked by far-right movements, spreading fear that environmental policies threaten traditional ways of life. Some protests have forced political concessions. In the most recent European elections, as global temperatures reached record levels, fewer green ballots were cast.

Protest is generally articulated not as climate denial but as perceived unfairness. Indeed, protestors are often at pains to stress the view that climate action is essential. They argue that, in principle, climate policy is good, but that it is unfair. The focus is, generally, not the pro-environmental intention of the policy, but unfairness in its execution.

As a concept, fairness is, unfortunately, as complex as it is powerful. This short paper argues that research and policymaking would benefit from embracing this complexity, from taking a broader and more empirical approach to fairness and, especially, from investigating perceptions of fairness. Additional understanding of when and why green policies are seen as fair or unfair will be helpful, perhaps even essential, if we are to achieve the scale and speed of change that are required.

In much economic analysis and commentary on the 'just transition', fairness is primarily considered in relation to preferences over financial and environmental outcomes. Economic models and empirical data provide measures of outcomes arising from given policy options. While perspectives may differ regarding the priority given to the environmental benefit, the overriding logic of the just transition is that climate policy should not increase inequality and preferably should reduce it. Where the outcome of a climate mitigation or adaptation policy is likely to affect a specific group disproportionately, especially an already disadvantaged group, this would be unfair and so compensatory policy actions are required. Provided these are sufficiently generous and administered in a timely and efficient manner, climate-friendly policies need not increase inequality and fairness can be ensured.

Consider the following perspective-taking exercise. Try to take the perspective of someone at the sharp end of reform. Think of a worker or proprietor whose livelihood depends on their prospects in a sector that produces relatively high carbon emissions. Consider, for example, a beef or dairy farmer, a qualified gas boiler installer, an owner of a small haulage company or a worker in a meat processing and packing plant. They may be, perhaps, a sole trader with 20 years of technical experience, a successful local entrepreneur, a young person who has secured a decent income after struggling to obtain qualifications or the third generation to own and run a family business. How might these people view the fairness of climate policy?

Suppose this person is you. Imagine that your first meaningful encounter with climate policy is news of a forthcoming threat. Perhaps you hear of a plan to change taxes, regulations or subsidies in a way that has serious implications for your livelihood and well-being. The news is not good: costs are going up steeply, your skills are becoming obsolete, your competition is getting new and generous government grants, you have to abandon a production process that has served you well and invest instead in an expensive new technology you know little about, the few qualifications you have are no longer going to matter or you need to retrain mid-career. There is more. Those behind the changes want to move fast, because they are deeply concerned about the climate change caused by your economic activity.

How would you feel in the face of this kind of threat to your livelihood? Would your instinctive response be to say that provided the authorities offer enough support and compensation the outcome seems fair? Probably not, and the reasons are worth unpacking.

Multiple things could feel unfair to you. You might feel simply unlucky to have inherited a family business that your parents and grandparents had no idea was harming the planet. You might think that change should be demanded more quickly from sectors that have known for longer that their activity caused serious pollution. You might think that you have battled to overcome challenges that more privileged people did not face, only to be told that you must start again. You might wonder how competitors who stand to gain from green subsidies seemed to know all about them before you did. You might ask why your government encouraged you to learn a skill that now it is trying to make obsolete. You might look at what is being asked of your sector and ask whether other sectors that generate high carbon emissions are also getting such a tough time. You might question whether the changes demanded are easier for big firms and multinationals to implement than for small operators like you. You might wonder whether the planned changes had any input from people like you. You might be outraged at the riches still on offer in the oil industry and the elite still flying on private jets, while you must turn your life upside down.

Even if you decide that policymakers are doing their best to offer you a fair deal, you might ask whether those demanding the change truly understand the scale of the pain involved. You have to saddle the uncertainty of the change – they do not. What if the new technology turns out to be less effective than expected? What if in another 10 years your new skills become outdated again? What if you go along with the change only for others to protest and force concessions? Even if the policy offers enough compensation that you are likely to be financially better off in the end, you might still conclude that, if you could press a button and make it all go away and keep doing what you are doing, you would not hesitate to press it.

Similar exercises of perspective-taking are possible for multiple other spheres of climate action, including fuel taxes and congestion charges, or proposed locations for renewable energy infrastructure. In each case, what looks fair from one perspective is rarely perceived the same way from another. I used a simplified narrative above, but technically the fairness concerns I raised can each be mapped to different conceptions and scopes of justice ([231]). Some are about distributional

([231]) Zimm et al., 2024.

justice or procedural justice, and some are about transitional (the pathway to the outcome), recognitional (accounting for group identity) or corrective (restoring or compensating for historical action) justice, while others are arguably a combination of more than one type. The geographical spaces and time frames over which justice is considered also vary. Perceptions of fairness are complicated, but they are nevertheless tractable.

Perceptions of fairness also really matter. A recent meta-analysis ([232]) found that perceived fairness was the strongest determinant of public support for climate policies – stronger than concern about the climate and much stronger than political ideology or education. Furthermore, over recent decades, experimental psychologists, behavioural economists and political scientists have documented systematic ways in which perceptions of fairness predict behaviour. Studies in both controlled laboratory and field settings demonstrate that many people who perceive unfairness will not only withdraw cooperation but often punish others whom they perceive to be acting unfairly, even at a cost to themselves. These studies provide a scientific basis for commonly observed patterns of political protest, where protesters incur costs or take risks that surpass the scale of material losses associated with the policy against which they are protesting. The general lesson is that perceived unfairness is a strong driver of behaviour, strong enough sometimes to trump the economic incentives involved. Given this, perceived unfairness may also cause people who have broadly pro-environmental attitudes to exhibit behaviours that cause environmental damage.

The scientific literature on behaviour in relation to collective action, including behaviour linking perceived fairness and contributions to public goods, contains important evidence about fairness with regard to climate and biodiversity policy. After all, our planet's climate and its nature are perhaps the ultimate public goods, in the true sense of the word. The central, positive, empirical finding concerning collective action is that many people choose the behaviour that favours societal benefit over the behaviour that favours self-interest ([233]), in laboratory, field and observational studies ([234]). The more negative finding is that collective action among humans is highly unstable and often breaks down.

Several decades of behavioural research provide much insight into the factors that promote cooperation in collective action. Cooperation is more likely when people accurately recognise the underlying collective logic of their situation, share a common group identity and can communicate with each other. However, perceptions of the fairness of actions play a big role in whether collective action occurs and is sustained. These perceptions have multiple components. When some people are seen to 'freeride' on others' efforts, it has a significant negative effect. Most people act as 'conditional co-operators', meaning that they are willing to make sacrifices for the common good provided that others do so too, but withdraw cooperation in the face of freeriders. Thus, perceptions of unfair behaviour by a few can upset the apple cart for the many. However, all observations of others are not equal. The behaviour of people in leadership roles carries additional weight; if leaders do not pull their weight, the demotivating effect is particularly large. Nevertheless, the presence of freeriding does not inevitably cause cooperation to unravel. If it is possible to punish freeriders, then cooperation can be maintained or even increased. It is straightforward to relate these scientific findings obtained in controlled studies to the perspective-taking exercise above. When people are asked to endure

([232]) Bergquist et al., 2022.
([233]) Ledyard, 1995; Ostrom, 2000.
([234]) Fehr et al., 2018.

personal economic upheaval, they will quickly want to know who else has been asked to endure it too, who is escaping it and how, what the consequences are for those who refuse and whether those in charge are playing their part.

More generally, inequality makes collective action substantially harder. People who are well off generally accept that they should make greater contributions to solving a problem through collective action than those who are less well off, but not to the extent that those who are less well off think that they should. In other words, there is a self-serving disparity in what constitutes a fair contribution, with consequences for the likelihood that a collective goal will be reached. More positively, however, collective action is more successful when the people who are being asked to make efforts for the common good are involved in designing the system of rules for encouraging, monitoring and enforcing the actions involved. Hence, procedural and recognitional justice may be an important part of the green transition, not only because it is equitable to involve people in consequential policy decisions, but also because it makes a successful outcome more likely.

There is an additional factor to consider. Almost all the evidence described above about how fairness considerations drive behaviour derives from situations where individuals know the full picture. They can observe the situations of others, the contributions of others and the system. The globalised world of climate emissions is not so helpfully organised, given that what matters is the fairness or unfairness that people perceive. An individual asked to endure meaningful changes to their economic activity for the sake of the green transition will be inclined to ask how their situation compares with those of others, not merely in terms of financial outcome, but in terms of speed, process, uncertainty, enforcement, timing, history and more. Yet comparisons are difficult to make, because the situations of others are difficult to perceive, especially across sectors, regions or nations. This provides fertile ground for misinformation and misperceptions to spread. Indeed, there is already evidence that people systematically underestimate other people's climate-friendly behaviours and that correcting the misperception increases the willingness of the perceiver to act.

There is a pressing need for more research on perceived fairness and climate action. Martin et al. recently undertook a scoping review of collective action research undertaken in the context of climate policy ([235]). It showed that fairness considerations matter and, encouragingly, that factors known to contribute to cooperative collective action outcomes in general also feature in climate action. Discouragingly, there are important aspects specific to the collective climate action problem that have not yet been addressed and are not understood: does asking different actors to make different types of contribution to the same collective outcome damage the collective effort? Does extreme inequality undermine collective action in a different way from more modest inequality? Is cooperation damaged more by the ongoing imposition of a negative externality (emissions) than by failure to contribute positively to mitigation? How does collective action compare with collective inaction? In each case, there will be multiple testable interventions or adjustments to promote higher cooperation. Crucial research questions about the perceived fairness of the green transition remain largely or completely unaddressed.

([235]) Martin et al., 2024.

In summary, we live in a time when the climate change and biodiversity crises threaten us all. Technologies to decarbonise our economies, to support biodiversity and, in places, to restore nature are advancing all the while. Principles and policies are being devised to exploit these technologies, supported by analyses that offer insights into the likely effects, in terms of environmental benefits and potential consequences for inequality.

However, while these advances are being made, Europe is experiencing political upheaval and polarisation, with opposition to environmental policies playing an increasing part. Those who protest are, generally, not climate change deniers. Instead, they believe that what is being asked of them is unfair. This perceived unfairness can take multiple forms, linked to different conceptions of fairness and to beliefs and understandings that may be accurate or otherwise. Perceived fairness is a strong driver of action, including behaviours that are cooperative, uncooperative or even destructive. Yet there are large gaps in our understanding of the perceived fairness of pro-climate policies, and there is an urgent need to investigate and understand the perceived fairness of policy options. Given the link between perceived fairness and behaviour, if we want to transition to a sustainable economy, the transition will not only be better if the required changes are perceived as fair, but also be unlikely to happen if they are not.

Smart specialisation strategies need to enter a third historical phase to promote truly sustainable development in regional economies

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Introduction

A new phase of the smart specialisation strategies should feature the consideration of three types of capital assets: manufactured, human and natural. This would mean that the smart specialisation strategies finally consider the full productive base on which any regional economy builds its economic and social activities. In other words, in designing and implementing a regional smart specialisation strategy, **nature** needs to be viewed as a capital asset and as such requires the same management as the other types of capital assets. This vision of the integral development of the regional productive base is going to change the theory and practices related to smart specialisation strategies in fundamental ways.

Framework: global impact inequality

In a path-breaking series of papers, the economist Partha Dasgupta invites us to use a framework to address the issue of sustainability ([237]). This framework is provided by the 'global impact inequality', which is no more than an accounting statement on the state of the earth's ecosystem at a moment in time.

$Ny/\alpha > G(S)$, where:

- N is the global population;
- y is the global gross domestic product (GDP) per capita;
- α is a measure of the efficiency with which natural resources are transformed into final goods and services.

Ny/α is therefore the aggregate demand for nature's services or a measure of humanity's ecological footprint, while S is the stock of natural capital. G is the biosphere net regeneration rate, and a function of S; G can be made to increase by allowing S to increase.

The size of the inequality is a measure of humanity's ecological overshoot, and by some estimates the ratio of our demand for natural resources to nature's capacity to meet that demand on a sustainable basis is 1.7, hence the metaphor that we would need 1.7 Earths to meet our demands.

Then, closing the inequality involves an obvious policy agenda: decrease N, decrease y, increase α and raise S (and therefore G).

Now not all terms of the equation are easily manipulable in the short and medium terms. While reducing N or decreasing y is a long-term goal whose potential achievement is very uncertain, increasing α is a work very much in progress. We can see how successful innovation systems in the developed world are: the circular economy, electrification, renewable energy, and the substitution of virtually all resources and transformation of systems in many sectors to facilitate many social functions,

([236]) I wish to thank, without implicating them in my arguments and conclusions, Johan Stierna, Luc Soete and Sylvia Schwaag Serger for their comments and encouragement.
([237]) Dasgupta et al., 2023; Dasgupta, 2024.

such as mobility, domestic life, healthcare and urban development, are illustrative of these successes. All things being equal, increasing α effectively reduces humanity's ecological footprint.

For a long time, faith in the power of innovations and technological change to increase α made economists excessively optimistic about the prospect of infinite economic growth. For example, having described the great power of technological innovations to increase efficiency, achieve partial substitutability of virtually all resources for others and develop recycling techniques, Baumol and Batey Blackman ([238]) wrote: 'Rising productivity may in a real sense actually augment humanity's stock of natural resource capital, instead of depleting it[,] and may be able to do so for all practical purposes forever'.

That statement was exaggerated, almost extravagant. Indeed, as Dasgupta shows, α cannot be increased indefinitely, and no amount of human ingenuity can make it unboundedly large. To assume that α can approach infinity over time would be to assume that in the long run human economy at the margin could free itself from the biosphere; in other words, asymptotically no additional resources would be required to raise α. This is obviously wrong. Let us just look at the implications of the ecological transition for mining and extraction. To succeed in electrification and other changes, the need for strategic raw material – nickel, cobalt, lithium, etc. – is increasing dramatically, meaning that a new industry is developing for mining and extraction, involving huge costs in terms of natural resources. Think also about the need for sustainable aviation fuel: the use of a massive quantity of renewable biomass is likely to worsen the problem of deforestation.

The fact that α cannot be increased indefinitely is not a matter of being optimistic or pessimistic; this is an analytical point ([239]). As GDP is bounded above, it cannot grow indefinitely. This does not mean that the innovation economy and related policy should stop aiming to increase α. Of course not. In spite of progress, our economies are very far from having achieved the maximum efficiency with which natural resources can be transformed into marketed goods and services. There is still a long way to go! Increasing α therefore remains a crucial objective, but it is not the only one. Increasing S and therefore G is another key goal.

Let us now examine the role of smart specialisation strategies vis-à-vis the crucial problem of ending global impact inequality.

Smart specialisation strategies and global impact inequality

In some recent works, Prognos and CSIL ([240]) investigated how smart specialisation strategies' priorities reflect the critical issues of sustainability (and digitalisation). Results were striking. Indeed, any regional smart specialisation strategy starts with the setting of priorities that associate sectors with transformational goals. Through this prioritisation phase, policymakers and stakeholders can provide some directions (e.g. transformational goals) within their strategies. And in most cases of regional smart specialisation strategies these directions have some relevance to both the green and the digital agenda of the EU. The findings of the Prognos and CSIL study are impressive.

([238]) Baumol et al., 2006.
([239]) Partha Dasgupta, personal communication.
([240]) Prognos et al., 2021.

The analysis shows that more than 700 out of 1 018 (69 %) priority areas of the 185 smart specialisation strategies in the EU have a connection to the green and digital transitions. And in most cases these priorities are translated into projects that will effectively allow regions to meet their transformational goals. This demonstrates the potential of smart specialisation strategies to contribute to the twin transitions.

Because the principle of prioritisation remains intact after almost a decade of implementation, it has become obvious that this principle can be used by regions to conduct their structural transformations towards green and digital trajectories of development. This is not to say that smart specialisation strategies are, by nature or by design, sustainable development policies. We argue, rather, that this approach provides the policy tools necessary to prioritise and execute transitions towards sustainable goals when these goals are considered essential. The same could be said in the case of other big challenges such as security and resilience. Smart specialisation strategies provide a toolkit (covering prioritisation and the Entrepreneurial Discovery Process (EDP) that facilitates any kind of transition.

The next generation of smart specialisation strategies: involving an integral vision of the regional productive base

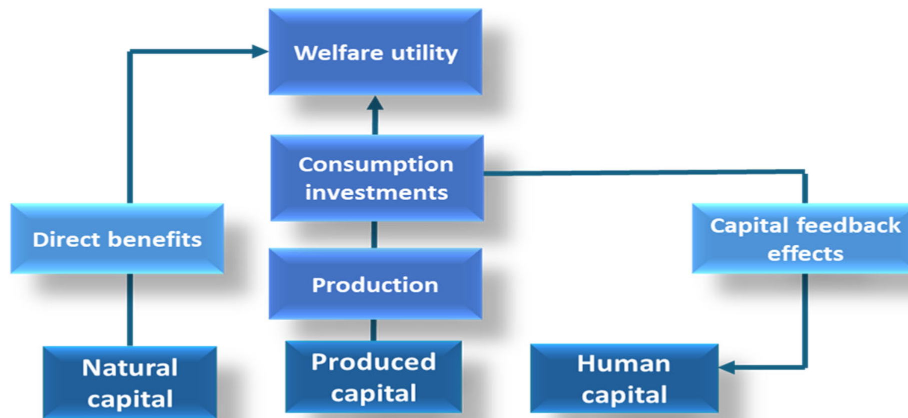
However, as has been said, increasing α will not be enough. For short- and medium-term results – which implies not considering population and global GDP per capita as realistic targets – we need to address both α and $G(S)$.

Smart specialisation strategies have a successful track record regarding their effectiveness in supporting and implementing system transformations for sustainability α. Have they had similar success in raising S and hence G? Obviously not!

- The first phase of smart specialisation (2014–2020) featured the dominance of technological innovations, so smart specialisation strategies essentially supported investments in manufacturing capital and technologies.
- In the second (current) phase (2021–2027), the emphasis is on technologies and competences (since training and developing high skill levels have become eligible for funding) and consequently supporting complementarities between technological investments and human capital.
- The third phase, which will start in 2028, should consider three types of capital assets: manufactured, human and natural capital. This means that smart specialisation strategies will finally consider the **full productive base** on which any regional economy builds its economic and social activities ([241]). Figure 6 shows how the productive base (i.e. the stock of three types of capital assets) leads to an economy's ultimate purpose, if any: social well-being.

([241]) Dasgupta, 2024.

Figure 6: Productive base and wealth creation



Source: Managi et al., 2018.

In the future phase of smart specialisation – characterised by the consideration of all determinants of social well-being – any design and implementation of approaches should view nature not as **external** to the human economy but as an integral part of strategies. In other words, nature should be viewed as a capital asset (e.g. human and manufactured capital) and, as such, needs to be managed like the other types of capital assets ([242]).

Smart specialisation strategies should become policies promoting the development of integral visions of the productive bases of regions – including **produced, human and natural capital**. The fundamental message of the new economics of sustainability ([243]) is the following: of course, it is imperative to improve the efficiency with which natural resources are transformed into final products and services; this, again, requires consideration of the circular economy, renewable energy, electrification, substituting one natural resource for another, labour and technologies, etc., and most regional smart specialisation strategies in Europe are dealing with such issues and are rather successful. These are crucial priority areas, since – as was said above – improving the efficiency with which natural resources are handled is a way to indirectly reduce the ecological footprint of the regional economy, other things (GDP, population) being equal. But improving the efficiency of the economy is not sufficient.

It is also very important to invest directly in nature. Investment can be passive: just letting an ecosystem alone, waiting for its health to improve, which can take years. Dasgupta and Levin write: 'As waiting is costly …, wetlands, grasslands and forests are at constant threat from bulldozers, drills and chainsaws.' The first generations of smart specialisation strategies ignored this problem, treating nature as external to the strategies, which obviously focused on the development and expansion of the two other types of capital assets – manufactured (technology) and human. These first generations considered natural capital as given (a sort of platform on which the strategy can be developed), leading to the mismanagement of one fundamental asset: nature. Newer strategies consider nature a true capital asset that deserves careful management, just like the two other types. Some regions are leading this paradigmatic shift. For example, the North and East Finland region considers priorities for building that combine the three types of capital to achieve transformation while ensuring the careful

([242]) Dasgupta et al., 2023.
([243]) Dasgupta et al., 2023; Dasgupta, 2024.

management of nature, which the region recognises as a critical capital asset ([244]).

While the procedural fundamentals of smart specialisation strategies remain intact (prioritisation and the entrepreneurial discovery process), this vision of the integral development of the regional productive base underlying any policy process is going to fundamentally change the theory and practices associated with smart specialisation strategies.

- New economic instruments will be needed to measure the economic value of natural ecosystems. The concept of assets' social productivity is central here. To take Dasgupta's definition of 2024: an asset's social productivity is 'the net increase in social well-being that would be enjoyed if an additional unit of that asset were made available to the economy, other things being equal'. In other words, the social productivity of a natural capital asset is the capitalised value of the flow of services an extra unit of this capital would provide to society. Economists call social productivities of capital assets their shadow prices, which are prices that cannot be observed in the market.

- Based on these values, new trade-offs will emerge: some investments, for example in the tourism or transport industry, will not be made because the social productivity of the threatened natural ecosystem is higher than the social value of the planned investments. In some (perhaps many) cases, protecting an ecological ecosystem has higher social value than building a highway or new tourism infrastructure.

- But then new financial tools are needed to finance – non-cheap – passive investments such as the creation of protected areas. In a recent paper, Cornet and Foray conduct a synthesis review of new financial engineering instruments to fund large-scale projects that have potentially significant benefits for society but are not implemented due to the lack of private incentives they generate to attract the required financing.

- New strategies will be drawn up to enable local communities to reap some benefits from investing in nature. Regions need to understand and identify the economic mechanisms through which local communities can capture benefits from protected areas that conserve nature. The Dasgupta review of 2021 describes tourism as the primary mechanism through which protected areas generate financial benefits. However, as commented by Albers ([245]), we are still missing economic analyses to estimate the elasticity of tourism demand with respect to the expansion of protected areas. But, in any case, the Dasgupta review argues that protected areas improve both conservation and well-being outcomes when decisions about tourism development are paired with decisions about the management of protected areas and the mechanisms for capturing tourism values locally. In conclusion, many smart specialisation strategy priorities dealing with tourism need to be redesigned to integrate the management of natural capital in the tourism development strategy and to realise the economic opportunities offered by managing natural capital assets and extending protected areas ([246]).

([244]) Joikelainen et al., 2024.
([245]) Albers, 2022.
([246]) Idem.

- Finally, since EDP is going to remain a key mechanism for identifying problems, gaps and opportunities and tailoring policy solutions in response, nature needs to be present in EDP, and legitimate representatives (non-governmental organisations, associations, networks of protected areas) should be invited to be involved. EDP is always dedicated to tackling concrete problems and finding solutions to achieve transformational goals but with nature involved in the process, EDP will no longer rely on technologies (and complementary investments) alone but will consider the management of the natural assets concerned, which is in many cases about conserving and restoring. A more long-term vision will, thus, influence the process of discovering what needs to be done to meet priorities. This means a step change in the logic of EDP and stakeholders' mindsets and values. Designing and implementing smart specialisation strategies that are truly sustainable (in the sense given in this essay) – including the mechanisms for enabling local communities to reap benefits from investing in nature – will help achieve such dramatic evolution.

Conclusions

Smart specialisation strategies – since their initial period of implementation – have proven to be an effective policy approach to promoting transformations involving sustainability goals. They have demonstrated their potential to trigger targeted transformations thanks to their two pillars: prioritisation and the entrepreneurial discovery process. However, the logic of sustainable transformation remains very much inspired by Baumol's world, in which increasing technological efficiency is almost everything. In such a world, smart specialisation strategies are designed as a pure efficiency strategy focused on technologies and human capital, while treating natural capital as external to the policy and related action plans. By this logic, this approach is only partially sustainable. It is now time to change perspective and to introduce the theory and practices of smart specialisation strategies into Dasgupta's world – instead of Baumol's – a world where α cannot move towards infinity exogenously. In such a new world, nature becomes internal to the strategy – as a capital asset that requires the same careful management as the other types of capital assets. Then, smart specialisation strategies will become truly sustainable – based on an integral vision of regional development. But adopting this new perspective is not easy. It involves changing our definition and vision of what 'sustainable regional development' is: transmitting to the next generations a regional productive base – including manufactured, human and natural capital – that is at least as large as the present one.

Can 'local missions' play a role in linking climate change mitigation with cohesion policies?

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Introduction

While mission-oriented innovation policy (MIP) is not novel, the EU's decision to reinvigorate has led to widespread renewed interest in government-led research and innovation policies targeted at specific societal challenges ([247]). A key imperative in the current take on MIP, as adopted by countries around the world, is to link top-down guidance to bottom-up experimentation ([248]). However, it is increasingly understood that there are tremendous challenges in terms of securing the traction needed for such guided bottom-up experimentation to emerge and accelerate – possibly because governments at the end of the day may be reluctant to make strong (political) choices, and therefore resort to broad and opaque missions with little direction ([249]). A recent review of the five EU missions suggests that, for this first and leading example of modern MIP, there is still little buy-in at the (highly heterogeneous) national, regional and local levels ([250]).

Struggles in getting varied stakeholders on board in collectively pursuing societal challenges are currently sparking research on the geography and multilevel aspects of missions ([251]), and on suitable (participative) governance modes ([252]). Such issues are particularly salient for the EU missions, as they stretch from the supranational to the subnational level. Geographical and regional variations within the EU imply that various important questions arise concerning who chooses the topic of the mission, how the voices of different parts of the EU are promoted and heard and what the basis is for policy design and citizen engagement ([253]).

Take, for example, the EU mission on climate change mitigation. There is obviously already overwhelming scientific evidence of the need for policy and behavioural changes, but whether this evidence is fully accepted and responded to by the most relevant stakeholders, in terms of their ability to drive major changes, is not at all clear. While all European cities, regions and nations are exposed to global warming, the economically weaker regions are most in need of re-equipping for a sustainable future, because their economies are typically more carbon-intensive and carbon-extensive. Unfortunately, at the same time, these same regions are most exposed to the risks and uncertainties associated with actions to mitigate climate change ([254]). An extra complication is that these vulnerable regions typically also lack the capabilities to diversify in more sustainable directions ([255]). Their ability to address large transformational challenges is compromised, as almost all opportunities for

([247]) Hekkert et al., 2020; Mazzucato et al., 2020b.
([248]) European Commission: Directorate-General for Research and Innovation, 2017; Mazzucato, 2018; Schot et al., 2018b; Larrue, 2021.
([249]) Brown, 2021; Janssen et al., 2021.
([250]) Reid et al., 2023.
([251]) See, for example, Flanagan et al., 2023; Uyarra, 2024.
([252]) See, for example, Butzin et al., 2024; Wiarda et al., 2024.
([253]) Wanzenböck et al., 2020; Kok et al., 2023; Wiarda et al., 2023.
([254]) McCann et al., 2020; OECD, 2023.
([255]) McDowall et al., 2023.

commercial and technological innovation, trialling and marketing that are associated with climate change mitigation favour already-prosperous cities and regions, which are more technologically advanced ([256]).

Such regional misalignment, in terms of the greater needs for climate change mitigation in economically weak regions also facing the greatest risks of climate change mitigation activities, poses a profound challenge to centrally orchestrated MIP seeking to spur and align bottom-up experimentation. This is because the local and regional geography of incentives is likely to be fundamentally misaligned with any top-down mission framing ([257]). A problem that is evident in countries outside the EU (258) as well as in Member States is the existence of cohesion policies serving to address inequality issues that are hardly discussed in relation to MIP. Exceptions are pointed out, for example, by Molica et al. ([259]).

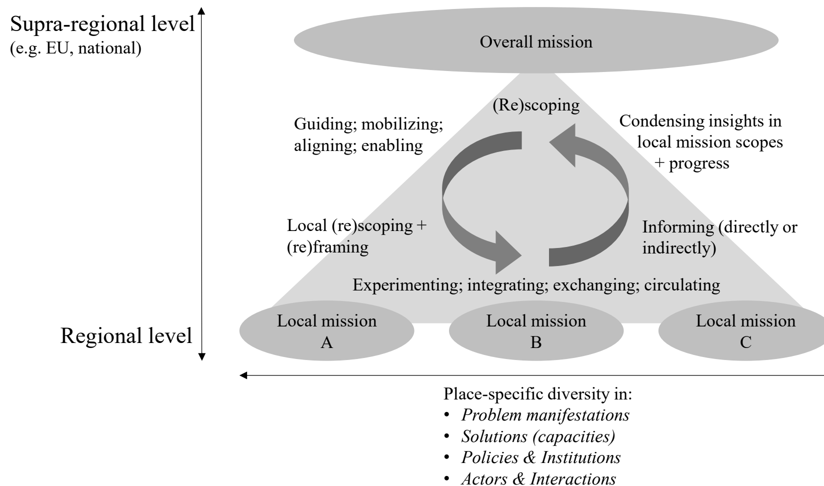
The above merits more attention to creating resonance between EU-level missions and the daily reality of 'field-level' actors like citizens, firms and non-governmental organisations located in strong or weak regions with different problems, capabilities and institutions. Possibilities of synchronising those two worlds depend on how the actors perceive risk and uncertainty ([260]), and how risk and uncertainty themselves reframe the notions of salience, credibility and legitimacy ([261]). This reframing is likely to differ markedly across the EU. While scientists and policymakers, especially those focused on environmental issues, will wish citizens, firms and institutions to be bold in moving forward on the climate change mitigation agenda, many arenas of society will not necessarily feel a similar sense of urgency in this regard. Lack of buy-in, or outright resistance, is often grounded on quite different logics and reasonings from those of the scientists or policymakers and is typically based on citizens' and firms' fundamentally different priorities, perceptions, fears, concerns, incentives, assets and endowments.

Local missions

Through conceptualising the notion of local missions and exploring possibilities of supporting this through EU cohesion policy, we aim to contribute original and concrete ideas useful for both academics and policy practitioners concerned with matching top-down policy guidance and bottom-up problem-solving capacity. Figure 7 gives an impression of how we understand the key dynamics associated with launching (supra)national missions aiming to give top-down guidance on innovation capacities from different stakeholders in different regions.

([256]) McCann et al., 2020.
([257]) McCann, 2023a.
([258]) Corfe et al., 2021; McCann, 2023a,b.
([259]) Molica et al., 2025.
([260]) Kay et al., 2020.
([261]) Cash et al., 2003.

Figure 7: Conceptualisation of local missions for (re)scoping challenge-led innovation policy



Source: Author's creation.

We assume that MIPs revolve around government-led top-down missions, which are formulated in a process that may or may not involve rigorous analysis and stakeholder consultations ([262]). To elicit the development and diffusion of new solutions for persistent challenges, these missions are supposed to promote more collaboration and investment ([263]). This can be achieved by engaging different stakeholders through a variety of mechanisms, such as guiding (e.g. by providing information and inspiration), mobilising (through policy incentives, or, perhaps more importantly, through creating expectations that new markets are emerging), aligning (e.g. by improving the consistency of policy strategies and instruments) or enabling (e.g. through removing barriers by updating or removing regulations).

Importantly, these mechanisms are targeted at stakeholders located in different regions, each with their own specificities when it comes to particularly prominent problems, capabilities for developing or adopting certain solutions, local policies and institutions, and characteristics of actors and networks (e.g. in relation to resources and power). All these place-specific features translate to differences in priorities, perceptions, fears, concerns, incentives, assets or endowments. For missions to spark action, they need to be reframed (in terms of values) and rescoped (in terms of problems and solutions) in a way that aligns with these specificities. This could be an implicit practice, in which stakeholders use the interpretative flexibility of a mission to understand it in a way that reflects their beliefs and interests (compare with the 'boundary object' perspective introduced by Janssen et al. ([264])). In that case, they adopt the overall mission as such and find their own way to contribute to it. However, it is also possible for regions to be more explicit in formulating a vision on the place-specific interpretation of the overall mission. We refer to this as creating a local mission. Local missions redraw the boundaries of the overall mission (in terms of prioritised values, problems and solutions), based on what local stakeholders deem to be a salient, credible and legitimate strategy. This determines the scope of the activities they initiate to achieve their mission.

([262]) Nylén et al., 2023.
([263]) Mazzucato, 2018.
([264]) Janssen et al., 2023.

Compared with (supra)national-level mission policy, typically rooted in science, technology and innovation policy ([265]), regional-level policy is likely to place more emphasis on experimentation, adoption and integration – activities that are less focused on generating genuinely novel knowledge, and more on combining and applying knowledge ([266]). In that sense, we follow the narrative of Henderson et al. ([267]) in presenting local missions as complementary to (supra)national policies.

What we add is that local missions may in turn also influence the scope of broadly formulated (supra)national missions. One possible channel is direct interaction between leaders of local missions and those of (supra)national missions, with the positions of those leaders being dependent on the specific governance structures used for mission formulation and pursuit. Leaders of local missions can use the results of local negotiation and experimentation processes, and exchanges between regions, to inform leaders of (supra)national missions about their perceived possibilities of and challenges to achieving the overall mission goal. Gathering and condensing such insights may then help to narrow the scope of that mission. In addition, local missions can indirectly lead to such rescoping. This can occur when analysis of cumulative experiences with and across local missions starts to point to specific problem framings that resonate widely, or to solutions that (as their development progresses) turn out to be scalable or replicable across places.

The result of the two-way dynamic described is that local missions may support the gradual process of refining the overall mission, thereby increasing the likelihood that it becomes sufficiently specific to act as a salient, credible and legitimate reference narrative. There is no fixed starting point for this loop, as the formulation of the initial (supra)national mission may already draw directly or indirectly on local inputs. Then again, the rescoping of the overall mission is only a secondary possible benefit of local missions. The primary and quintessential promise of local missions is that the underlying customisation logic may help to overcome their lack of traction. This addresses the often-cited but poorly respected claim that solving today's societal challenges requires decentralised rather than centralised control ([268]). Unlike traditional 'moonshots', the tackling of more 'wicked' societal challenges cannot be planned in accordance with an agreed strategy and derived task distribution. In that case, it is in fact welcome that (supra)national missions can not be fully coordinated, and that local missions spark explorations in different and perhaps even incompatible directions. While this could be regarded as inefficient, it may still be more effective than launching a mission that eventually falls flat due to a lack of commitment among the stakeholders that need to make change happen.

Addressing societal challenges through EU cohesion policy

Returning to the context of the EU and its climate change mitigation goals, a question that remains is whether the EU missions can be complemented by an EU-wide policy framework for supporting local missions, as introduced above. The alignment of actions between localities, regions and the wider EU and UN agendas is deemed critical for building scale and momentum towards achieving the UN sustainable development goals: 'In terms of governance for sustainability, regions and cities are crucial

([265]) Mazzucato, 2018; Schot et al., 2018.
([266]) Coenen et al., 2015.
([267]) Henderson et al., 2024.
([268]) Soete et al., 1993.

for transformative investments as they have the appropriate competences on industrial development and natural resource management' ([269]). In the EU context, it has been noted that using local knowledge to tackle societal challenges can only be faced head-on, with genuine multilevel governance participation between high-level, meso-level and local stakeholders ([270]). This is exactly in line with the Barca principles of 2009, which were enshrined in the 2014 EU cohesion policy reforms after a five-year EU-wide deliberation process in which environmental, energy and sustainability issues were of key concern ([271]).

At this stage, it is important to note that many of the characteristic features of new mission-oriented policies – including entrepreneurial discovery; cross-sector/cross-actor/cross-disciplinary collective learning; co-creation; monitoring; outcome-focused, no-one-size-fits-all logic, bottom-up decision-making; and the use of conditionalities – all emerge from, and are already widely evident in, the variety of literature on modern theories of innovation, science policy, economic development and regional policy ([272]). Following the recommendations of Barca in 2009 and the ensuing five-year EU-wide deliberation process, these features were legally enshrined in the 2014 EU cohesion policy reforms ([273]), and in the Regional Innovation Strategies (RIS3), smart specialisation and results-oriented agendas ([274]). Given this, many of these features are not exclusively specific, or inherently intrinsic, to mission-oriented policies, and are already central to the governance logic, institutional design and legal underpinnings of EU cohesion policy.

Accordingly, in the fight against climate change, there are numerous opportunities for cross-fertilisation between the EU's mission-oriented policies and EU cohesion policy ([275]): 'The aims and goals of regional policy in Europe, as made explicit in the regional smart specialisation exercise, are convergent with a mission-oriented innovation policy approach'[276], and 'Europe's unique multilevel governance system is highly suitable for mission-oriented policies: member states and regions can experiment within larger EU-wide missions' ([277]). EU cohesion policy and its reformed multilevel governance architecture and logic is therefore primed to deliver on the mission-oriented approach.

In terms of this cross-fertilisation and the leveraging of opportunities between the EU's mission-oriented policies and EU cohesion policy, the mission-oriented approach can provide greater top-down directionality to EU cohesion policy while also strengthening its results-oriented logic in the context of the EU's multilevel governance set-up ([278]). In turn, from the perspective of governance and institutions, EU cohesion policy is uniquely equipped to garner an EU-wide multilevel and multiregional mobilisation of resources and responses to the attainment of the sustainable development goals. The European Commission has therefore already undertaken a great deal of detailed conceptual and

([269]) Matti et al., 2023.
([270]) Uyarra, 2024.
([271]) Uyarra, 2024.
([272]) McCann et al., 2013a, 2016.
([273]) McCann et al., 2013b; McCann, 2015.
([274]) Foray et al., 2012; McCann et al., 2015.
([275]) Cappellano et al., 2023a.
([276]) European Commission, 2017
([277]) Mazzucatto, 2018.
([278]) Cappellano et al., 2023b.

analytical work ([279]) on the operational alignment of missions to EU cohesion policy to leverage directionality. In parallel, within the broad EU cohesion policy schema, a plethora of deliberation- and engagement-driven activities ([280]) have taken place at the local and regional levels across EU regions, which are trialling and testing sustainability initiatives, including the pursuing of missions ([281]).

The crucial test of the success of the EU's mission-oriented approaches to climate change mitigation is the extent to which they garner the requisite salience, credibility and legitimacy on the part of local citizens, stakeholders and governance institutions to drive collective action for change, and this itself depends on whether they can genuinely offer a reference narrative that can be embodied in local contexts. In any regional setting, there will always be many social, institutional, governmental, political and pre-existing policy schema frictions seeking to inhibit and stymie attempts at transformative change ([282]). Fear on the part of potential 'losers' from transformational changes will imbue defensive and obstructive behaviour, a feature endemic to many of the EU's poorer regions, and, in the case of challenges related to the climate change transition, often the same regions fear that they have the most to lose ([283]). Therefore, systems need to be introduced that incentivise local actors and institutions and persuade them that it is in their own interests to overcome these blockages and to act for change, **even in the face of radical uncertainty**.

Conclusions

Above, we argued that cross-fertilisation and the leveraging of the EU cohesion policy logic, architecture and delivery agenda is crucial for the mission-oriented success of the European Green Deal. EU cohesion policy provides a ready-made governance and behavioural framework highly amenable to mission-oriented approaches. EU cohesion policy has long-established salience, credibility and legitimacy in the weaker regions of the EU, backed up by significant medium- and long-term financial commitments that cannot be undermined by short-term political manoeuvring. Moreover, this policy is implemented in a multilevel governance setting, which maximises bottom-up initiative alongside both top-down and bottom-up shared management. The most difficult issues concern precisely how directionality is to be understood ([284]), both conceptually and legally, and how this will be interpreted in terms of the tightness or stringency of conditionalities ([285]). These issues must now be the focus of much more detailed consideration by all parties concerned ([286]).

([279]) Bianchi et al., 2024; Molica, 2024.
([280]) Matti et al., 2023.
([281]) Bianchi et al., 2024.
([282]) Barca, 2009.
([283]) McCann et al., 2020; OECD, 2023.
([284]) Avdeitchikova et al., 2023.
([285]) Molica, 2024.
([286]) Kivimaa et al., 2023.

Democracy

Introduction: is democracy sustainable in Europe?

Capitalism, particularly in Europe, never developed as a self-regulating system, nor was it intended to work as such: it required social, political and cultural regulation and compromise-based institutional arrangements to form the framework based on which the ongoing capital accumulation spurred by technical change and process and product innovation could take place. Furthermore, this capital accumulation process occurred in an environment of easy, global access to cheap fossil energy sources. Particularly in Europe, the 'extractive' tradition of economic growth with respect to nature was not only distributed to both producers and consumers as discussed in the first section on 'Capitalism'; it also involved the strong social participation of the labour class. The high rates of material growth and productivity that were achieved through the introduction of new technologies were accompanied by strong labour representation and new forms of social participation. In short, as we stressed in the overall introduction, the European capitalist system, as it developed over the post-war period, appeared in synergy with democracy.

By contrast, as highlighted in the previous section, the safeguarding of biodiversity and the introduction of the energy transition from fossil fuels to renewables are expensive, particularly in Europe, for both individual citizens and most incumbent firms. These processes are affordable only to those with the means, while those without the means are expected to shoulder the costs. However, not transitioning will be even more expensive for European society in the long term, although the burden of these costs will likely be distributed differently. The shift towards a more sustainable development path on which the need for reinvestment in and the replenishment of nature is at the centre raises – as argued in the previous section by, among others, Dominique Foray – major challenges in not only economic terms but also democratic terms. This is one of the first major policy paradoxes. Sustainability creates tensions with respect to not only capitalism but also, and possibly even more so, democracy.

Particularly in Europe, these tensions, as highlighted in the previous section, are reflected in social and territorial frictions when trying to implement the European Green Deal. In a certain sense, the Schumpeterian dynamism of the new form of 'creative destruction' (described above as 'creative resource efficiency') required to set in motion the necessary industrial transformation towards sustainability is being undermined by the successful convergence of capitalism and democracy in post-war Europe, 1945-1975 ([287]). As Tobias Haas et al. note when describing the German phasing-out of coal: 'the tension between capitalism, democracy, and sustainability, which is articulated in concrete power relations, limits the possibilities for a rapid transition to a post-fossil future and for forms of collectively defined self-limitation within planetary boundaries' ([288]).

As argued in the previous section, the 'climate coalition' in society that has emerged today consists primarily of what Pierre Charbonnier calls 'strategic transition actors': a largely professional and

([287]) As reflected in, for example, the way politicians appear to focus more on the immediate cost of achieving sustainability and to be less concerned about future costs to democracy and capitalism of not pursuing sustainability.

([288]) Haas et al., 2022.

technocratic elite, not less well-off workers or farmers ([289]). Commenting on Charbonnier's analysis, Willy De Backer ([290]) raises a central question:

> *If climate politics struggles to build broad working-class support, and if expertise becomes a new mark of distinction, then perhaps the issue runs beyond coalition composition. It may concern how we understand [ecological] limits themselves.*
>
> *Is it enough to set limits through technical consensus and institutional design, as Charbonnier proposes, or does legitimacy require a wider change in how humanity sees its place within living systems?* ([291])

In short, how can aspects of 'carbon democracy' ([292]) and 'nature democracy' be overcome and contribute to bridging the tensions in a European capitalist setting of an economic and political union of states and regions built on the principles of a single market and political freedom? Or, in more radical terms, to what extent might forms of government other than democracy (e.g. a more autocratic regime, as in China) be better equipped to achieve the necessary transitions of producers and consumers towards sustainability? Can democracies overcome this challenge in a competitive global context? The US government seems to have opted out of any attempt to address sustainability as a policy priority. Worse, the US policy priority focus on the country's domestic industrial competitiveness, based primarily on cheap fossil fuel production, is likely to undermine many other countries' efforts regarding decarbonisation. Europe's own attempt to accelerate the transition to climate neutrality through the clean industrial deal and the Net-Zero Industry Act can only succeed on a more protected 'level playing field', justifying the establishment of an external cost barrier such as the EU Carbon Border Adjustment Mechanism Regulation. However, such a barrier further internalises the costs to European citizens, with implications for the cost of living, raising questions as to whether the EU's industrial transformation policy of open strategic autonomy will provide an alternative, successful domestic development path building on new complementarities between capitalism and sustainability or ultimately fail because of its isolated nature, hampering economic development and further straining democracy.

From a more global democracy perspective, the EU as a region now stands out, together with individual countries (e.g. Australia, Canada, Japan, or the United Kingdom), as a global exception. However, as a unique transnational institution, it finds itself under increasing attack, as Arnold Tukker points out in his paper,[293] by the neo-nationalistic political views popularised in a growing number of more autocratic regimes within or outside the EU. The purpose of these regimes, whether authoritarian or openly anti-democratic, is often to push for less unity, or even the disintegration of the EU. As a result,

([289]) Charbonnier, 2025.

([290]) De Backer, 2025.

([291]) The question takes on a particularly interesting meaning in view of the global emergence of (generative) AI. Quite suddenly, innovation with AI has become unbounded. As De Backer points out: 'As algorithms perform cognitive and managerial tasks, the order built on human labour begins to fragment. When machines produce, predict, and plan, the link between human action and collective legitimacy weakens. This is not only an economic challenge but a philosophical one. If creation and foresight are automated, the basis on which we connect work to value becomes unstable. The "value of work" that sustains Charbonnier's social-democratic ecology may erode before it is realised.'

([292]) Mitchell, 2023.

([293]) Tukker, 2025

the EU's commitment to democratic values is abused to feed the very diverse, cultural and nationalistic feelings in European society. This raises the question of whether the EU will be able to continue to defend its democratic values without a clearer political European identity, as discussed by, among others, Andrea Renda and in the contribution of Sylvia Schwaag Serger and Luc Soete.[294]

We come back to the implications of all this for the EU's multilevel policy governance structure in the overall conclusions. Suffice to say here that it explains the plea in the Draghi report for unity and for a move towards treating the EU as one state.

Social and political polarisation of society in Europe

As highlighted in the first section, after having mutually strengthened each other in the period of *les trentes glorieuses* (covering 1945–1975), capitalism and democracy increasingly collided in the last fifty years, particularly following the implementation of the European monetary union and the EU's enlargement. Both the internal European and later particularly the global distribution of value chains – whereby the immaterial high value was created in multinational firms' establishments in the richest regions and countries, and the low value added phase of physical production was offshored to low-cost regions and countries – exacerbated inequalities and social divides within the EU. As Giovanni Dosi ([295]) notes with respect to the EU:

> *[T]he growing globalization has increasingly de-linked (a weakened) political domain and a (dominant) economic one and, with that, the de-linking between popular representation and the loci of decision-making, increasingly nested in an unaccountable international technocracy. This is at the heart of what Rodrick defines as the trilemma among globalization, sovereignty and democracy (Rodrick, 2011), in which the three cannot apply at the same time.*

There are also, as already discussed within the framework of the 'climate coalition' formation, major concerns with respect to the impact of deep tech, in particular (generative) AI, on democracy. The new form of modern, deep tech capitalism risks undermining democracy, not just because it fundamentally changes the power balance between capital and labour, but more directly because it is potentially more aligned with autocracy than with democracy. As Erik Brynjolfsson puts it:

> *This spiral of marginalization can grow because concentration of economic power often begets concentration of political power. In the words attributed to Louis Brandeis: 'We may have democracy, or we may have wealth concentrated in the hands of a few, but we can't have both.' In contrast, when humans are indispensable to value creation, economic power will tend to be more decentralized*
>
> *[…]*
>
> *Unlike nonhuman assets such as property and machinery, much of a person's knowledge is inalienable, both in the practical sense that no one person can know everything that another person knows and in the legal sense that its ownership cannot be legally transferred. In*

([294]) Renda, 2024; Schwaag Serger and Soete, 2025

([295]) Dosi, 2025.

contrast, when knowledge becomes codified and digitized, it can be owned, transferred, and concentrated very easily. Thus, when knowledge shifts from humans to machines, it opens the possibility of concentration of power

[...]

The risks of the Turing Trap are amplified because three groups of people-technologists, businesspeople, and policy-makers-each find automation alluring. ([296])

In so far as generative AI provides data- and algorithm-driven solutions, it offers opportunities to expand the scope of decision-making for policymakers, no longer having to take into consideration democratic principles, rules and participation.

It is, unsurprisingly, at the regional and local levels that democracy in Europe is under the most direct pressure. Since 2019, young people have been expressing their anger over and fear of climate change, most notably in the Fridays for future initiative, while *gilets jaunes* and farmers have been protesting strict environmental policy legislation. Discontent, fuelled by social media and disinformation, has grown, affecting elections both at the EU level and in various Member States. Discontent not only introduces serious hurdles to overcome in the territorial roll-out of the energy transition ([297]) but also jeopardises the European project as such, with neo-nationalistic trends feeding anti-EU sentiment.

There are also place-based economic dynamics behind the growing discontent ([298]). The contribution of Rodríguez-Posé and Dijkstra later in this section ([299]) highlights, in the most direct fashion, how growing polarisation and inequality have given rise to a widespread 'geography of discontent', targeting the EU and the European integration project.

People living in areas experiencing long-term economic decline – where jobs have disappeared, talented individuals have migrated away, public services have dwindled and essential amenities like transport, schools and hospitals have been cut – are increasingly displaying signs of aversion towards European integration.

[…]

People in trapped regions feel estranged and disenfranchised both economically and politically, increasing their susceptibility to being lured by anti-EU rhetoric.

[…]

The intensity and duration of the development traps exacerbate feelings of despair and marginalisation among residents of these regions, especially when compared with those in

([296]) Brynjolfsson, 2022.
([297]) For a more comprehensive analysis of the challenges faced by and local resistance to the delivery of renewable energy in territories, with concrete empirical data from Spain, see Requejo, 2024.
([298]) See also Koukoufikis et al., 2024.
([299]) Rodríguez-Posé et al., 2024.

more prosperous EU areas, leading to a sense of relative deprivation. Prolonged territorial polarisation can escalate social conflicts and political instability, contribute to the erosion of the middle class, hinder economic growth and investment and perpetuate a vicious cycle of discontent and disaffection with the European project.

[…]

Such malaise drives support for ideologies seeking to undermine the EU or, in extreme cases, advocate for its dissolution. This sentiment has been capitalised on by Eurosceptic groups. Both soft Eurosceptics, who oppose specific EU policies, and hard Eurosceptics, who frequently challenge the EU's viability, have gained traction by tapping into this growing discontent with deep geographical roots.

Pete Lunn in his contribution ([300]) provides an overview of the factors explaining such discontent. He extends the analysis of the sources of discontent beyond economic factors:

Higher growth improved regional policy and other policies to reduce inequality are likely to dampen the demand-side drivers of political discontent. But there are many other candidate sources, including not only cultural backlash, but also developments on the supply side of politics and technological changes that have altered the political marketplace.

Among technological changes, Pete Lunn and Arnold Tukker both highlight the importance of social media. Social media acts at several levels, according to Lunn:

First, direct communication via digital media allows political actors to gain attention and microtarget messages, without oversight or accountability. Second, if digital platforms design online choice architectures to maximise engagement, they may not expose users to challenging perspectives or, worse, may push extreme or polarising political material. Third, a lack of content oversight entails a proliferation of misinformation and disinformation. Fourth, online forums allow those holding extreme views to organise and persuade in relative seclusion.

In established democracies, digital device use is linked to declining political trust, increasing populism and growing polarisation. As Pete Lunn concludes: 'A broader consideration of sources of discontent implies a broader canvass for creative ideas in defence of democracy' ([301]).

In response to this challenge to modern democracies, Philip McCann and Johan Stierna highlight the role of bottom-up engagement and agency of citizens in regions and local communities when delivering on EU policies related to the European Green Deal or economic competitiveness. This dynamic can emerge from clusters, particularly those located in Europe's left-behind regions, which are 'crucial for identifying the different roles that different EU regions can play in driving the Draghi plan, and also the possibilities available for widening the engagement and agency opportunities for commercial clusters and civic communities across the whole of the EU' ([302]).

([300]) Lunn, 2025.
([301]) Lunn, 2025.
([302]) McCann et al., 2025.

The European welfare state

Draghi focused on growth and productivity as fundamental prerequisites for the sustainable financing of the welfare state model in the EU. However, his report did not address the challenges of the process of sharing prosperity, distributing wealth or covering the costs of the green transformation. As Luis Ayala highlights in this section, there are institutional bottlenecks within the EU in relation to the distribution of wealth, not just in territorial terms, as highlighted in the previous section, but also in the social sharing of prosperity resulting from the globalisation changes described above. Following the principle of subsidiarity within the EU, there are limits to direct intervention in social policies, leaving the core responsibility primarily to Member States. As Luis Ayala ([303]) observes: 'Without binding commitments or dedicated funding mechanisms, the current framework remains insufficient to ensure equitable protection across all countries.' Therefore, there is a major need to 'set common minimum adequacy levels for income support', considered by Ayala as a crucial first step towards a more integrated European social model:

> *While national differences in economic structures, institutional frameworks, and social needs make full harmonization challenging, establishing a baseline standard would prevent extreme disparities and enhance economic and social cohesion. Strengthening the EU's role in social protection through this harmonization of minimum standards would reinforce its commitment to reducing inequality, fostering inclusive growth, and ensuring that no citizen is left behind in an increasingly uncertain economic landscape.*

Time is, however, not on the side of Europe's social investment. The pathway proposed by Luis Ayala of an expansion of social investment policies, such as the strengthening of 'social safety nets through targeted investments in education, labour market policies, and public services', whereby traditional tax–benefit systems are integrated with proactive social investment strategies, is difficult to imagine within the current prioritisation of public defence expenditure. Yet, as Éloi Laurent points out in his contribution: 'the perceived trade-off between securing external borders and guaranteeing social stability in time of constraints on public finance is a perilous illusion. Security depends on solidarity. Scaling back social policies to "finance" a new defence effort may end up jeopardizing the very security this effort aims at preserving.'

The defence of democracy in Europe will, in other words, be closely related to the defence of the welfare state. To quote Laurent: 'The welfare state has been for decades if not centuries the driving force of democratic consolidation in Europe for the greater good of its citizens, whose civil liberties and political and social rights are essential determinants of their well-being. It needs to be consolidated and updated, not dismantled nor sacrificed. Europe, considering its own history, cannot ignore that reckless social inequality and relentless vulnerability lead to the destruction of civic fabric and eventually democracy itself' ([304]).

Policy defending the welfare state and its interaction with economic growth requires a solid system for measuring progress. Laurent et al. propose in their joint paper new indicators and a monitoring

([303]) Ayala, 2025.
([304]) Laurent, 2025.

framework to measure well-being beyond gross domestic product. They outline a new vision of European well-being, including health and cooperation, and detail the institutional pathways through which indicators other than gross domestic product can inform European policy ([305]).

Delivery in multilevel governance and a sense of purpose

Modern democracies are based on representation, where voters delegate power to political parties and select politicians based on their electoral programmes or messages. However, today's deep transformations of entire socioeconomic systems pose fundamental challenges to democracies worldwide but particularly in Europe. First, deep structural transformations can only be tackled through long-term and rational decisions. Today, short-term electoral dynamics more often dominate political discussions, with emotions and misinformation increasing in intensity and impact. Second, citizens' trust in political representatives is grounded in representatives' delivery of their policy agenda. This is true at the local and EU levels.

The first scientific report summarising the Fair and Sustainable Economy contributions in 2024 highlighted the EU's 'delivery gap', that is, its increasing tendency to abandon the delivery of its 10-year policy agendas after each European election. Comprehensive medium-term policy strategies such as the Lisbon strategy, the Europe 2020 strategy and the European Green Deal are abandoned by the public debate already during their implementation phases, lost in fragmented and confused multilevel governance.

Several authors contributing to this publication insist on the importance of the implementation phase, proposing innovative approaches to policy delivery that build closely on continuous and agile policy learning. In his reflection on the EU's future financial instruments, Andrea Renda presents a comprehensive vision of how they could be more agile and effective in addressing the EU's multiple, simultaneous and structural challenges ([306]). He proposes the notion of 'quantum policymaking', responding to the more down-to-earth and practical need for 'boosting the value for money of EU funds' and 'ensuring that the EU pursues its goals and addresses the related trade-offs in a structured, consistent manner'. Renda's notion of quantum policymaking is also a response to the commonly used, Tinbergen-inspired budget allocation approach of 'one policy, one goal', which is characteristic of recent European policymaking. Renda's very practical proposal involves a reorganisation of the EU's multiannual financial framework that would 'remove silos, enable mission-oriented policymaking with conditionalities, unleash quantum policymaking (starting with dual use) and leverage EU and other resources through enhanced collaboration and partnership'. Slavo Radosevic et al. ([307]) question whether our current science for policy approach to learning is sufficient in times of deep systemic transformations. Matthijs Janssen et al. ([308]) propose a new theoretical framework for a policy evaluation system adapted to the roll-out of transformative innovation policy. Alexandra Mazak-Huemer ([309]) takes an even more concrete stand, outlining how AI technology can be integrated into a more effective technology monitoring system.

([305]) Laurent et al., 2024.
([306]) Renda, 2025.
([307]) Radosevic et al., 2024.
([308]) Janssen et al., 2025.
([309]) Mazak-Huemer, 2025.

In this final reflection, we conclude by situating multilevel governance within the broader context of democracy, arguing that the EU and the European project must rediscover their sense of purpose and identity. Beyond formalised institutions, democracy is forged by shared social, cultural and ethical norms and beliefs that enable and shape governance. These social and cultural foundations of democracy have a particular importance in Europe. As pointed out by Jorge Semprun, in the 20th century, Europe's liberal democracy was shaped by the double opposition to fascism and Stalinism ([310]). These historical roots and identity are often omitted in the political turbulence of today.

Unlike those in China and the United States, the European project is uniquely based on diversity – social, political and cultural diversity – deliberately avoiding the comprehensive efforts of nationalistic constructionism ([311]). This does not imply a lack of a common European value base. In May 1935, when many European nation states moved towards authoritarian governance, the Austrian philosopher Edmund Husserl held an influential lecture in Vienna ([312]), developing the idea of a common European 'spirit', independent of concrete territorial borders, a transformative force of critical rationalism in which he saw Europe's future beyond authoritarianism ([313]): 'No matter how inimical the European nations may be towards each other, still they have a special inner affinity of spirit that permeates all of them and transcends their national differences. It is a sort of fraternal relationship that gives us the consciousness of being at home in this circle.'

In our current context, when European-level democracy is being questioned, it is prudent to learn from history. In May 1935, democracy in Europe was even closer to collapse. 'The European nations are sick', warned Husserl in his lecture. 'The crisis of European existence can end in only one of two ways: in the ruin of a Europe alienated from its rational sense of life, fallen into a barbarian hatred of spirit; or in the rebirth of Europe from the spirit of philosophy, through a heroism of reason that will definitively overcome naturalism. Europe's greatest danger is weariness.'

Husserl's warning of weariness, of a great tiredness threatening our democratic spirit, have a surprising parallelism to Schumpeter's warning of the fading capitalist spirit, routinised while losing its transformative force. Today, we are the heirs to the rebirth of Europe. What can we learn from history? How can we revitalise our social market capitalism and unique European democratic spirit? How can we safeguard 'the transformative force of critical rationalism' and a rational, mutual, open and objectively informed public debate in Europe? How can we nurture the European 'inner affinity of spirit' within multilevel European governance?

The different analyses presented within the framework of the Fair and Sustainable Economy and reviewed under the heading of 'democracy' point to the need to reflect, in the current rapidly changing global geopolitical environment, on possibly more radical ideas going beyond the current European multilevel governance system as it was developed and has gradually changed over the last 75 years.

([310]) Semprun, 2006.

([311]) All nation states have, at one stage in their histories, capitalised on their political power to construct national and cultural building blocks, including the mobilisation of a sentiment of national identity. Andersson, 1983; Smith, 1991.

([312]) Husserl, 1935.

([313]) This idea of Europe spanned from east to west. It inspired the 'founding fathers' of the European project in the early 1950s and the authors of 'Charter 77', among them Jan Patocka, in their civic fight against Soviet occupation in the 1970s.

Clearly, the current fiscal system, with the central role given to national states, appears increasingly inappropriate for addressing the combined challenges of competitiveness, sustainability and socioeconomic polarisation. From this perspective, the growing institutional policy mismatch in Europe is in danger of undermining European citizens' belief in the values of democracy and its capacity to deliver results.

This development is accentuated when defence is added to the policy picture. A reassessment of the EU's governance structure now appears even more essential. Defence influences democracy in many ways. On the one hand, it points to civil society, with the need for engagement, preparedness and resilience. On the other hand, it also provides a new angle on solidarity at the European level, between north and south and between east and west. In the city state of Athens in ancient Greece, civil rights including citizenship and voting rights were linked to the defence of the city. A concrete, radical proposal for Europe could simply consist of applying this old idea to the European level: spend half the time of a possible new expanding national military (or perhaps civil) service in another European country (an 'Erasmus for all'), strengthening a common understanding and feeling of solidarity among Europeans. It could even contribute to a European identity and, in doing so, help in the fight to maintain democracy.

Any institutional governance reform in the EU must build on a new sense of purpose and a framing of EU democracy as defending civic respect, science-informed debate and critical rationalism, which have always been characteristic of Europe. This reflection on the purpose and value of European integration is anchored in not only the notion of European democracy and the creation of European identity but also the human search for security in a broad sense: social security, environmental security and personal security.

1. Social and political polarisation of society

Economic polarisation and Euroscepticism

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Introduction

Growing polarisation and inequality are giving rise to a widespread 'geography of discontent,' particularly targeting the EU and European integration ([314]). People living in areas experiencing long-term economic decline – where jobs have disappeared, talented individuals have migrated away, public services have dwindled and essential amenities like transport, schools and hospitals have been cut – are increasingly displaying signs of aversion towards European integration. Many in these regions perceive – and are often told by politicians – that European integration is at the heart of their woes ([315]). Brexit was a significant manifestation of this brewing discontent against a system perceived as no longer beneficial to large swathes of the European population.

Moreover, stagnation and development traps foster social and political resentment against the EU ([316]). People in trapped regions feel estranged and disenfranchised both economically and politically, increasing their susceptibility to being lured by anti-EU rhetoric. This is particularly evident in regions where economic decline coincides with cultural and identity concerns ([317]), fostering a loss of faith in the European project and creating fertile ground for intra-country and pan-European enmity. The intensity and duration of the development traps exacerbate feelings of despair and marginalisation among residents of these regions, especially when compared with those in more prosperous EU areas, leading to a sense of relative deprivation ([318]). Prolonged territorial polarisation can escalate social conflicts and political instability, contribute to the erosion of the middle class, hinder economic growth and investment and perpetuate a vicious cycle of discontent and disaffection with the European project ([319]).

The sense of despair extends beyond economic and social hardships to political disenfranchisement and social alienation. Such malaise drives support for ideologies seeking to undermine the EU or, in extreme cases, advocate for its dissolution. This sentiment has been capitalised on by Eurosceptic groups. Both soft Eurosceptics, who oppose specific EU policies, and hard Eurosceptics, who frequently challenge the EU's viability, have gained traction by tapping into this growing discontent with deep geographical roots ([320]).

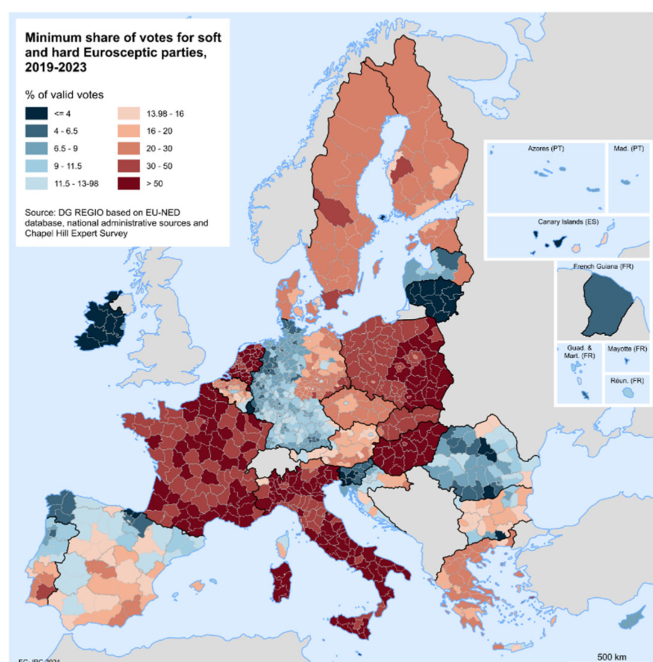
([314]) Dijkstra et al., 2020.
([315]) Rodríguez-Posé, 2018.
([316]) Iammarino et al., 2020; Rodríguez-Posé et al., 2024.
([317]) Norris et al., 2019; Bornschier et al., 2021; Rodríguez-Posé et al., 2024.
([318]) Larson et al., 2021.
([319]) Brzezinski, 2013.
([320]) Rodríguez-Posé et al., 2024.

European election in 2024

The consequence of all this is the surge of support for Eurosceptic parties in national and European elections over the past decade. In 2003, hard Eurosceptic parties garnered less than 4 % of the vote. The combined vote for both soft and hard Eurosceptic parties remained around 7 %. By 2023, these numbers had risen dramatically, with hard Eurosceptic parties receiving nearly 15 % of the vote and hard and soft Eurosceptics together reaching 28.5 %.

The rise in Euroscepticism is not uniformly distributed across the continent; it is particularly evident in areas that have experienced acute economic stagnation or prolonged development traps (see Figure 8).

Figure 8: Minimum shares of votes in European elections for soft and hard Eurosceptic parties



NB: Guad. & Marl., Guadeloupe and Martinique; Mad., Madeira; Réun., Réunion.
Source: Authors' creation.

As European societies face profound structural transformations – from demographic shifts and technological advancements to the imperative of the ecological and digital transitions – these changes, while offering new avenues for growth, risk creating fresh problems if not carefully managed. Europe needs to recognise that not all regions or communities have equal capacity to respond to these shifts and, without a sustained commitment to cohesion, Europe may struggle to achieve its full potential and regain its global competitiveness.

Cohesion – economic, social and territorial – is more than just an ideal; it is the very foundation on which the EU's progress and resilience are built. In the face of growing polarisation, it is cohesion that can ensure the EU remains united in purpose and direction. The disparity between urban centres and rural or less-developed regions threatens to undermine the EU's collective strength. Addressing these imbalances is not simply a matter of fairness; it is essential to unlocking the full potential of the EU and positioning Europe as a global leader in innovation, sustainability and economic performance.

The EU's cohesion policy is its principal instrument through which to address these disparities, and its role will be ever more critical as Europe fights these current challenges. Cohesion is a prerequisite for promoting sustainable development, enhancing economic dynamism and facilitating the green and digital transitions that are central to the EU's future. A more cohesive Europe will ensure that the benefits of growth and innovation are shared more equally, helping to mitigate rising inequalities that, if left unchecked, could foster discontent and threaten the very fabric of European unity. Such inequalities will also undermine the capacity of Europe to overcome these bold structural challenges.

However, it is vital to recognise that the implementation of cohesion policy has not been without its difficulties. Critics have raised legitimate concerns about its complexity and administrative burdens, which can make it less accessible and hinder its effectiveness. There are also valid concerns that the policy's broad scope can dilute its impact, as it attempts to address too many objectives simultaneously. In some cases, regions – particularly in newer Member States – have struggled to fully utilise the available funds, further limiting the policy's overall effectiveness. These issues are compounded by challenges in ensuring sufficient coordination with other EU and national policies, leading to inefficiencies and missed opportunities.

To overcome these obstacles, cohesion policy must be transformed and reinvigorated. Streamlining its procedures and reducing administrative burdens will make the policy more accessible and efficient, allowing regions to tap into the resources they need to thrive. A sharper focus on a smaller number of key priorities will help to maximise the policy's impact, while improving coordination with other EU and national policies will ensure coherence and strengthen synergies. Enhancing capacity building in regions with low absorption rates will empower them to fully utilise the available resources, driving local development and reducing disparities.

Long-term sustainability is another key concern, with critics questioning whether the improvements achieved through cohesion policy are built to last. Greater emphasis must be placed on fostering sustainable development strategies that promote resilience, innovation and inclusivity. This shift from short-term interventions to long-term structural improvements is essential to ensuring that Europe's regions, particularly those currently lagging and falling behind, can adapt to the changing economic landscape and contribute meaningfully to Europe's future prosperity.

In the context of these reforms, further research is necessary to shape the development of cohesion policy. Understanding how megatrends such as deglobalisation, climate change, geopolitical tensions and the rise of AI will affect territorial disparities is essential in order to develop effective strategies that are both targeted and forward-looking. Regions face diverse challenges and opportunities, and tailored, place-based policies will be necessary to account for these differences. Rigorous evaluation of what works, where and why will help to refine strategies and ensure that interventions are not only effective but also adaptable to changing circumstances.

Moreover, persistent regional inequalities have significant social and political consequences that extend far beyond economic performance. Regions trapped in long-term decline often experience a loss of social cohesion, rising political discontent and a growing detachment from the European project. Targeted cohesion investments are essential to rebuild trust, foster solidarity and ensure that

all citizens feel engaged in and benefit from the EU's broader goals. Similarly, exploring the untapped innovation potential of lagging regions can reveal new opportunities for regional development, highlighting the importance of investing in education, skills and local infrastructure.

The interaction between cohesion policy and other EU initiatives – such as industrial policy, research and innovation strategies, and environmental sustainability efforts – must also be better understood. Achieving policy coherence and avoiding policy silos is key to creating synergies that enhance the overall effectiveness of all EU interventions.

Cohesion is not just a policy objective; it is at the heart of the EU's mission. It embodies the EU's commitment to unity, solidarity and shared prosperity. By addressing economic, social and territorial disparities, cohesion policies help build a stronger, more inclusive Europe, where all regions have the opportunity to flourish. The true transformative power of cohesion lies in its ability to foster a sense of shared purpose and collective destiny among Europe's diverse citizens. This, in turn, drives the EU towards a more equitable and prosperous future, where the benefits of growth and innovation are widely shared and deeply rooted in all regions.

As Europe continues to confront significant structural challenges, reinforcing cohesion is vital for sustaining the European project. Cohesion ensures that all citizens, regardless of where they live, are active participants in the EU's future, benefiting from and contributing to Europe's collective success. Without cohesion, Europe risks fragmenting into places of haves and have-nots, undermining both its social fabric and its global competitiveness.

Overall, cohesion is the glue that binds all Europeans together. It ensures that the EU remains united, strong and competitive on the global stage by fostering a Europe where every citizen and every region feels a sense of belonging, purpose and opportunity. A cohesive Europe is not only a more equal Europe. It is also a more competitive, more resilient and inclusive Europe and a Europe that is far more prepared than the current one to tackle the challenges of tomorrow.

Understanding discontent

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> *There is discontent in large parts of Europe about the direction in which we are heading. And there is considerable unease about the future.*
>
> (Mario Draghi, speech to the European Parliament, 17 September 2024)

The speech containing the above quotation was delivered to the European Parliament following the publication of the Draghi report, which addressed the future of European competitiveness. The report placed its analysis firmly within a challenging political context:

> *Europe's fundamental values are prosperity, equity, freedom, peace and democracy in a sustainable environment. The EU exists to ensure that Europeans can always benefit from these fundamental rights. If Europe can no longer provide them to its people – or has to trade off one against the other – it will have lost its reason for being.*
>
> *The only way to meet this challenge is to grow and become more productive, preserving our values of equity and social inclusion. And the only way to become more productive is for Europe to radically change.* ([321])

The implication is clear. Europe's treasured political values are threatened and the way to counter this threat, indeed the **only** way, is through improved economic productivity combined with the inclusive distribution of the spoils.

This commentary does not question these prescriptions for improving the European economy but offers a broader consideration of the implied diagnosis of political discontent. Is an economic diagnosis and remedy sufficient? Even if these (or other) economic prescriptions succeed in raising European competitiveness and spreading the benefits equitably and inclusively, might we still find ourselves surrounded by worrisome political discontent?

It is not hard to marshal troubling anecdotal evidence. The United States is an important comparator for Draghi, given the EU's low growth relative to the more dynamic US economy. Yet the United States is suffering from unprecedented post-war political turmoil. I live in Dublin, Ireland. Dublin is a prosperous capital region in an economy that enjoys enviable growth rates, high employment rates, declining inequality and a relatively generous welfare system ([322]). Nevertheless, in 2024, Dublin's central streets exploded into a riot. Later in the year, Ireland held a general election in which an unprecedented number of candidates promoted extreme political views. There are many similar examples of the emergence of extreme politics across Europe and beyond, but Ireland is interesting because it is hard to construct a convincing explanation for these political events based on economic fortunes. Both Ireland and the United States have had their shares of economic turbulence, hardship and inequality over the post-war decades, but current expressions of political discontent are unparalleled. Even if economic grievances play a role, other factors are surely involved.

([321]) Draghi, 2024, p. 5.
([322]) Roantree et al., 2021.

Scholarship on this matter struggles to cross disciplinary boundaries, with theories and evidence spread across political science, sociology, economics, psychology, behavioural science and communication studies. All these social science disciplines are playing catch-up. The success of populist politics was not expected and has researchers scrambling in its wake to explain what has just passed them by. I am merely one such researcher. My goal here is to look across disciplines and to assemble explanations for consideration, with the aim of encouraging broader thinking about the potential causes of political discontent. Good remedies are more likely to emerge from good diagnoses.

Evidence of growing political discontent is clear. Political trust has declined across developed democracies over recent decades. Citrin et al. ([323]) review relevant survey evidence. Across 19 industrial democracies, mostly European, confidence in the legislature fell in most of them after the 1980s and 1990s. The United States experienced an earlier sharp decline in trust in its government between the 1960s and 1980s, covering both the executive branch and congress, with fluctuations and a more modest decline since. In most of the EU, between 2004 and 2018, the share of the population expressing distrust in the EU rose, with increases of more than 20 % in one third of Member States ([324]).

Santucci et al. ([325]) provide evidence of a change in political psychology. Political scientists have long differentiated between left and right or, more often in the United States, between liberal and conservative. Now, a second dimension of discontent with the political system can be measured through responses to statements such as 'People like me don't have any say in what the government does' or 'Elites in this country don't understand the problems I am facing'. Santucci et al. show how this dimension predicts voting patterns. These developments have occurred alongside a substantial decline in news consumption in developed countries over at least the past decade, especially but not only among younger adults ([326]).

An accompanying shift in voting patterns is undeniable, given recent electoral successes of populist politicians and parties in multiple countries. Here, 'populist' implies a political standpoint based on the failures of an alleged elite that controls traditional political parties and established political institutions, generally including international ones. Populists typically adopt economic nationalist or isolationist policies. Parties that articulate such policies have increased their vote shares in Europe ([327]) and more broadly across Organisation for Economic Co-operation and Development countries ([328]).

The overall pattern of political discontent, therefore, is one of declining trust and confidence in politics that has fundamentally altered modern political psychology. Alongside a loss of interest, these developments have led to increased voting for populist and nationalist political parties that oppose international institutions, including the EU. However, one aspect to note is that much of the political discontent is directed primarily at national politicians and parties holding liberal, multilateralist views about international issues, rather than at international institutions and structures themselves ([329]).

([323]) Citrin et al., 2018.
([324]) Dijkstra et al., 2020.
([325]) Santucci et al., 2022.
([326]) Villi et al., 2022; Robertson, 2025.
([327]) Colantone et al., 2019.
([328]) Trubowitz et al., 2022.
([329]) Hobolt et al., 2016; Walter, 2021.

In political science, a standard way of conceptualising electoral politics is by analogy to a marketplace. According to this perspective, voters are on the demand side and politicians and political movements are on the supply side. Voters evaluate what they see around them and form political preferences. This demand is met by political actors seeking votes or other kinds of support, who supply and sell messaging and policies. The analogy is a useful organising principle. However, developments in media and digital technology have had profound impacts on marketing and communication, some unique to political communication. Consequently, as argued below, some sources of discontent may belong on neither the demand nor supply side but instead reflect the operation of the marketplace itself.

Beginning with the demand side, economic fortunes have long been understood to drive political opinion. One strand of recent empirical research, broadly headlined 'geographies of discontent', focuses on the regional variation in discontent and aims to tease apart the multiple correlates of regions where discontent is high. While researchers' opinions may differ somewhat regarding the precise economic drivers ([330]), a broad consensus has emerged that discontent is higher in regions that have experienced long-term declines in growth, productivity and employment or, more broadly, where inhabitants feel that they have been left behind. People may seek revenge against mainstream political parties and be drawn to populist politics ([331]), which lays the blame at the door of an aloof and distant elite. This is a demand-side perspective that a root cause of discontent, perhaps even **the** root cause, is people's experience of economic decline, which makes people susceptible to supply-side factors, especially the overtures of populist politics.

Geographically defined economic decline appears to be an important piece of the puzzle, but there are reasons to look for other pieces. Causal pathways can be complicated. A researcher who judges that the rise in discontent is primarily a supply-side phenomenon might argue that what has changed in recent decades is the strategies of extreme political parties and populist politicians, whose success is moderated by the experience of long-term economic decline, generating an association between support for populists and experience of decline. It is also not obvious why long-term economic decline would lead to an increase in people switching off from the business of politics. Moreover, protracted periods of economic decline in the past have led to swings in political support from along the left–right spectrum, rather than the opening-up of a new axis of political thinking. Other factors are probably involved.

A related contender as a demand-side source of discontent is growing inequality. Economic growth in the digital era has overwhelmingly benefited the richer end of the income distribution, with median incomes increasing slowly or remaining stagnant. The incomes and behaviours of the very richest in society, including an even smaller global elite, have become more salient, with politicians seemingly unable to regulate or tax the super-rich. A recent global survey of 60 countries found that two thirds of respondents view inequality as unfair and a greater proportion want the government to do something about it ([332]). This source of discontent is consistent with the withdrawal of support for mainstream political parties, coupled with increased support for left-wing populists. However, while right-wing populists frequently lay the blame for all economic ils at the door of an elite, reducing inequality rarely features in their proposals. Inequality may play a part in discontent, but only a part.

([330]) Ejrnæs et al., 2024.
([331]) Rodríguez-Posé, 2018.
([332]) Almås et al., 2025

An alternative source of discontent stems not from economic change, but from cultural change. Norris et al. ([333]) present a theory of 'cultural backlash' focused on developed western nations. The idea is that greater security and freedom offered to successive post-war generations led to a steady and silent revolution in cultural values that consistently moved in a socially liberal direction. Eventually, the argument goes, this was bound to produce a conservative backlash, as people with traditional values felt estranged and left behind in their own countries. The thesis is consistent with measures of changing values over successive cohorts and with the socio-demographic make-up of support for populist parties.

The politics of immigration offers a prominent microcosm of the debate between cultural and economic factors in explaining discontent. Competing theories of anti-immigrant sentiment centre on either perception of economic insecurity ([334]) or a backlash against a multicultural view of society. Interestingly, the data suggests little change in attitudes to immigration over recent decades; what has changed is the increased prominence of immigration as a political issue ([335]).

The supply side clearly matters too. Populism is not new ([336]) but may have made itself more effective. The essential component of populism is how politicians change the central issue of politics from one of **what** needs to be done to one of **who** should be doing it. The rhetoric creates an in-group, which consist of the ordinary people, and one or more out-groups, most notably a self-serving and incompetent elite that runs the show ([337]). De Vries et al. ([338]) identify anti-establishment rhetoric as one of the two advantages that have helped populist politicians erode support for traditional mainstream parties since the 1980s. A second advantage is the focus on policies that are 'wedge issues' within mainstream parties. The EU and immigration are attractive areas for populists because opinion does not simply follow the left–right divide that defines traditional party identity. Therefore, the successful populist concentrates on the failures of the elite and sticks as much as possible to wedge issues. While it is difficult to determine how much the success of populism reflects an inevitable response to demand-side discontent and how much it results from a supply-side strategy that has generated and spread discontent, the latter seems to be a significant factor.

Having considered the demand and supply of political discontent, what can be said about the marketplace itself? Digital media, and especially social media, has radically altered political communication. Although the start of the rise of modern populism predates social media, its introduction may nonetheless have made it easier for populists to generate or exploit discontent. Lewandowsky et al. ([339]) highlight four pressure points. First, direct communication via digital media allows political actors to gain attention and microtarget messages, without oversight or accountability. Second, if digital platforms design online choice architectures to maximise engagement, they may not expose users to challenging perspectives or, worse, may push extreme or polarising political material.

([333]) Norris et al., 2019.
([334]) Arzheimer, 2018.
([335]) Dennison et al., 2019.
([336]) von Beyme, 1985.
([337]) Oliver et al., 2016.
([338]) De Vries et al., 2020.
([339]) Lewandowsky et al., 2020.

Third, a lack of content oversight entails a proliferation of misinformation and disinformation. Fourth, online forums allow those holding extreme views to organise and persuade in relative seclusion.

At present, the second and third of these pressure points have received greater attention from researchers, with the extent and effects of exposure to misinformation generating a debate between those viewing misinformation as a danger to democracy ([340]) and those seeking to correct what they believe to be exaggerated narratives about its impact ([341]). Lorenz-Spreen et al. ([342]) undertook a systematic review of almost 500 international research articles examining digital device use and political outcomes. On the positive side, digital device use was linked to greater political participation and engagement in autocracies and emerging democracies. However, in established democracies, it was linked to declining political trust, increasing populism and growing polarisation. It seems that digitalisation has changed the political marketplace in ways that foment discontent.

While attention has been directed to digital media and, particularly, social media, perhaps too little attention has remained on more traditional political communication. Declining political trust and losses of vote shares for mainstream parties largely predate the digital revolution, as does the start of the increase in polarisation ([343]). Research indicates that media coverage, particularly fragmented media coverage, may be a factor. Bennett et al. ([344]) argue that the fragmentation of the media landscape means that there is no longer any such thing as authoritative information. The segmentation of the media audience means that there is less accountability to the audience (and more broadly) for fairness and balance in coverage. Based on US data, Muise et al. ([345]) find that a higher proportion of citizens are segregated in their television news consumption than in their online news consumption. It is perhaps not a coincidence that the trend towards US political polarisation began shortly after the advent of cable news. The United States was quick to embrace multichannel broadcasting, but this has now spread across the developed world.

To conclude, if Europe improves its competitiveness and spreads the benefits equitably and inclusively, might we still find ourselves surrounded by worrisome political discontent? Given the arguments above, my answer to this question is straightforward: yes. It is beyond the scope of this paper to consider potential remedies to match the various diagnoses of discontent. However, policymakers may need to reach for multiple sections of the policy toolbox, in addition to the many tools of economic policy. It is still early in the life of the EU Digital Services Act, which places greater responsibilities on online platforms to regulate content. The regulatory flexibility within the act may determine its practical impacts on political communication. More broadly, there is a case to be made for a more proactive approach in the face of current threats ([346]). Consideration of multiple sources of discontent offers a broader canvas for creative ideas in defence of democracy.

([340]) See, for example, Ecker et al., 2024.
([341]) See, for example, Budak et al., 2024.
([342]) Lorenz-Spreen et al., 2023.
([343]) Boxell et al., 2017.
([344]) Bennett et al., 2018.
([345]) Muise et al., 2022.
([346]) Abels et al., 2024.

The Draghi report on the future of European competitiveness: challenges of participation, engagement and economic geography

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The publication in early September 2024 of the report by Mario Draghi entitled *The Future of European Competitiveness* potentially represents a landmark moment in the political economy of the EU. The report is comprised of two component reports, namely Part A – A competitiveness strategy for Europe and Part B – In-depth analysis and recommendations. Part A of the two-part report provides the overall argument and key elements of the strategy proposed by Draghi, or what has since become widely known as the 'Draghi plan', while Part B of the report provides detailed evidence and analyses of key aspects of the overall argument. A report published five months earlier by another former prime minister of Italy, Enrico Letta, examined the workings and future of the EU single market, also providing some important contextual framing that is relevant to the Draghi report ([347]).

The overarching concerns that Draghi raises relate to the fact that the economic growth of the EU has slowed in recent years, and especially since the 2008 global financial crisis, relative to both China and the United States. In the 2024 two-part report, Draghi focuses his arguments and attention on what he perceives to be the key inhibitors of and blockages preventing the promotion of European competitiveness and economic growth. Based on his analysis of these constraints to growth, Draghi then advocates a series of recommendations on regulatory reforms to the workings of the single market and the EU institutions, which he argues are required to underpin a new European industrial strategy. These recommendations are intended to spur debate and policy reforms aiming to drive improved EU productivity growth. Draghi argues that Europe finds itself today in a profoundly different global political economy environment from the environment in which the EU was founded and developed and for which it was designed. The almost seven-decade era since the 1957 signing of the Treaties of Rome, an era during which the European Economic Community and then the EU were created, has come to an end ([348]). Draghi contends that, in the coming decades, the most pressing challenges that Europe will face are going to be driven primarily by three fundamental changes in its external environment. These changes relate to trade, energy and defence. As a matter of urgency, Draghi argues that the EU needs to rediscover its growth momentum by finding new 'growth engines' ([349]) that can address the tripartite challenges associated with trade, energy and defence.

Draghi's arguments are eerily prophetic in terms of what has transpired since the publication of his report. As such, there is no doubt that the two-part Draghi report of 2024 represents an important contribution to the European political economy and a major step forward in promoting renewed thinking about the future of the EU and the most pressing economic, environmental and security-related challenges and concerns that the EU faces, which it must respond to in the coming years.

On many levels, the issues and concerns raised by Draghi would appear not to be new. Worries about what became known as 'the transatlantic productivity gap' between the United States and the EU have

([347]) Letta, 2024.
([348]) Wolf, 2025a.
([349]) Draghi, 2024, p. 10.

been evident for over two decades ([350]), first drawing attention around the time of the turn of the new millennium and then more seriously after the 2008 global financial crisis ([351]). However, in the meantime, Europe has faced other crises, such as the Euro currency crisis, the Greek default, Brexit, the COVID-19 pandemic, and the Russian war of aggression against Ukraine and the resulting energy and military shocks. These crises differed in their extents but all diverted attention away from the productivity slowdown. As such, for the last decade and a half, the productivity-, innovation- and growth-related concerns about Europe have remained something of a contextual backdrop for EU political economy and policy debates, rather than a core and central feature of strategic discussions. However, this may have changed fundamentally since the publication of the Draghi report, which identified these issues as central to all EU policy discussions. There are three reasons for this.

First, the publication of the Draghi report in late summer 2024 itself marked a turning point in EU policy debates simply due to the gravitas underpinning the research and reflection contained in the report, and the gravitas and authority of the author himself. Second, the 15-year delay in addressing these issues as core policy challenges means that the scale of the challenges Europe now faces are much greater than was previously the case. Third, the global political economy events that have played out since the report's publication, especially those in early 2025, have greatly magnified the scale and urgent nature of the issues raised by Draghi. The old global economic order that developed in the post-war era and lasted for precisely eight decades is now dead, and countries, states and groups of states are suddenly and urgently having to rethink their ways forward for fostering growth, development and security in the new realities. As the world's largest trade bloc, the EU's responses to the challenges it faces therefore have not only continental implications but also global implications ([352]).

Into this dramatically new and largely unexpected arena, Draghi introduces a laser-like focus on the fact that slower economic growth over the last two and a half decades has meant that Europe has missed out on many of the technology-related growth surges that have been the hallmark of the modern economy, dominated as they have been by both Chinese and US companies. Relative to the United States, productivity among western European countries grew at a fairly constant rate throughout the post-war reconstruction era up to the 1980s, after which relative growth slowed during the 1980s and 1990s, with relative EU–US productivity levels peaking at around 95 % by the end of the 20th century. Levels have since slipped back to around 75–80 % today ([353]). While parts of the industrialised world have faced a productivity growth slowdown during the era since the 2008 global financial crisis, the contraction in both overall growth and productivity growth in the EU has been much more severe than that in either China or the United States ([354]).

Draghi repeatedly re-emphasises that, over the last two and a half decades, the leading Chinese and US firms have pulled away from many European firms and industries in the very computer-, telecommunication- and information-related technologies that have dominated the economy of the modern era. Draghi's concerns are magnified further with regard to the growing technology gaps

([350]) Ortega-Argilés et al., 2014.
([351]) World Bank, 2012.
([352]) Wolf, 2025a.
([353]) The Economist, 2024; Wolf, 2024d, 2024b.
([354]) Wolf, 2024c.

associated with investments in AI. In the United States, the 'magnificent seven' ([355]) leading technology-based firms today account for over one third of the entire value of the Standard & Poor's 500 index ([356]). During the same period, the United States has gained almost total energy security due to the shale gas revolution. Meanwhile, China has developed global leadership in areas such as electric vehicles, renewable energy, defence, nuclear power and, most recently, AI. More broadly, China's emergence as an economic superpower, along with the economic rise of India and other smaller states such as Viet Nam, means that the centre of gravity of global trade has been moving significantly eastwards since the turn of the new millennium.

Draghi's key concerns are that Europe is being increasingly left behind economically and technologically by China and the United States and that this slow backward drift risks the future prosperity and stability of Europe.

To counter this backwards drift, Draghi argues that it is essential that Europe addresses its competitiveness, innovation and productivity growth challenges head on. To do this, the three areas that Draghi regards as being of paramount importance and most in need of urgent structural and policy reform are innovation in advanced knowledge technologies, energy and industrial decarbonisation and enhanced military security and defence capabilities. Draghi calls for a new industrial strategy for Europe requiring the EU to raise investments by EUR 800 billion per year based on capital market integration and major changes to how capital is raised via new forms of common funding and common assets, centralised supervision, regulatory reforms to facilitate industry consolidation and mergers, joint procurement in defence and a new trade agenda ([357]). The falling EU-wide investment and competitiveness levels ([358]), the technology gaps between the EU and China / the United States ([359]) and the need to boost Europe's AI technologies ([360]) were already well understood in specialist circles before the 2024 Draghi report was published. However, it is the Draghi report that has shocked Europe's political institutions and arenas into fundamentally reconsidering their policy approaches ([361]).

At the same time, Draghi sets out what he perceives to be the three main types of EU governance and institutional failures that tend to stymie or inhibit much-needed reforms. First, he argues that the EU typically displays a lack of focus regarding the setting of priorities and how any such priorities relate to the intended policy objectives. Second, Draghi argues that Europe's enormous potential to drive growth through spending and procurement is largely undermined, since Europe's potential array of fiscal and financial means is too fragmented into different pan-EU and national expenditure lines. Third, he argues that the EU institutions and governance processes typically also display systemic failures regarding essential coordination requirements.

([355]) Parikh, 2025.
([356]) Parikh, 2025.
([357]) Draghi, 2024; Tamma et al., 2024.
([358]) MGI, 2024a.
([359]) MGI, 2022.
([360]) MGI, 2024b.
([361]) Lagarde et al., 2025.

To some extent, it is possible to argue that the weaknesses that Draghi identifies are a natural result of the fact that the EU is not a single country but an institution in which there are different forms and degrees of pooled sovereignty and in which different competences and levels of authority and autonomy are situated in different governance settings. While areas such as the single currency and the Schengen mobility zone have the highest levels of EU-wide sovereignty pooling, many other economic and social issues – such as health, education, land use and housing – are areas with little or no sovereignty pooling in which governance and decision-making takes place almost entirely at the Member State level or even at the lower regional or municipal level. Although both China and the United States are very highly devolved states, they are still far more integrated than the EU. As such, Draghi's observations regarding the focus, fragmentation and coordination weaknesses of the EU can be interpreted as inherently being discussions about the overall governance and sovereignty challenges facing the EU, of which Draghi considers the trade, energy and security challenges to be the most urgent challenges that need to be addressed in order for Europe to tackle other, wider societal challenges. Draghi's call to urgently address these issues is therefore a call for more fundamental reforms of the EU to make it more fit for purpose for the coming decades.

Conclusions

There is no doubt that the Draghi report represents a key milestone in the history and political economy of the EU, especially when it is discussed in tandem with the 2024 Letta report. However, both reports fail to address the geography of discontent that is nowadays endemic to many of Europe's left-behind regions and has the power to stymie or even totally undermine well-considered and well-intentioned EU policies. Therefore, to strengthen the salience, credibility and legitimacy ([362]) of Draghi's argument among EU citizens, which is essential for such policy schemata to work, the first step would be translating Draghi's arguments into economic geography terms, which could be done by focusing on the topic of clusters. Although the word 'cluster' appears just four times in the shorter Part A of the Draghi report, the much longer Part B makes 45 references to clusters, including industrial, green and technological clusters. However, what does not appear in Draghi's analysis is any discussion of where these clusters are or the Member States and EU regions in which the clusters that will underpin the Draghi plan are located. This missing element is crucial for identifying the different roles that various EU regions can play in driving the Draghi plan, and the possibilities of widening the engagement and agency opportunities for commercial clusters and civic communities across the whole of the EU. If 'superstar' cities in Europe are the major beneficiaries of the Draghi plan, it is wholly unlikely that it will gain or maintain long-term traction.

To pinpoint these elements, we can begin by building on the work of Hollanders et al., who analyse 51 exporting industries in the EU. They identify 2 950 distinct regional industrial clusters, accounting for almost a quarter (23.4 %) of all EU employment (or some 61.8 million jobs) and for almost exactly half (50.3 %) of Europe's employment in exporting industries, with an average productivity level that is 25 % above the EU average and some 15 % higher than the average for all EU export industries ([363]). Breaking down these clusters into more refined performance characteristics, Hollanders et al. identify 198 high-performing clusters, whose productivity is some 140 % above the EU average and whose

([362]) Cash et al., 2003.
([363]) Hollanders et al., 2020.

employment is growing at more than 1 % per annum faster than the EU average; and 898 medium-performing and 1 854 basic-performing clusters, with the productivity of both cluster types typically being in the range of 10–15 % above the EU average. Mapping these clusters geographically and technologically and situating them in terms of their likely roles within the specific aspects of the Draghi plan will provide a broad EU landscape perspective of the opportunities and implications of the Draghi agenda for different parts of Europe. It will also allow for a comprehensive re-assessment of the role of EU cohesion policy, in partnership with the Draghi agenda, in facilitating these transitions. Cohesion policy has already played a central role in helping EU regions adapt to the prevailing and emerging economic, social and environmental challenges they face ([364]) and, importantly, modern iterations of EU cohesion policy have already built an essential architecture that facilitates and enhances the agency and ownership of local commercial, educational and civic communities in innovation-, skills- and infrastructure-related activities. There is already much in the EU regional policy agenda on which to build to enhance and the Draghi plan.

([364]) McCann, 2025.

2. The European welfare state

The role of tax–benefit systems in reducing income instability in Member States

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Introduction

The development of inequality and poverty in Europe over the last few decades challenges the assumption that sustained economic growth systematically leads to a reduction in income disparities and an overall improvement in social welfare. Empirical evidence shows that economic growth does not uniformly benefit all segments of the population, and that inequality has been rising in many countries since the 1980s. This increase in inequality has been attributed to various factors, including rising wage inequality due to technological changes favouring skilled workers, globalisation and weakening labour market institutions. Additionally, the reduced redistributive capacity of public policies has not improved the situation. Recent trends indicate that traditional sources of inequality have been compounded by new social risks associated with decarbonisation and digitalisation. These transitions create uncertainties and potentially amplify existing inequalities, as lower-income individuals are more likely to be affected by climate change and automation.

Tax–benefit systems are essential for mitigating economic risks and ensuring income security. These systems play a crucial role in income redistribution, thereby reducing inequality and fostering social cohesion. Social benefits help stabilise household incomes over time, acting as insurance against sudden income drops. In Member States, direct taxes and cash benefits significantly reduce income inequality, with a larger impact than those in non-EU Organisation for Economic Co-operation and Development (OECD) countries. The effect is especially strong in countries with higher fiscal pressure and more generous social protection systems. These systems not only address inequality but also enhance intergenerational mobility by cushioning economic fluctuations. During periods of economic shock, such as the Great Recession and the COVID-19 pandemic, the EU tax–benefit systems have exhibited notable resilience. Despite these relative successes, the EU still faces challenges in harmonising the effectiveness of these systems across Member States and adapting them to economic and social changes.

In addition to inequality, economic insecurity – characterised by the fear of job loss and financial instability – has become a significant issue due to these shocks. Growing evidence highlights the increased uncertainty about future economic hazards and the difficulty in recovering from financial shocks. This insecurity is evident in the heightened anxiety over maintaining income levels and managing household debt. As financial instability grows, especially due to structural changes such as digital transformation and globalisation, households face greater risks, leading to adverse impacts on their economic prospects and overall well-being.

The effects of economic insecurity extend beyond individual households to the broader economy, influencing decisions on investment, consumption and labour supply. Vulnerable groups, including low-skilled workers and unemployed people, are particularly affected, resulting in limited social mobility and poor outcomes for their children. The persistence of income instability underscores the need for strong public policies and social protection systems that can mitigate these risks. Effective

measures should include tax–benefit systems designed to stabilise incomes and provide financial security, thereby reducing the vulnerability of individuals to economic shocks and facilitating better risk management in the face of ongoing social transformations.

Traditional and new inequalities in the EU

In recent decades, inequality and poverty trends in the EU have broken away from previous expectations that sustained economic growth would automatically reduce income disparities. Empirical research has shown that the relationship between growth and distributive outcomes is neither linear nor universal. The capacity of societies to transform growth into welfare gains depends largely on the strength of their social protection systems.

The long-term inequality pattern has resembled less the famous inverted U of Kuznets and more a V shape since the late 1970s. Two main processes explain this rise: widening disparities in primary income and the declining redistributive capacity of public policies. While in earlier decades progressive taxation, wealth taxes, labour market regulation and financial oversight reduced inequality, since the 1980s, wage polarisation, deregulation, globalisation and weakened labour institutions have fuelled growing social gaps. Capital income concentration has also accelerated the trend. At the same time, tax–benefit systems have lost their effectiveness: although cash transfers had a strong redistributive capacity until the 1990s, their impact has since weakened. As a result, disposable income inequality has increased, and monetary poverty remains high.

The persistence of vulnerable households demonstrates this dynamic. A considerable share of the EU workforce earns wages insufficient to escape poverty, particularly in Mediterranean, Baltic and eastern Member States. The problem has expanded over time, showing the limits of existing safety nets.

New challenges compound these structural risks. Decarbonisation and digitalisation transitions are reshaping income distribution. Climate change threatens key economic sectors, while the green transition may generate opportunities in new industries but also displace workers in traditional ones. Similarly, automation disproportionately affects low- and medium-skilled jobs, especially in manufacturing. These processes will probably generate uneven impacts across regions, sectors and social groups, concentrating losses in already vulnerable populations.

Although the idea of a ‘just green transition’ aspires to combine environmental and social objectives, historical evidence suggests that major transformations tend to widen social gaps, at least in the short and medium terms. Forecasts for Europe point to highly uneven territorial effects, which could deepen fragmentation and require substantial resources to counterbalance.

Overall, the risk is clear: current and emerging dynamics may create new winners and losers, extending vulnerability even into the middle classes. This could further erode social cohesion. To address these risks, the EU must strengthen protection mechanisms capable of both preventing vulnerability and compensating those most affected by the ongoing transformations.

Economic insecurity

Economic insecurity refers to the uncertainty of facing adverse financial shocks and the inability to recover from them. It involves the fear of job loss, the struggle to make ends meet and broader anxieties about the future. Evidence shows that insecurity intensified after the Great Recession and the COVID-19 pandemic, when many households suffered sharp income losses, unemployment risks and rising debt, decreasing their long-term prospects.

Beyond its effects on household welfare, insecurity also harms macroeconomic stability. Fear of income loss reduces consumption and investment, and persistent instability can alter decisions on labour supply, education or fertility. One of the most direct channels is income losses, especially when linked to unemployment or drastic reductions in working hours. Structural transformations – digitalisation, the green transition and globalisation – have magnified these risks, particularly for workers more exposed to automation and less able to benefit from the opportunities AI provides. Those under temporary contracts or without contracts remain especially vulnerable in social protection systems designed for more stable labour markets.

Income instability disproportionately affects unemployed, low-skilled and young workers, limiting upward mobility. Families with unstable incomes are often trapped at the bottom of the distribution, and their children face worse educational outcomes. The absence of financial buffers aggravates this situation: one in six households with working-age adults in European Organisation for Economic Co-operation and Development (OECD) countries both lack sufficient liquid assets to cover three months of expenses and suffer from unstable incomes.

Economic insecurity also impacts mental health. Continuous income fluctuations are associated with stress, anxiety and reduced ability to plan for the future, which in turn reinforce vulnerability and hamper social mobility. The COVID-19 crisis and inflation shocks intensified these problems, particularly for indebted households.

In the EU, income instability has attracted growing attention. According to the OECD ([365]), nearly one in six people in working-age households experience economic insecurity, unemployed people and those lacking job security. Welfare regimes display marked contrasts: social democratic countries, with strong social benefits and tax systems, prevent drastic income fluctuations, while Mediterranean and liberal market economies show higher levels of instability.

Public policies, particularly tax–benefit systems, are central to addressing these risks. Automatic stabilisers should minimise shocks, stabilise incomes and enhance financial security. More redistributive tax schemes can reduce consumption volatility and act as social insurance, although their effect on mobility depends on labour incentives and levels of human capital. Cash benefits also play a key role. Evidence shows that more generous transfers provide stronger insurance in risk-prone countries. Across European OECD countries, social benefits – unemployment insurance, pensions and education allowances – reduce income instability by around 42 %, and by more than half in countries such as Germany, Ireland and Spain.

([365]) OECD, 2023b.

Despite these effects, instability remains high and may worsen with ongoing transformations in labour markets. Governments must therefore adapt tax–benefit systems to protect against current vulnerabilities while preparing for future shocks. Policies should both reduce exposure to adverse events and strengthen individuals' capacity for risk management.

The effects of tax–benefit systems on income stability

Tax–benefit systems in Member States face the dual challenge of cushioning income drops during downturns and addressing the risks linked to structural transformations such as digitalisation and the green transition. By smoothing reductions, they help sustain consumption and act as automatic stabilisers, thereby protecting well-being, limiting inequality and reinforcing trust in institutions. Their compensatory role is particularly crucial for vulnerable households, whose incomes typically fall faster than those of higher earners during recessions.

The effects of these systems go beyond crisis response. In an era of accelerating transitions, they are also essential for shaping income distribution and sustaining middle-income groups, which are vital for growth, education, health, democracy and social cohesion. Without adequate protection, the middle strata are at risk of erosion, with consequences for intergenerational mobility and stability. To assess the impact of tax–benefit systems, comparisons can be made between disposable and market income distributions, focusing on three outcomes: income instability, the size of the middle-income group and income mobility. These exercises allow these effects to be measured, although they do not account for behavioural adjustments by households.

Income instability. Tax–benefit systems substantially reduce the risk of sharp annual income losses. In many Member States, they halve the percentage of the population whose income decreases by 25 % compared with the previous year, with particularly strong effects in Member States such as the Netherlands. Still, in Mediterranean and eastern Member States, more than 1 in 10 individuals face such losses yearly, and in places like Greece, Poland or Romania, the protective capacity is weaker. These systems also struggled to maintain their effectiveness during crises. During the Great Recession, their cushioning role was limited in many Member States where the percentage of households with such abrupt drops in disposable income exceeded 20 %. In contrast, during the COVID-19 shock, public intervention was much stronger, highlighting the importance of system design for resilience.

Middle-income weight. A robust middle class underpins modernisation and democratic stability. Evidence on its development in Europe is mixed: while some countries show signs of decline, others do not. Tax–benefit systems help increase the relative size of the middle-income group, but not uniformly. On average, they raise its proportion by 37 %, with stronger effects in Portugal, Germany, Ireland, Spain and France, but weaker ones in Czechia, Hungary, Cyprus, the Netherlands and Estonia. Worryingly, in nearly half of the Member States, the impact of these systems is now weaker than before the Great Recession. Redistribution tends to lift the bottom more than it reinforces the middle, suggesting that stronger pre-distributive policies are also needed.

Income mobility. Income mobility indicates whether households can improve their relative position over time. High mobility fosters equality of opportunity and efficiency, while excessive fluctuations

create insecurity and distort labour markets. One key measure is the correlation between current and past incomes: in two thirds of Member States, it exceeds 0.75, indicating strong inertia. Persistence is highest in Czechia, Malta, Italy and Finland, and lowest in Hungary, Germany, Ireland and Belgium. Since the early 2000s, most EU Member States have experienced declining mobility. Tax–benefit systems mitigate this dependence, especially in Germany, Belgium and Ireland. However, in about one third of EU Member States, their effect on mobility is minimal, and their capacity to promote it has weakened.

In summary, tax–benefit systems remain central to stabilising incomes, sustaining middle classes and supporting mobility. Their effectiveness, however, varies widely across Europe and has diminished in some areas. To safeguard social cohesion and manage future crises, reforms must enhance their capacity to reduce instability and reinforce opportunities in the face of profound economic transitions.

Conclusions

The development of inequality and poverty in the EU challenges the assumption that sustained growth narrows disparities. Growth affects groups differently, and only societies with strong protection systems effectively translate income increases into reduced vulnerability. The green and digital transitions bring opportunities but also uneven risks, especially for lower-income groups and exposed occupations.

Tax–benefit systems remain central to reducing inequality and fostering cohesion. On average, they lower the Gini coefficient of market income by more than 20 points, with stronger effects in countries with higher fiscal pressure and more generous welfare states. These systems also provide resilience in times of crisis. During the Great Recession, they helped protect household well-being, although austerity policies weakened their capacity to do so. They must adapt to labour market polarisation and new working conditions. Ensuring comparable protection across Member States is critical, as uneven effectiveness poses risks to stability and efficiency.

Economic insecurity has become a key concern in the EU, amplified by the Great Recession and the COVID-19 pandemic. It not only undermines household welfare but also reduces consumption and investment, aggravating downturns. It disproportionately harms vulnerable groups, limiting mobility and deepening disadvantages for children. As they lack financial buffers, these households are more exposed to poverty.

The effectiveness of EU tax–benefit systems in stabilising incomes varies. While some EU Member States reduced annual income drops by half or more and reinforced middle-income groups, others – particularly in Mediterranean and eastern Europe – struggle to provide comparable protection. Severe crises have exposed these differences. Tax–benefit systems generally enhance mobility, but their effect has weakened in many countries since the early 2000s, underscoring the need for renewed policy attention. Strengthening tax–benefit systems is essential to address insecurity and instability. More generous benefits and progressive taxation reduce risks and provide insurance, particularly in high-exposure contexts. Persistent instability calls for adapting these systems to structural changes so that they can minimise shocks, stabilise incomes and reinforce financial security.

Three strategies for tackling emerging economic and social challenges

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Introduction

The EU is facing a profound disruption of its socioeconomic foundations. Productivity growth is stagnant, disposable income is increasing more slowly than in the United States, and European industry lags behind in relation to research and development, AI and other strategic technologies. Recent crises have exposed the fragility of a model heavily dependent on external suppliers for energy, raw materials and digital platforms. The ambition of global leadership now seems unattainable, and the challenge is to redefine the European model amid economic decline and geopolitical uncertainty.

The European Commission stresses competitiveness as the guiding principle of the EU strategy, but, if this priority does not integrate social cohesion, it risks deepening inequalities and fuelling scepticism towards the European project. At the same time, the debate has shifted towards security as the new cornerstone of EU strategy, encompassing not only military matters but also economic, technological and environmental stability. Defence budgets and cybersecurity investments are rising, requiring sustainable financing mechanisms.

Financing security cannot come at the expense of essential services, and social protection must adjust to the transitions under way. A new European model must combine two recognitions. First, it must recognise that the EU has the world's most advanced social and sustainability policies, making cohesion central rather than secondary. Preserving the European social model can serve both as a buffer against discontent and as an engine of growth. Second, it must recognise that economic security is inseparable from the broader concept of security. A strong tax–benefit system is essential to stabilise economies in times of crisis and to reduce the risk of social and political instability.

This report examines three possible pathways: (1) reinforcing and coordinating the existing safety net across Member States, (2) fostering social innovation through new instruments, such as partial basic income, and (3) prioritising strategic social investments that yield returns in equality, employment, productivity and revenue. All require additional public resources, obtained through ambitious tax reforms and adjustments.

First pathway: a better coordination of the current safety nets

Strong economic safety nets are essential to respond to new social needs in times of crisis. They function both as automatic stabilisers and as active mechanisms against shocks. Without them, the impact quickly translates into higher poverty rates, reduced services and increased household vulnerability. While, historically, crises were strongly correlated with rising poverty rates, recent shocks, like the Great Recession and the COVID-19 pandemic, showed more moderate effects in the EU, thanks to existing protection systems. Yet wide differences across Member States reveal unequal capacities to cushion risks, underscoring the need for stronger and more coordinated safety nets. Income support schemes vary greatly in generosity, coverage and accessibility. Some, like those of Denmark, raise those in poverty to just above the poverty threshold, while others fall far behind.

However, adequacy does not necessarily guarantee effectiveness: eligibility rules, take-up rates and supplementary allowances create significant heterogeneity.

Efforts towards harmonisation have historically been limited by the principle of subsidiarity, leaving social policies largely in national hands. Past initiatives – such as the Lisbon European Council's open method of coordination – promoted information exchange, indicators and best practices but failed to generate structural convergence. The absence of binding mechanisms and EU-level funding explains the modest results. More ambitious proposals, such as a framework directive on minimum income schemes with common criteria of adequacy, accessibility and labour activation, were discussed but lacked political consensus.

Recent developments, including the European Pillar of Social Rights action plan of 2021 and the 2022 Council recommendation on adequate minimum income, renewed the focus on active inclusion and the role of robust safety nets in managing the green and digital transitions. These instruments, however, remain non-binding and rely on Member States' discretion. Without dedicated resources or stronger commitments, the risk that convergence will remain superficial persists.

The idea of defining **common minimum standards** has gained traction. Proposals include linking EU recommendations to funding mechanisms, particularly to support poorer Member States. Yet challenges abound: political resistance to transferring competences, disparities in adequacy levels and the difficulty of setting objective criteria for adequacy or financing responsibilities. Cultural and institutional differences further complicate the prospect of a single model.

Despite these obstacles, inaction carries its own risks. Current schemes were designed to tackle traditional forms of vulnerability but are less prepared for risks tied to decarbonisation, digitalisation and geopolitical instability. Establishing minimum adequacy levels would be only a first step, but a crucial one, in reducing extreme disparities, reinforcing EU cohesion and demonstrating to citizens that the EU upholds the principle of leaving no one behind.

Second pathway: towards partial basic income in the EU

Better coordination of economic safety nets and minimum standards can strengthen social protection, but they are insufficient to address new vulnerabilities linked to automation and the energy transition. In this context, proposals for **basic income** have gained prominence, moving from academic debate to mainstream policy discussions. The rationale is that current tax–benefit systems struggle to cope with rising inequality, insecure work, the erosion of contributory schemes and new forms of employment.

Growing interest in universal basic income (UBI) stems from its potential to provide unconditional support amid technological disruption. Proponents argue that it could reduce poverty, mitigate the effects of job instability and redistribute the productivity gains from digitalisation. Beyond equity arguments, UBI is also seen as an instrument for encouraging entrepreneurship, simplifying welfare administration and reducing stigma compared with means-tested systems.

However, the evidence is mixed. Automation is reshaping labour markets, displacing mid- and low-wage jobs and disproportionately affecting young workers. Yet employment effects are complex: some

sectors lose jobs, while others create new opportunities. Rather than mass technological unemployment, trends point to job polarisation and increased poverty. In this scenario, UBI might not be the only or most efficient tool. The effectiveness of UBI in reducing poverty depends heavily on its amount and interaction with existing benefits. Budget-neutral proposals would result in insufficient levels, while schemes linked to the poverty threshold would require massive tax increases. Moreover, universal systems may not be more effective than targeted welfare in reducing inequality, and labour market disincentives remain a concern.

Pilot projects in Finland, the Netherlands and Spain (Barcelona) show improvements in well-being and job search confidence, but limited effects on employment. Microsimulations by the Organisation for Economic Co-operation and Development and others indicate that only modest UBI levels are feasible without additional spending, and higher levels would require significant new taxation. For these reasons, a fully-fledged European UBI seems unrealistic in the near term.

A more viable option could be *partial basic income*, targeted at vulnerable groups such as young people. This approach could be linked to training and reskilling policies, ensuring income security while facilitating adaptation to the green and digital transitions. Financing could come from EU-level taxes – such as environmental levies, digital services taxes or even a 'robot tax' – and would help align redistribution with sustainability goals. Although such schemes would depart from the unconditionality of UBI, they could gain greater political and social acceptance.

Third pathway: new EU social investments

The extension of EU tax–benefit systems through harmonised minimum income levels or partial basic income would strengthen resilience, but cash transfers alone cannot address the full scale of current challenges. Geopolitical tensions and the twin transitions require complementary strategies. For this reason, the European Commission has promoted social investment as a central approach, aiming to equip households and sectors with the capabilities needed to adapt to structural changes. Linking the European Pillar of Social Rights with the new fiscal framework represents a coherent way to ensure both protection and adaptability.

Social investments differ from traditional *ex post* risk coverage by simultaneously promoting opportunities *ex ante*. They contribute to competitiveness and growth by enhancing human capital, facilitating labour market transitions, raising labour supply and supporting innovation. Recent EU reports highlight concrete examples: social housing, which alleviates poverty and improves employment opportunities; early childhood education and care, which reduce gender gaps and improve prospects; active labour market policies, which help people access and keep jobs; and public funding for skills development, particularly in the green and digital transitions.

Despite these advantages, the concept of social investment remains somewhat vague. Definitions used by the European Commission are broad, making it difficult to translate the concept into concrete budgetary commitments. Moreover, framing social policy primarily as a driver of productivity risks overshadowing its ethical foundations and marginalising groups less integrated into the labour market. The focus on training and employability also does not sufficiently address structural issues such as precarious employment, wealth concentration and weak regulation. There is, however, growing

recognition that hybrid systems – combining traditional income protection with capability-enhancing measures – may be most effective in tackling new social risks.

The implementation of social investment strategies faces three main challenges. First, financing remains constrained by the EU's limited fiscal capacity and the tension between promoting social investment and enforcing deficit control. This makes such programmes vulnerable to cuts during downturns, as seen during the Great Recession. Second, disparities between Member States mean that poorer countries may lack the fiscal space to pursue social investments at scale, potentially widening intra-EU inequalities. Third, many policymakers still treat social policy as a cost rather than an investment, highlighting the need for improved evidence and evaluation frameworks to demonstrate long-term returns.

While the social investment approach has clear potential to enhance resilience, productivity and social cohesion, its effectiveness depends on supportive fiscal arrangements, a balance between efficiency and rights, and strategies to reduce structural inequalities across Member States. A pragmatic step could be to define a selective set of EU-recognised investments that would qualify for more flexible borrowing conditions, at least during their initial implementation phases.

Fiscal constraints and opportunities for advancing the three strategies

While harmonising minimum income levels across the EU would not necessarily entail high costs, introducing partial basic income or expanding social investments would require substantial funding. Yet the current context of economic slowdown and fiscal conservatism limits governments' and the European Commission's ability to raise new revenue. The EU budget itself remains too small and overly dependent on Member State contributions, with little progress towards a more autonomous system of own resources. Recent Commission initiatives – such as introducing revenue from the emissions trading system, the Carbon Border Adjustment Mechanism and multinational corporate profits – represent steps in the right direction, but their impact has been modest due to political resistance and uncertain revenue potential.

The implementation of the Organisation for Economic Co-operation and Development / G20 Pillar 2 rules, which established a 15 % minimum effective corporate tax rate, marked another step in strengthening the EU's influence on taxation. However, its immediate fiscal impact will be limited, and the low rate may fail to prevent aggressive tax planning. Both Pillar 2 and the new own-resource proposals fall short of breaking away from the traditional model, revealing the need for far more ambitious reforms. The key question remains whether Member States are willing to support new tax structures to finance social investment and other transformative strategies.

The European Commission has long encouraged Member States to modernise their tax systems, making them more growth-friendly and socially equitable. This involves improving tax collection; broadening tax bases; closing loopholes; and shifting taxation from labour to capital, property and environmental sources. Environmental taxes, for instance, could both raise revenue and support sustainability. Public opinion across the EU is generally supportive of fair and transparent taxes – such as digital service taxes, carbon pricing or financial transaction taxes – particularly if the revenue is directed towards education, health or social inclusion.

Another emerging debate concerns taxing wealth more effectively. Research from the EU Tax Observatory has shown that ultra-high-net-worth individuals often pay lower effective tax rates than average citizens. Proposals for a 2 % minimum wealth tax on centimillionaires could neutralise the regressivity of current systems and generate around EUR 67 billion annually, which would help cover part of the EU's new defence and social investment needs. Nevertheless, the political feasibility of such reforms remains low. Most Member States continue to rely heavily on regressive sources like value added tax (VAT) and excise duties, which are difficult to replace. Temporary cuts on energy and food VAT introduced during the recent inflation crisis show how entrenched these instruments are.

In practice, meaningful tax reform remains constrained by political inertia and elite resistance, despite both national and EU frameworks providing tools to advance change. While sweeping reforms are unlikely, incremental progress is possible through continued coordination, harmonisation and the framing of tax reforms in terms of solidarity.

Conclusions

The EU faces a range of new challenges driven by socioeconomic, technological and geopolitical disruptions that have weakened its integration model. In this new context in which competitiveness has become central to EU policies, an inclusive approach is needed to avoid social polarisation and distrust in the European project. Digital transformation and the green transition, while essential, pose risks such as structural unemployment and fiscal inequalities. The EU must modernise its social protection and tax systems to balance these changes without compromising economic and social stability.

Ensuring a robust and well-coordinated economic safety net is essential for the EU to effectively address emerging social challenges and mitigate the impact of economic shocks. Despite various initiatives to harmonise social protection mechanisms, significant governance and political constraints hinder the establishment of common minimum standards. Without binding commitments or dedicated funding mechanisms, the current framework remains insufficient to ensure equitable protection across all countries. Addressing these limitations requires stronger European determination to develop a more cohesive and effective social protection strategy.

Partial basic income could serve as a complement to existing welfare systems, providing a safety net for those most affected by technological transformations and a harsh labour market. While full-scale UBI remains financially and politically challenging, a targeted approach could mitigate economic insecurity, particularly among young people and low-income workers. Environmental taxation could help fund a targeted income scheme without placing excessive burdens on national budgets.

A third pathway could be the expansion of the EU's social investment policies. Strengthening social safety nets through targeted investments in education, labour market policies and public services can improve productivity, human capital and long-term economic growth. Several challenges remain, particularly regarding funding, policy coordination and economic disparities between Member States. The lack of independent EU financing mechanisms limits the potential of these policies, making them

highly dependent on national budgets. Additionally, placing excessive emphasis on productivity-based justifications risks undermining the ethical foundations of social protection.

Finally, the development of social investments is constrained by the EU's current revenue system, which lacks the capacity and structure to support transformative social investment strategies. Its over-reliance on national contributions and regressive taxes such as VAT limits both fairness and financial scope. Without bold reform, efforts to finance cohesive and inclusive policies will remain constrained. Measures such as broadening tax bases, enhancing environmental taxation and reducing regressive elements could significantly improve fairness and efficiency without necessarily raising overall tax burdens.

Securing European democracies from within: two social–ecological pathways

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This paper argues that, while the issue of security is of primary importance and an urgent concern for the viability of the European project, it should not be limited to defence and armament but also encompass social–ecological security. This notion is understood as follows: first, it implies guaranteeing essential well-being for Europeans regarding housing, energy and food (i.e. safeguarding 'essential democracy'); second, it means protecting this essential well-being from ecological shocks (i.e. building social–ecological protection by upgrading current welfare systems to mutualise new forms of risk, that is, creating a 'social–ecological state'). Empirical elements and policy recommendations are presented to support both suggested policy paths.

Security in Europe should encompass domestic or internal security defined by European social stability and ecological resilience. While democracy is a core value of the European project, it has been altered in a very tangible way by a large and increasing portion of the European population lacking access to essential dimensions of well-being, starting with affordable housing, energy and food. Defining and guaranteeing this essential well-being has emerged as a cornerstone of European security in increasingly troubled geopolitical times on par with securing the outside borders of the EU. In other words, security starts within. The concept of essential well-being is also fully in line with the very existence of the European project and its purpose of democratisation through social stabilisation.

What is more, European security faces severe environmental challenges that could further undermine social stability and are already affecting tens of millions. The EU is the fastest-warming region in the world and recent tragic events triggered by climate extremes, such as the flooding of the city of Valencia in the autumn of 2024, show how the lack of adequate protection can lead to breakdowns in trust and democracy in the face of deprivation and insufficient policy responses. Spain has just enacted what can be seen as a pioneering form of social–ecological protection in its 'paid climate leave'. This new model of collective protection should be extended to mutualise growing social–ecological risks (stemming from both biospheric destabilisation and also transition policies themselves) to give even more substantial meaning to the emerging notion of 'preparedness' in the European public debate.

This paper outlines two paths to complement and extend European security: first, by securing and guaranteeing sufficient well-being in Europe as a form of essential democracy; second, by mutualising biospheric and transition risks and thus starting to build a social–ecological state.

The medium-term policy response to those pressing issues lies in reframing European prosperity to better focus on the true determinants of human well-being. Aiming for sufficiency and the satisfaction of essential needs rather than increased gross domestic product can prevent policies from pushing the illusion that economic growth will trickle down and have positive effects on human well-being. The issue of food insecurity is telling in this respect: the EU food system does not suffer from a shortage of production, but rather it generates considerable food waste (close to 60 million tonnes or EUR 132 billion). However, the system does not allow for decent living standards for most European farmers, while it is substantially harming biodiversity, ecosystems and human health (via the use of industrial practices and chemical inputs). Refocusing the EU food system on key determinants of human well-being such as health (including ecological health) and social justice rather than growth and

profitability would go a long way towards alleviating social–ecological insecurity. However, while the increase in economic growth has obviously not mitigated social vulnerabilities in recent years in Europe, neither did existing social policies, or at least not to the extent required, hence the need to extend them. The short-term policy response lies in acknowledging living insecurity in Europe through an effort to define residential insecurity and food insecurity in the way energy security has gradually come to be acknowledged and defined at the European level. These newly defined rights to residential security, energy security and food security then need to be integrated into the European Pillar of Social Rights. Guaranteeing essential democracy in the EU is one aspect of social–ecological security but there is another: essential human needs should also be protected from increasingly destructive social–ecological risks.

The nature of social risk has been changing rapidly throughout the early 21st century, developing into social–ecological risk. A social risk is an uncertain event that can be assigned a probability of occurrence at a societal level, in terms of either responsibility or impact. It can become insurable (covered and compensated) by a collective insurance mechanism (private or public) if both its probability (of occurrence) and the associated monetary and non-monetary losses can be precisely determined. A social–ecological risk is a social risk linked to the occurrence of an ecological shock, defined as a cyclical or structural alteration of the environmental conditions of existence affecting human well-being. Two types of emerging social–ecological risks can be identified and possibly mitigated: risks related to the current destabilisation of the biosphere and risks related to transition policies implemented to mitigate environmental crises.

Responding adequately means deploying institutional capacities that can mutualise the risk, which is not restricted to insurance and also includes prevention mechanisms. Building social–ecological protection calibrated for the environmental and social emergencies of the 21st century appears to be a promising path in this regard, with some pioneer initiatives already paving the way forward. For example, in the wake of the tragic event in Valencia, Spain, on 29 October 2024, which killed some 220 people and devastated one of the largest cities in Europe, the government decided to work on introducing ‘climate paid leave’, which has just been incorporated into Spanish legislation.

For decades, if not centuries, the welfare state has been the driving force of democratic consolidation in Europe for the greater good of its citizens, whose civil liberties and political and social rights are essential determinants of their well-being. It needs to be consolidated and updated, not dismantled or sacrificed. Europe, considering its own history, cannot ignore that reckless social inequality and relentless vulnerability lead to the destruction of civic fabric and eventually democracy itself. If necessary, the current situation in the United States can serve as a wake-up call.

The well-being economy: beyond gross domestic product and growth

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Beyond gross domestic product: informing EU policies with a holistic well-being perspective

The climate crisis and the destruction of the biosphere, the COVID-19 pandemic, financial crises, persisting poverty, social exclusion and increasing inequality and societal polarisation all clearly demonstrate the limits of policies building predominantly on gross domestic product (GDP) as the most important yardstick of a country's economic performance and overall progress. Human well-being is plural: it can hardly be summed up and governed with a single metric and needs to be approached from different angles.

Despite the growing interest in well-being and moving beyond growth, GDP and its growth remain the most important economic indicators that serve as gauges of the overall state of an economy, with policymakers relying heavily on these indicators to form economic policy decisions, from fiscal to monetary policy. In the shifting paradigm, economic growth is no longer seen as an end but instead seen as a means to improve well-being. It therefore requires the identification of an alternative set of indicators that can better measure, monitor and steer policies in the right direction. Environmental and social aspects are already reflected in many public and private decisions, but they need to be further mainstreamed. This more holistic concept of well-being can help guide European societies through the current 'polycrisis' and transitions, which are themselves complex processes.

To progressively complement the use of GDP with well-being indicators in EU policymaking, the European Commission is working on an integrated approach to develop a framework and propose metrics for capturing sustainable and inclusive well-being ([366]). The framework aims to account for well-being today, resources for future well-being within planetary boundaries, resilience, intergenerational fairness and inclusiveness. Corresponding metrics, including a holistic indicator dashboard and augmented GDP measures, are being developed. The availability and use of such metrics will help demonstrate the progress of well-being inside and outside the EU, highlighting in particular the contributions of environmental, health or social policies to people's well-being beyond the traditional economic perspective. The recently released Sustainable and Inclusive Well-being Dashboard ([367]) has been flagged by the Commission's *2025 Strategic Foresight Report* ([368]) as 'now mature enough to be embedded into policy evaluation, and investment and reform decision-making'.

This is most helpful for informed and relevant international comparisons. For example, whereas the recent Draghi report points to a deteriorating economic position of the EU vis-à-vis its main international competitors, looking into aspects such as inequality and health may help grasp the bigger picture when comparing the quality of life in different areas. A recent paper published by the UK Office for National Statistics ([369]) shows that productivity can develop very differently if its scope is broadened

([366]) See European Commission, 2023b; and Benczur et al., 2024.
([367]) Benczur et al., 2025.
([368]) European Commission, 2025c.
([369]) Figure 7 of Heys et al., 2024.

from gross economic production (GDP) to include non-market production and the costs of environmental degradation.

These well-being metrics would also facilitate the communication of political challenges and the options to address them in a people- and planet-centred manner, while ensuring that economic growth does not destroy its very foundations and that today's policies do not disadvantage future generations. This last aspect is strongly featured in the new political guidelines, including the designation of a commissioner on intergenerational fairness.

Finally, if adopted and mainstreamed by governments, the metrics could provide better tools to assess progress towards sustainability and social fairness in their multiple dimensions. This agenda links closely to the recently adopted UN pact for the future that commits to developing a framework on measures of progress towards sustainable development to complement and go beyond GDP.

Given the inherent fragmentation of policy areas, the sustainable and inclusive well-being indicators could provide a completer and more coherent picture, emphasising the impact of policies across different areas on outcomes that are key to the well-being of people and the planet, which are currently not considered in a holistic way in routine policy analysis. These indicators can play an important role at various stages of the policy cycle, from agenda setting to policy monitoring, including through influencing public debate on strategic priorities and emergent issues.

Beyond growth: health and cooperation as building blocks of European well-being

The EU is experiencing an economic gap or lag with respect to China and the United States. The ongoing debate in Europe on this issue, reminiscent of the debate in the early 2000s, is mainly informed by standard economic indicators such as GDP per capita.[370] One should not forget, however, that during the same period the EU's approach has delivered outstanding outcomes in terms of governance, health, education and environmental protection. It is thus important for EU institutions and Member States to discuss the current state and future of European prosperity from a well-being perspective, developing and defending *European well-being*.

Many dimensions of well-being coexist in the EU, but two priorities arise from the broader notion of well-being that can be found in the academic literature ([371]): health and cooperation. Theories of human essential needs insist on the centrality of biological and mental health ([372]), while theories of evolution insist on the centrality of cooperation for human prosperity ([373]). Cooperation is a distinct human ability, while health connects humans to the biosphere and the life it harbours in accordance with a principle of interdependence ([374]). These two dimensions are prominent in most human needs theories (e.g. Maslow's 'pyramid' and its contemporary refinements). Promoting health and cooperation is fully in line with European values.

([370]) Draghi, 2024, p. 9
([371]) Stiglitz et al. 2009.
([372]) Doyal et al., 1991.
([373]) Nature Human Behavior, 2018.
([374]) This insight is reflected in the 'planetary health' and 'one health' approaches; Laurent, 2023.

Valuing and protecting health, in all its dimensions (individual, collective and ecological).

- Respondents to Eurobarometer surveys ([375]) unmistakably prioritise health, in the form of wide support for public health.
- Policymakers in the EU also clearly valued health during the COVID-19 crisis, much more than in the United States, for instance, with far better results in terms of maintaining life expectancy'([376]).
- Scientific studies show that human health cannot be sustained without addressing the health of the ecosystems and biodiversity that underpin it. Hence, we have the concept of 'planetary health' (defined as 'the health of human civilization and the state of the natural systems on which it depends' ([377])) and the 'one health' approach's insistence on the complementary nature and interdependence of human health, animal health, plant health and environmental health ([378]). The EU is the most committed region in the world when it comes to sustainability, as evidenced by the European Green Deal.

Valuing and protecting cooperation, in all its dimensions (social relations, fairness and democracy).

- Social relations are the key to life expectancy and happiness. The Harvard Study of Adult Development, unique in its length and depth, yields a clear-cut result: good social relationships best explain mental and biological health outcomes over time (i.e. the declared felicity of participants and their longevity) ([379]). Conversely, studies have revealed the considerable health penalties associated with loneliness and social isolation ([380]). Yet social isolation is increasing in the EU, as recently evidenced by the Joint Research Centre ([381]). The quality of social relations should be recognised as an EU-wide goal in terms of well-being.
- Compared with the two other major global economies, China and the United States, Member States enjoy both relatively lower levels of inequality and much higher levels of civil liberties and political rights. This is not by accident but by design: European societies value social justice and democracy. Fairness and democracy, two key facets of cooperation, should also be valued as core dimensions of European well-being.

In her statement as a candidate for a second mandate at the helm of the European Commission on 18 July 2024, Ursula von der Leyen[382] eloquently talked about the existential choice facing Europe at this point in the early 21st century: 'The choice comes down to whether we will be shaped by events and the world around us or whether we will come together and build our future for ourselves. And that choice is ours.' There are few decisions more consequential in terms of making the right choice than the decision for Member States to define prosperity in their own terms and live by it.

([375]) The autumn 2023 Eurobarometer showed that the three policy demands of EU citizens six months before the European elections were (1) the fight against poverty and social exclusion, (2) public health and (3) climate crisis mitigation; the spring 2024 Eurobarometer showed that European citizens wanted to see the fight against poverty and social exclusion (33 %) and support for public health (32 %) as the main issues under discussion during the electoral campaign.

([376]) Rossen et al., 2020, 2021.

([377]) Horton et al., 2015.

([378]) One Health High-Level Expert Panel, 2022.

([379]) Waldinger et al., 2023.

([380]) Holt-Lunstad et al., 2023.

([381]) Berlingieri et al., 2023.

([382]) MEPs debate with Ursula von der Leyen ahead of EP's vote on her election | News | European Parliament

3. Delivery in multilevel governance

Multilevel governance and geopolitical challenges

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Introduction

During the second half of the 20th century, the institutional process governing the EU was shaped by the need for gradual economic and political integration whereby the overall supremacy of EU law over national legislation represented the logical expansion and direction of the integration progress. Then, 20 years ago, this process came quite suddenly to a halt.

At the beginning of this millennium, the vision of the EU, as highlighted in the 2001 European Council declaration on the future of the European Union ([383]), led to the European Convention drafting the Treaty establishing a Constitution for Europe. The treaty was supposed to prepare the EU for the 21st century. Following two referendums in France, the Netherlands' rejection of the proposed constitutional treaty, and a two-year 'period of reflection', in June 2007 the European Council finally adopted a mandate for a subsequent Intergovernmental Conference, which concluded its work at the end of 2007 under the Portuguese Presidency with a new treaty: the Lisbon Treaty, signed by the European Council on 13 December 2007 and ratified by all Member States.

Viewed in retrospect, the Lisbon Treaty marked, in a certain way, the end of the institutional integration progress in the EU: no additional exclusive competences were transferred to the EU, but rather the complex decision-making processes within the EU were clarified. It identified areas of exclusive competence for both the EU and Member States, areas of shared competence where Member States could legislate and adopt legally binding measures if the EU had not done so, and what are known as areas of 'supporting competence' where the EU could adopt measures to support or complement Member States' policies.

A quarter century further into the 21st century, one can only conclude that the Lisbon Treaty did not prepare the EU well for the 21st century; on the contrary, the institutional complexities with respect to the multilevel policy governance structure enshrined in the treaty made the EU particularly ill-equipped to handle crises. It also led to the sort of over-regulation that the recent Draghi report described as 'gold-plating' ([384]) but could be considered a broader, more general European regulatory problem closely linked to the shifting emphasis of the innovation process with the advent of digital technologies, and most recently AI, becoming more focused on services and the organisational aspects of innovation. As Foray et al. ([385]) have argued, the traditional policymaking of the European Parliament in its regulatory 'technology assessment' role has focused on acquiring advance warning of potential

([383]) The Laeken Declaration.
([384]) Regulatory gold-plating refers to the practice where national governments or authorities go beyond the minimum requirements set by European Union legislation when implementing it into domestic law. Draghi 2024, p.30
([385]) Foray et al., 2025.

negative effects of new technologies with respect to possible security, health and environmental risks for consumers and broader users. However, such an *ex ante* assessment process is problematic when dealing with new forms of digital innovation, such as AI, that reach into nearly all spheres of human activity. In these cases, *ex ante* technology assessment tends to be too precautionary, potentially preventing the positive 'creative destruction' processes of structural change.

A European multilevel policy governance structure too vulnerable to address crises

The crises that have impacted the EU in recent years have indicated in different ways the policy difficulties involved in handling such crises through the current multilevel policy governance structure.

The financial crisis of 2008 was ultimately addressed but at huge social **and** geographical cohesion cost, with the emergence of persistently socially disfavoured groups and 'regions of discontent' ([386]). Social and territorial inequality within the EU effectively became a natural 'externality' of economic and monetary integration. At the same time, the monetary union contributed to both consumption and production transparency, but it did not provide any impetus for further capital market integration in the EU or the establishment of a capital union. Worse, following the financial crisis, the European Central Bank was forced to bail out other banks, further exacerbating the EU's financial system risk averseness. As a result, the financing environment for start-ups and scale-ups became notoriously anti-European, as the recent Draghi report notes.

By contrast, the COVID-19 health crisis could only be addressed at the European level after some legal acrobatics to fund vaccine research, temporarily unleashing a vaccine war between the European Commission and some Member States and the United Kingdom. As Ricardo Borges de Castro, the Associate Director of the European Policy Centre, put it back in 2021 ([387]): 'The trials and tribulations of the EU's vaccine strategy may serve as an illustration of what it means to be an autonomous geopolitical actor that tries to keep internal cohesion and focus on crucial strategic objectives and, at the same time, defends its interests and values in the global order. Often, values and interests will coincide, but sometimes, one will prevail over the other. Instead of turning inwards, the EU should learn from this experience and see it as an opportunity to discuss what it means to be a geopolitical actor in the world that is emerging from the pandemic.'

Finally, the energy crisis following the Russian invasion of Ukraine in 2022 not only highlighted the lack of a European energy union as an essential common institutional structure but also brought to the fore the broader failure of the European integration process in not having addressed security ([388]). Unsurprisingly, the recent Letta and Draghi reports both included the security dimension as a new European challenge arising from increasing geopolitical tensions. As was argued in the Fair and Sustainable Economy (FASE) scientific report based on the contributions of Kivimaa et al. and Kattel et al., the EU must develop a coherent and overarching approach to security investments and align this

([386]) See, among other sources, the recent Fair and Sustainable Economy papers on rising inequality from Luis Ayala (2024) and Éloi Laurent (2025), and the papers on regional inequality by Philip McCann (2025) and Andres Pose-Rodriguez (2024).

([387]) Borges de Castro, 2021.

([388]) Kattel et al., 2024.

with the green and digital agendas. Loosely gathering these issues under the umbrella of 'competitiveness' alone will not be sufficient.

As highlighted by the Draghi and Letta reports, the issue with the current multilevel governance structure of the EU is not just that it lacks essential further integration elements such as a European capital market, a European energy union or single regulatory regimes in areas of common strategic interest. It has also created a multilevel regulatory burden, resulting in a phenomenon of regulatory 'gold-plating' between the EU and Member States. Furthermore, the tendency to wish to regulate new technologies *ex ante* has contributed to the structural failure of the EU to innovate and increase its productivity, resulting in a growing competitiveness gap with China and the United States.

These failures, identified within the framework of the FASE exercise for the Joint Research Centre, were painfully exposed with the election and instalment of the new Trump administration in the United States and the sudden politisation, even weaponisation, of international trade and investment. Current US policy increasingly aligns with China and Russia in undermining the EU's multilevel governance structure, thereby not just exploiting but also attempting to contribute directly to internal policy differences between Member States and undermining the European project. The use of social media owned by US platform firms has been instrumental as a tool for eroding the democratic legitimacy of EU governance in the digital area. As Arnold Tukker ([389]) noted in his FASE paper: 'social media are already used to support policy actors aligned with Europe's competitors (particularly Russia and the US). Discrediting individuals, inciting street protests, and indeed, influencing elections may be possible at surprisingly low costs. It is a realistic prospect that Europe or its member states may be played apart, or that member countries will change to regimes friendly to the EU's adversaries, without any use of traditional force.'

In short, and contrary to the European Commission's own internal diagnosis that 'Europe has shown a remarkable ability to respond to a succession of crises' ([390]), we would argue that the EU's multilevel policy governance structure has often prevented the EU from taking swift, effective policy action and has also made the EU particularly vulnerable to political turmoil.

Considering this situation, there is a need for a more fundamental reassessment of the EU's multilevel policy governance structure. Is it appropriate for the 21st century and addressing the new common geopolitical challenges the EU and individual Member States find themselves confronted with to varying degrees? Is it still appropriate to pursue an incremental economic integration purpose and focus mainly on achieving trade benefits? These questions become particularly relevant at a time when economic development, resilience and well-being, on the one hand, and security and defence, on the other hand, have become increasingly intertwined and co-dependent. Is the sanctity of 'subsidiarity' in the current geopolitical context still a useful concept in deciding on the allocation of competences between Member States and the European Commission? What should be the minimal fiscal room for manoeuvre for the EU as opposed to its Member States? Is there anything one can learn here from the United States or from other economic and political unions?

([389]) Tukker, 2025.
([390]) European Commission, 2025a.

These questions require a more thorough, in-depth analysis and discussion than this paper can provide. Our aim is to point to the need to pay more serious attention to them. Unsurprisingly, the central area we wish to focus upon here is, first and foremost, the EU's own defence area: the one area that was never part of the European integration project and, as a result, failed to benefit from any of the single market benefits of the formation of the EU. In the rest of this paper, we lay out several arguments based on, among other things, the analysis presented by Kattel et al. ([391]).

To some extent, Europe's low total military expenditure is not that surprising. The EU is composed primarily of small Member States that viewed the EU primarily as a peace project whereby most Member States could freeride on the common security efforts of the larger Member States, particularly, within the framework of the NATO alliance, the United States. The central idea behind the European project, particularly after the end of the Cold War, was that the EU's internal and external economic relationships could, in a certain way, be sheltered from the interference of geopolitics so that sovereignty for the EU as a whole would be, first and foremost, economic sovereignty, with most international economic powers devolved to EU-level bodies and most security and foreign policy instruments left to individual Member States.

As a result, the individual Member States' defence industries, particularly those of many smaller Member States, withered and rarely succeeded in benefiting from European-scale advantages. When they did, they were part of bilateral, more politically inspired transactions between Member States. Military production and procurement remained entirely subject to national decision-making. Those Member States that were part of the NATO alliance coordinated their procurement policies more with the United States than with European partners. This became even more pronounced following the end of the Cold War, with many of the newer Member States looking to NATO and the United States rather than their (western) European partners for their military security. The public procurement of European defence markets has not developed and, as a result, up to now it only marginally contributed to the overall competitiveness of Europe's defence and security industries.

From this perspective, it is logical when discussing a new European defence strategy to start from those Member States with the largest military expenditure budgets, which are primarily Europe's largest countries, with some exceptions. The total military expenditure of EU Member States in 2023 amounted to some USD 280 billion, less than a third of the USD 880 billion expenditure of the United States and well below the USD 309 billion of China, but still substantially more than the USD 126 billion of Russia. Including other European NATO countries, such as the United Kingdom and Norway, results in a European figure of some USD 315 billion. Of course, the total EU and European figures represent simply the sum of individual countries' military expenditure and thus cannot be compared in terms of their military impact with the expenditure of an individual country such as China or the United States.

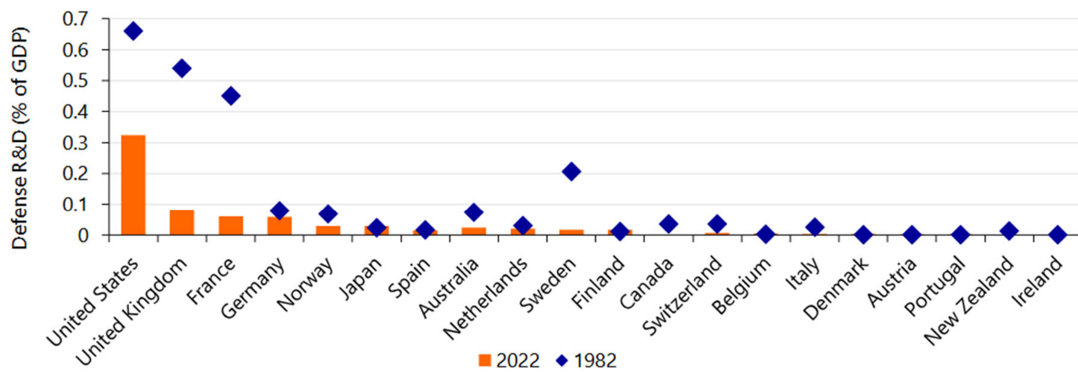
The role and contribution of defence research

More importantly, and as already highlighted by Kattel et al. (2024), the fundamental issue is not so much the gap in total military expenditure between Europe and the United States, but the huge gap in defence **research** investment between Europe and the United States.

([391]) Kattel et al., 2024; see also Soete, 2025.

A recent study by RaboResearch ([392]), as shown in Figure 9, showed the relative decline in defence research and development (R & D) as a percentage of total gross domestic product in the most important Organisation for Economic Co-operation and Development (OECD) countries since the end of the Cold War. As argued in the study: 'Not all economies used to spend on this area, but for those who did, the reversal has been marked. In the US, 1982 spending was 0.66 % of GDP, but in 2022 just 0.32 %; in the UK, it dropped from 0.55 % to 0.08 %; in France, from 0.45 % to 0.06 %; and in Sweden, from 0.2 % to 0.01 %.'

Figure 9: The relative decline in defence R & D spending following the end of the Cold War



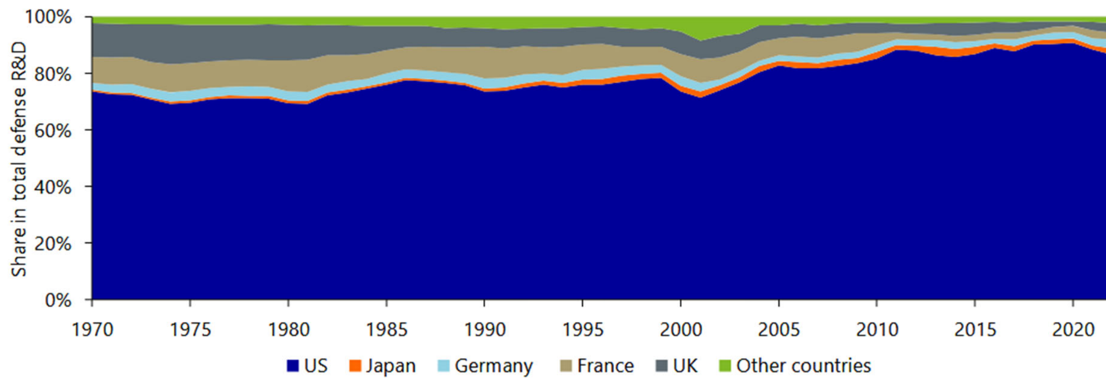
Source: OECD Main Science and Technology Indicators (MSTI)

As illustrated in Figure 9([393]), the decline has been much more significant in European countries, in particular the United Kingdom, France and Sweden, than in the United States. In 2022, the 27 Member States of the EU invested just EUR 4.4 billion in defence R & D, compared with the US spending on defence-related research of some EUR 74.4 billion (in 2023, the US figure increased even further to EUR 82.9 billion). Within the EU itself, the largest Member States, such as Germany and France, spent the largest amounts, but these remained minimal compared with the expenditure of the United States: in Germany, it totalled some EUR 2.3 billion; in France, it was some EUR 1.6 billion (with the United Kingdom reporting a similar figure); and these were followed by Spain and the Netherlands, with EUR 200 million each.

Figure 10, from the same RaboResearch study, illustrates the fact that, as a result, since 2001, the United States has become totally dominant in defence R & D spending, now contributing more than 90 % of the total of all 19 OECD countries' defence R & D spending. In 1982, the US share amounted to only 75 %.

([392]) RaboResearch, 2025.
([393]) from RaboResearch, 2025

Figure 10: The United States dominates OECD countries' defence R & D spending



Note: Other = AU, BE, AT, CA, DK, FI, IE, IT, NL, NO, NZ, PT, ES, SE, CH
Source: OECD MSTI

Viewed from a historical perspective, it could be argued that the sharp decline in defence R & D spending since the end of the Cold War in Europe – and in particular in European countries with substantial investments in defence R & D, such as the United Kingdom, France and Sweden – curtailed those countries' ability to reap the benefits from dual-use research and innovation. This may, as a result, partly explain the lower productivity growth over the last few decades in Europe compared with the United States.

In contrast to the EU, the United States could benefit optimally from such dual-use opportunities and the institutional military procurement set-up enabling rapid scale-up. Furthermore, having large defence research institutions at its disposal such as the Defense Advanced Research Projects Agency enabled the United States to continuously feed its own national civilian market with new start-ups. As claimed elsewhere ([394]), the emerging 'innovation gap' between the EU and the United States, as identified by Draghi, could well have its origin in a defence R & D and innovation gap.

More broadly, and as already argued by Kattel et al. ([395]), the fact that the defence sector remained largely absent in the European integration project as the project took form and became institutionalised following the Second World War prevented the emergence of substantial dual-use innovations and scale-up applications. Worse, dual-use opportunities for civilian technologies remained explicitly outside any European scope of action. They were explicitly eliminated from any of the European Commission's framework research support programmes when the programmes were first developed in the 1980s and when they were subsequently renewed and enlarged to create the current Horizon Europe R & D support programme. As Kattel et al. note: 'The Treaty on the European Union actually restricts the use of the EU budget for defence (European Court of Auditors, 2023). The EU action in the field of defence is limited to the common security and defence policy as an external crisis management tool and is not intended to be a collective European defence policy, encompassing, for example, a common definition of the threats.'

([394]) Van den Biesen et al., 2025.
([395]) Kattel et al., 2024.

The changing geopolitical environment brings to the fore the need to broaden the discussion on increased defence spending, defence research spending and the more effective exploitation of the dual-use opportunities of civilian research. Military spending in itself will not enhance long-term productivity growth. In most small countries, it will represent primarily current public expenditure, such as payments for salaries **and pensions** of military personnel, the cost of producing or importing military equipment and ammunition, and maintenance expenditure. Most empirical research points, unsurprisingly, to a negative relationship between military expenditure and economic growth. Furthermore, in the current European context, most countries propose increases in military spending, which will exacerbate the growing labour shortages resulting from an ageing population structure, have a negative impact on future public funding commitments to public health and social welfare and even call into question the commitments to addressing the sustainability transition challenges. In short, increases in military spending raise major debates and trade-offs within most European countries.

By contrast, some recent economic analyses have shown that public support for defence R & D as opposed to total defence spending can lead to an increase in private R & D and productivity gains becoming part of the effective exploitation of dual-use opportunities ([396]). From this perspective, harnessing the arguments for increased EU defence funding, the R & D components that foster dual-use innovations become essential. When arguing for such an increase, it will be essential to look at defence not just as a sector but as a distributed and complementary knowledge capability.

([396]) Moretti et al., 2025

Can the EU become more agile, adaptive and effective in the 2028–2034 cycle?

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Introduction

As the European Commission intensifies its work on the next multiannual financial framework (MFF), uncertainty reigns over the size and allocation of the next seven-year budget cycle of the EU, set to start in January 2028. In terms of size, the past few years have seen a significant increase in budget, partly due to the launch of NextGenerationEU, a EUR 750 billion stimulus plan aiming to relaunch the EU economy during and after the COVID-19 pandemic. This has led the overall EU MFF for 2021–2027 to reach an unprecedented EUR 1.8 trillion. Yet it is not clear if this one-off budget increase will be repeated the next cycle, in the absence of a health emergency like the one that originally triggered the collection of own resources and the launch of the recovery and resilience plan.

Besides EU policymakers' tendency towards path dependence, one argument that may support a large budget is another crisis, Russia's ongoing war of aggression against Ukraine, which many deem even more dangerous and existential than the COVID-19 pandemic. Especially since the Trump administration took office in the United States, pressure has mounted for the EU to become more strategically autonomous and able to defend itself and Ukraine in the coming months and years. This has led, in turn, to the announcement of a rearm Europe plan ([397]), with a price tag of EUR 800 billion to be spent over the next four years mostly by Member States, with help from the EU budget (and EUR 150 billion in loans already mobilised through the new security actions for Europe instrument). Already, well before 2028, funds originally earmarked for research and innovation (R & I) or for development and humanitarian aid are being repurposed to fuel a surge in defence spending. This is the case for some of the 'crown jewels' of the EU, such as Horizon Europe, and this is being mirrored by similar decisions in countries like Sweden, Germany and the United Kingdom.

Yet the need to rearm Europe is not the only emergency the EU faces. The Draghi report already raised the need for EUR 750–800 billion a year to restore European competitiveness, to be found through collecting own resources and thus reproposing the experimental NextGenerationEU, which many continue to consider an exception. In the longer-term future, the need to boost Europe's excellence in AI by creating bespoke gigafactories (in addition to the 13 'regular' factories currently being created) and mobilising the Eurostack ([398]) (which proposes investment of EUR 300 billion over the next decade), now politically backed by the German government and the European Parliament, will require massive additional resources not originally included in Draghi's plan. Ursula von der Leyen also announced a EUR 200 billion investAI plan ([399]) at the Paris AI Action Summit in February 2025 and later mobilised EUR 500 million to convince researchers to 'choose Europe' ([400]) (mostly postgraduates, and from the United States). The Letta, Draghi and Heitor et al. reports all call for a doubling of the R & I budget (up to EUR 220 billion).

([397]) European Commission, undated-a.
([398]) Bria et al., 2025.
([399]) European Commission, 2025d.
([400]) European Commission, undated-b.

Besides the competitiveness imperative, many other 'priorities' loom over the next MFF. The reconstruction of Ukraine, beyond immediate military support, is associated with a prospective cost that approaches EUR 1 trillion ([401]) for the coming years, even if this does not typically account for the undeniable benefits Ukraine's accession can bring to the EU. The need to 'ungreen the Green Deal' by giving more attention to social and territorial impacts and tackling the mounting discontent ([402]) in several regions of Europe demands new and smarter investment, namely in agriculture and cohesion. At the international level, the United States' withdrawal from multilateral organisations like the World Health Organization and the United Nations Educational, Scientific and Cultural Organization, the defunding of the United States Agency for International Development and the freezing of funds managed by the National Science Foundation and National Institute for Health (to name a few) present the EU with an imperative (the need to replenish funding for all projects and activities that require immediate assistance to avoid being terminated) and a window of opportunity (to step into a more prominent role in the global order, supporting scientific collaboration, democracy, development partnerships and humanitarian aid around the world) simultaneously. These ambitions, recently backed by the European Parliament and the European Council, may require massive new funds.

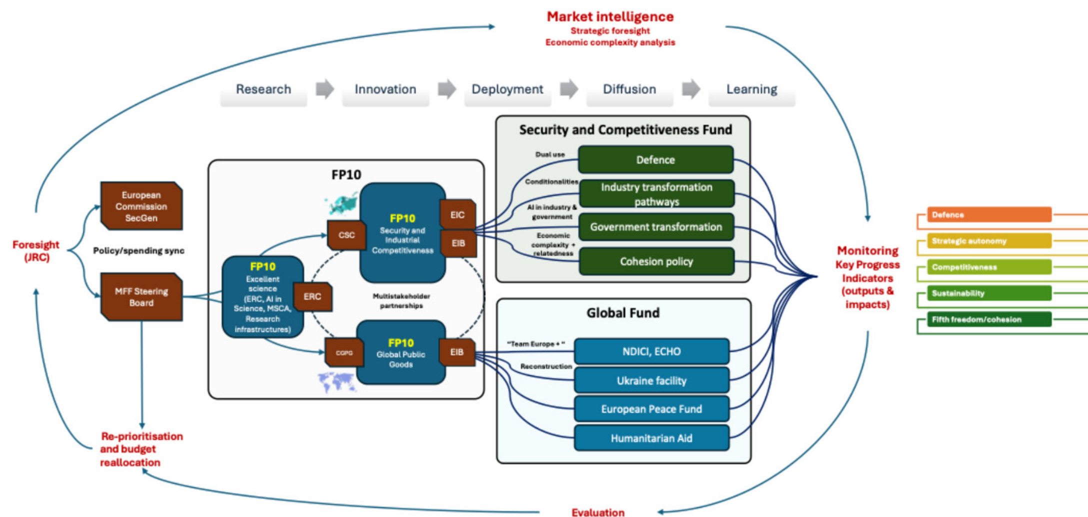
These claims could, in theory, be accommodated if the EU budget ended up being much larger, in the order of several trillion euro over seven years. However, the chances of massively upsizing the MFF are extremely slim. Several Member States struggle with fiscal stability and hesitate to increase their contributions due to mounting Euroscepticism and internal pressure for both social spending and support for the private sector. The private sector is struggling even more than in the past, as the Trump administration engages in erratic and unpredictable negotiation tactics on bilateral tariffs. Given the current circumstances, the EU is therefore being forced to either drop some of its 'priorities', as was already highlighted by commentators in arguably less troubled times ([403]) or develop innovative ways to increase the value for money of the MFF.

Conclusions: another view of the multiannual financial framework cathedral

Based on all the above considerations, the next MFF will have to present a radically different architecture than the current one. Figure 11 sketches the key elements of this architecture, based on the centrality of foresight, economic complexity analysis, R & I, agile governance and lean management in the overall design of the MFF.

([401]) European Parliament, 2024b.
([402]) Rodríguez-Posé, 2025.
([403]) Tagliapietra et al., 2023; Renda, 2024d.

Figure 11: A stylised representation of a possible agile, adaptive and simplified MFF



NB: CGPG, council devoted to global public goods; CSC, ad hoc council for security and competitiveness; ECHO, Directorate-General for European Civil Protection and Humanitarian Aid Operations; EIB, European Investment Bank; EIC, European Innovation Council; ERC, European Research Council; FP10, framework programme 10; JRC, Joint Research Centre; MSCA, Marie Skłodowska-Curie action; NDICI, Neighbourhood, Development and International Cooperation Instrument.
Source: Author's creation.

Figure 11 shows, first and foremost, a cycle of policy learning and adaptation, which starts with foresight and scenario building (left side of the figure), an activity that feeds the Secretary-General for the policy agenda (and informs all better regulation tools, primarily *ex ante* impact assessment, stress testing and *ex post* evaluation) and the MFF Steering Board and its Technical Secretariat. During the implementation phase, market intelligence is applied to both the newly labelled Security and Competitiveness Fund and a more globally focused external window called the Global Fund.

After foresight comes the drafting of the agenda, with existing priorities for spending and policy. Ideally, contrary to what happens now (with more than 90 % of the spending already decided before the MFF starts operating), policy and spending go hand in hand, and legislative intervention functions in a way that helps achieve the EU's medium-term goals. While the policy agenda and work programme are defined by the Secretary-General after consulting stakeholders, experts and the rest of the Commission services, the budget spending is set by the MFF Steering Board. The MFF Steering Board can decide to reallocate the budget to address emergencies, reflect the need for progress on indicators and targets that are not being met or respond to emerging geopolitical trends.

Once the priorities and possible budget reallocations are set, other instruments and institutions come into play. The first one in Figure 11 is framework programme 10 (FP10), separate from the comprehensive funds that are tasked with consolidating existing policy and spending instruments. In FP10, mirroring the proposal made by the Centre for European Policy Studies ([404]), the European Research Council and its board remain independent and oriented towards excellent research; they are coupled with a more targeted 'CERN for AI', which involves fundamental AI research, the Resources for AI in Science institute and (following the indication of the competitiveness compass) downstream

([404]) Dell'Aquila et al., 2025.

R & I activities in science, industry and government services. This area of FP10 also hosts key infrastructure such as the open science cloud and AI (giga)factories, which fuel R & I activities in the downstream phases as well. Ideally, this part of FP10 also includes talent attraction and retention, for example through the Marie Skłodowska-Curie actions and the choose Europe programme.

From there, Figure 11 presents a slightly modified vision of the 'investment journey', more aligned with the output that the EU needs to achieve in the future to promote its intermediate and ultimate goals. Excellent research leads to two 'hemispheres' of FP10 dedicated to innovation, with different rules, participation and governance. The first one is labelled 'security and industrial competitiveness' and is governed by an ad hoc council for security and competitiveness, on which the European Commission sits together with representatives of Member States, the private sector, European foundations and other donors. The council, supported by an expert group (similar to the one recently created by the Directorate-General (DG) for Research and Innovation on directional initiatives under the EU's framework programme for R & I), identifies the best way to promote innovation through the matchmaking of problems and solutions, relying on the European Investment Bank (EIB) and the European Innovation Council (EIC) to create large-scale industrial alliances to support innovation and to promote the scale-up of promising ventures in domains where industry signals the need for breakthrough innovation.

Outside FP10, these activities contribute to a variety of domains, from defence to industrial policy, government transformation and cohesion policy for territorial security and development. In that context, a key role is played by economic complexity analysis, which aims to study the technological specialisation and relatedness of each portion of European territory, and the possible frontiers that each territory can reach. This is essential to build a security and competitiveness policy that is based on territorial specificity and aims to realise the 'fifth freedom', the free movement of knowledge across the EU ([405]). Moreover, when addressing defence and industrial policy, the EIC and the EIB should work hand in hand to fund meaningful dual-use R & I. Finally, government transformation should be related to existing programmes such as the European interoperability framework (and, in policy, the Interoperable Europe Act), the initiative on enhancing the European administrative space and all programmes launched under the Recovery and Resilience Facility, with a view to developing a single pan-European digital public infrastructure and achieving the modernisation of government services, namely through the deployment of trustworthy AI-driven solutions.

The second domain, devoted to global public goods, is governed by a specific council, and gathers experts from multilateral institutions, the EIB, national development finance institutions and global philanthropies and also researchers and experts from Europe, associated countries and low- and middle-income countries. The aim is not to launch self-standing FP10 projects but rather to create or join multistakeholder partnerships for R & I and, through science diplomacy, pursue global public goods and the creation of genuine collaborations for mutual benefit. The council is also tasked with creating the preconditions for better investment in research, education and innovation in partner countries around the world, through basic and enhanced schemes for collaboration (e.g. within the pact for the Mediterranean, with the Association of Southeast Asian Nations, with Latin America and the Caribbean), an activity carried out by DG Research and Innovation in cooperation with DG

([405]) Letta, 2024.

International Partnerships on the EU side. The Global Fund is managed by the EIB (as one of its 'three mandates', as outlined by President Calviño).

FP10 and the two funds, managed by the two councils, would lead to completing the investment journey with the diffusion of innovation on the ground. For this, an adequate policy framework and use of supply-side and demand-side policy measures would be essential. This suggested approach would challenge the appropriateness of introducing specific measures in individual industrial markets, instead focusing on the EIB and EIC working together to ensure that pathways to industrial transformation were accompanied by the right conditions (in terms of security, competitiveness, sustainability, good jobs, etc.) The progress achieved by the management and implementation of the two funds would be subject to automated reporting and progress monitoring, which in turn would lead to the evaluation and (coupled with foresight) re-prioritisation and reallocation of the flexible portion of the EU budget, once or twice per year.

Figure 11 sketches out a possible governance approach that may still appear rather complex yet would be significantly simpler than the current one. Key features would be the pooling of existing instruments into ad hoc funds for internal and external action; the provision of trust-based mandates to the European Research Council, EIB and EIC, with much less detailed reporting and input or throughput indicators; the emphasis on impact investment, with the blending of funds and instruments (grants, loans, guarantees) in the hands of experienced programme managers and multistakeholder partnerships experts; and possibly the support of expert groups. The expert groups could then be pooled into a single 'think tank' of the European Commission, something that has been de facto missing since the European Political Strategy Centre was dismantled at the end of the Juncker Commission.

All in all, the proposed reorganisation would remove silos, enable mission-oriented policymaking with conditionalities, unleash quantum policymaking (starting with dual use) and leverage EU and other resources through enhanced collaboration and partnership. Altogether, this would enable the EU to step into the future with a more agile and adaptive MFF, which could guide and steer EU action all the way to 2034.

Science for policy in times of transformation

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The conventional view of policy research is that it produces knowledge for policymakers to utilise in crafting effective policies. The underlying assumptions are as follows.

- Policymakers do not fully understand the complexities of the issue they are trying to address, including its causes, dynamics and solutions. This requires research that makes science for policy an indispensable input into the decision-making process.
- Science has the unique ability to address the underlying policy issue analytically and objectively, using verifiable methods that yield reliable, relevant and reproducible results. This potential of science for policy is a key factor in its indispensability as an input into the decision-making process.

Based on these two assumptions, science for policy should be organisationally kept at arm's length from the policy process, as this is considered the best way to prevent politicisation and manipulation by vested interests. The autonomy of science for policy is regarded as a virtue and a prerequisite for providing scientific advice and recommendations for policymaking. The policy process is considered highly political and subjective and therefore incompatible with the objective nature of science.

From this perspective, science does not influence or interfere with the political nature of decision-making. From the policy side, this is convenient, as it does not require changes to the established political processes, where science operates as an external input. An implicit, often underacknowledged, feature of this set-up is that the political process determines the terms of using the external input. This can range from completely ignoring science when it is politically too costly, to the approach of claiming 'we follow science' when it is politically opportune. Going one step further, policymakers might have incentives to consult researchers who are or research that is more likely to provide 'palatable' advice. This, in turn, can affect the focus, scope or approach of research, particularly when there is a strong dependency of the research-performing unit on the policymaking unit (in terms of funding, steering or power). The increasing scientification of politics, that is, the compulsory use of scientific advice in policy processes – has not fundamentally changed this linear logic of science for policy.

In this paper, we challenge this linear model, arguing that it has largely become outdated and irrelevant, thereby setting the stage for critically examining the current role of policy research. We do not claim that our critique applies across all policy research areas. In some cases, the conventional position (science for policy as a unidirectional, arm's-length activity) is fine, for example when estimating the impact of taxation in aggregate and on different stakeholders. However, in conditions of uncertainty, complexity and contestation, there is a need for consensus on direction and, with a multitude of stakeholders involved, the conventional approach is an unsuitable one. In these conditions, the science for policy approach enables politics to manipulate science. At the same time, it allows for the uncritical deployment of scientific paradigms and methodologies that may be

inappropriate to the policy issue ([406]). In the mid-20th century, the tobacco industry funded research to dispute the scientific consensus on the harmful effects of smoking. The industry used manipulated studies to delay regulatory action by casting doubt on the link between smoking and lung cancer. Recently, climate change research has been edited or suppressed to downplay the reality and human causes of global warming.

During the COVID-19 pandemic, public health guidelines were downplayed or misrepresented to maintain political narratives minimising the pandemic's severity. In the EU, political and public opposition to genetically modified organisms has sometimes led to policies inconsistent with scientific evidence of the safety and benefits of genetically modified organisms. Energy policy is another area where science is sometimes manipulated or selectively presented to suit political narratives. For instance, lobbying by the oil industry has led to the suppression of scientific data on the environmental impact of fossil fuels. While science for policy is intended to provide evidence-based guidance for decision-making, political interests can sometimes manipulate, selectively interpret or even distort scientific findings to advance their agendas.

While the challenge of providing scientific advice on complex or wicked problems has long been acknowledged and discussed in the field of social policy and issues ([407]), it has not received sufficient attention in the context of research and innovation policy. We think that the approach is highly relevant in the context of what has recently been termed 'transformative policies', that is, policies supporting technological transformation towards sustainable development, especially climate change, energy transformation and security. These areas are of a strong systematic character, entangled with broader sociopolitical, economic and technological systems.

As pointed out above, we are not the first to question the conventional view of the role of scientific advice in the policy context. Mulgan's book *When Science Meets Power* ([408]) is an excellent recent examination of the issue. Mulgan's point of departure is the 'science–politics paradox', whereby he recognises that politics can guide science in line with public interests but that, to do so, politics must change. In addition, conventional science for policy often fails to synthesise knowledge across areas. Science needs to be part of the broader synthesis of knowledge, which Mulgan calls 'metacognition'. Lindblom ([409]) points out that conventional scientific advice is premised on the myth of the decision-maker as a coherent and consistent entity, while actual policy consists of a multiplicity of parties and participants with different interests and preferences. Policy is the product of interaction among a plurality of partisans, and scientific advice should address this variety of views. Lindblom et al. ([410]) have questioned and explored how real-world policymaking differs from the conventional model, where professional social inquiry is considered the sole input into policymaking. If a policy is about social problem-solving, it cannot be reduced simply to scientific problem-solving. Instead, professional social inquiry is only one among several routes to social problem-solving. Ordinary knowledge and

([406]) For excellent scrutiny of the misuse of equilibrium economics approaches in climate policy, see Sharpe, 2024. Also see Keen, 2021.
([407]) Lindblom, 1979; Rittel et al., 1973; Head, 2022.
([408]) Mulgan, 2024.
([409]) Lindblom, 1990.
([410]) Lindblom et al., 1979.

casual analysis are often sufficient, as professional social inquiry is rarely conclusive and thus seldom independently authoritative.

However, we see a major gap in our thinking when exploring the role of science in the transformative policy context, which further magnifies the challenge for the role of science in policy. We hope our critical examination can provide valuable insight into transformative policies. The issue's significance cannot be overstated, given the scale and relevance of the area. Are the current forms of the institutionalisation of scientific advice for policy appropriate? This question becomes particularly pertinent in the current crisis of the relationship between science and liberal democracy.

The conventional science for policy approach is insufficient for transformative policies. The traditional science for policy model, characterised by *a linear and arm's-length approach*, is outdated in terms of addressing transformative policies' complexities, uncertainties and multistakeholder dynamics. In transformative contexts, a broader and more *iterative integration of scientific input* is needed, involving various stakeholders in navigating complex societal challenges.

Transformative policies require a policy mix, not a single policy approach. Transformative change is inherently dynamic and multidimensional, necessitating a *combination of policy instruments* rather than the reliance on a single policy response. Effective policies must address timing, sequencing and *synergistic effects* to ensure successful interventions across sectors like climate change, digital transformation and economic restructuring.

A shift is needed from science for policy to knowledge for policy. There is a need to broaden the approach from purely scientific input to the *incorporation of various forms of knowledge*, such as lived experiences, policy expertise and ordinary knowledge, into policymaking. Knowledge for policy emphasises the importance of *synthesising diverse types of knowledge* to inform more effective and inclusive decision-making processes.

There is a need for inclusive and participatory governance structures. Transformative policy challenges require inclusive dialogue and participatory processes that engage multiple stakeholders (government, industry, civil society) in co-creating solutions. Science must be integrated into a broader system of knowledge synthesis and participatory governance rather than acting as an isolated external input.

The role of institutions in facilitating cross-sectoral knowledge integration is key. Organisations like the Fraunhofer Institute for Systems and Innovation Research and the Austrian Institute of Technology demonstrate how institutions can bridge knowledge gaps across sectors and disciplines, offering a model for integrating science, policy and industry. Similar organisations in China and the United States play a crucial role in connecting applied research, technology development and policy guidance, indicating a global trend towards multi-actor, cross-sectoral approaches to innovation policy.

AI has a role as both a tool and a challenge in the science–policy interface. AI presents opportunities to enhance cross-disciplinary collaboration and metacognition but poses risks due to its opaque nature. The challenge is to ensure that AI serves as an augmentative tool for human decision-making, provided that the process of generating results is explainable, transparent and inclusive.

In summary, the transformative policy context necessitates a shift from the conventional science for policy model to a more inclusive, dynamic and integrated knowledge for policy approach. This requires embracing diverse knowledge sources, participatory governance and a strategic mix of policy instruments that can adapt to the rapid, complex changes characteristic of transformative challenges, such as climate change, digital transformation, societal innovation and economic restructuring. AI is emerging as both a catalyst and a challenge in this changing landscape, necessitating the careful integration of AI into policymaking.

Theory-based evaluation of transformative innovation policies

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Introduction

Over the past decade, there has been a rising interest in transformative innovation policy (TIP): challenge-based innovation policy deliberately designed to transform entire socio-technical or production–consumption systems ([411]). A key characteristic of TIP is that it recognises the role of and attempts to draw on heterogeneous and continuously adapted policy mixes in changing and reconfiguring the various structures and processes that make up such systems ([412]). It is also open-ended, since complexity, uncertainty and value contestation hamper the possibilities of working systematically towards a planned new system ([413]).

As the debate on rationales for TIP has preceded its actual application, TIP's design and implementation are still in exploratory and experimental phases. Yet the emergence of a new frame of innovation policy has already sparked questions on revisiting methodologies, metrics and practices of policy monitoring, evaluation and learning (MEL). It is increasingly understood that such practices need to reflect the widening of the system in which innovation policies intervene (from innovation systems to socio-technical systems) and the nature of the desired change (from optimising existing systems to changing systemic configurations). Arguably, these changes pose new types of theoretical and methodological challenges, just like when evaluation practice needed to be adapted to innovation policy's shift from supporting research and development to strengthening innovation systems ([414]).

While some authors have discussed the use of conventional monitoring and assessment techniques ([415]), others suggest that the new innovation policy paradigm ([416]) demands substantially different evaluation processes and practices ([417]). Given that TIP principles promote reflexivity ([418]) and considering the accountability requirements faced by policymakers experimenting with TIP, the need for suitable evaluation approaches is only growing. This demand is echoed in the debate regarding monitoring and evaluating mission-oriented innovation policy ([419]), which, depending on how it is designed and implemented, can be regarded as one way of enacting TIP ([420]).

Some initial responses have been provided by scholars proposing frameworks for either assessing policy-induced innovation and transition dynamics ([421]) or structuring the various steps and (sub-

([411]) Schot et al., 2018a.
([412]) Haddad et al., 2022.
([413]) Kroll, 2019.
([414]) Arnold, 2004.
([415]) Santos et al., 2023.
([416]) Diercks et al., 2019.
([417]) Molas-Gallart et al., 2006; Rohracher et al., 2023; Baarslag et al., 2024; Wieser, 2025.
([418]) Weber et al., 2012.
([419]) See, for example, Larrue et al., 2024.
([420]) Schot et al., 2018b; Edler et al., 2025.
([421]) See, for example, Molas-Gallart et al., 2021; Elzinga et al., 2023.

)analyses in an evaluation study ([422]). Many of these contributions explicitly or implicitly highlight the importance of theory-based evaluation ([423]). That is, instead of focusing exclusively on identifying suitable indicators and counterfactuals for measuring the magnitude of the overall impact, TIP evaluations should seek to uncover, test and propose revised causal mechanisms that describe how policies contribute to driving transformative change ([424]).

So far, the debate on the MEL of TIP has seen little discussion of the methodological requirements and ramifications of adopting theory-based evaluation. With the aim of being relevant to both the academic and practice-oriented community of evaluation researchers, we discuss the applicability of theory-based evaluation methods that are still relatively uncommon in the field of innovation policy evaluation and yet are promising methods for examining the multitude of interwoven and sequential changes TIPs that aim to engender.

The promise of theory-based evaluation

A commonality across many examples of recently published TIP evaluation frameworks is the emphasis on revealing and explicating the causal mechanisms through which policies exert their influence ([425]). The general tenet is that in any evaluation study or process it is first necessary to determine, on the basis of available evidence, policy documents and input from various stakeholders, how policy seeks to bring about change. This is the policy theory or theory of change (TOC) ([426]).

Theory-based evaluation emerged as an alternative to black box evaluations: studies that primarily use quantitative indicators to measure policy intervention effects (notably whether and to what extent they occur) without explaining how or why outcomes occur ([427]). By contrast, theory-based evaluation focuses on unpacking the processes between policy intent and policy outcome by revealing the causal mechanisms that generate the outcomes and the contextual factors that influence them. The resulting TOC is typically expressed in the form of a visual model – for instance, in the form of a logical framework (connecting inputs to throughputs, outputs, outcomes and impacts) or a network map of causal relations forming impact pathways ([428]). In both cases, causal mechanisms may run in parallel or intersect at some point (e.g. two outputs contributing to the same outcome).

A key promise of theory-based evaluation in the context of TIP consists of offering an analytical approach suitable for addressing the many and often interconnected causal mechanisms that are inherent to dynamic heterogenous policy mixes aiming to drive systemic change. Explicating these mechanisms helps to address Geel's complex forms of causality in socio-technical transitions: policy-induced mechanisms can strengthen or weaken each other (configurational causality), which possibly also depends on the order of engendered effects (sequential causality) and the influence of changing external factors (conjunctural causality).

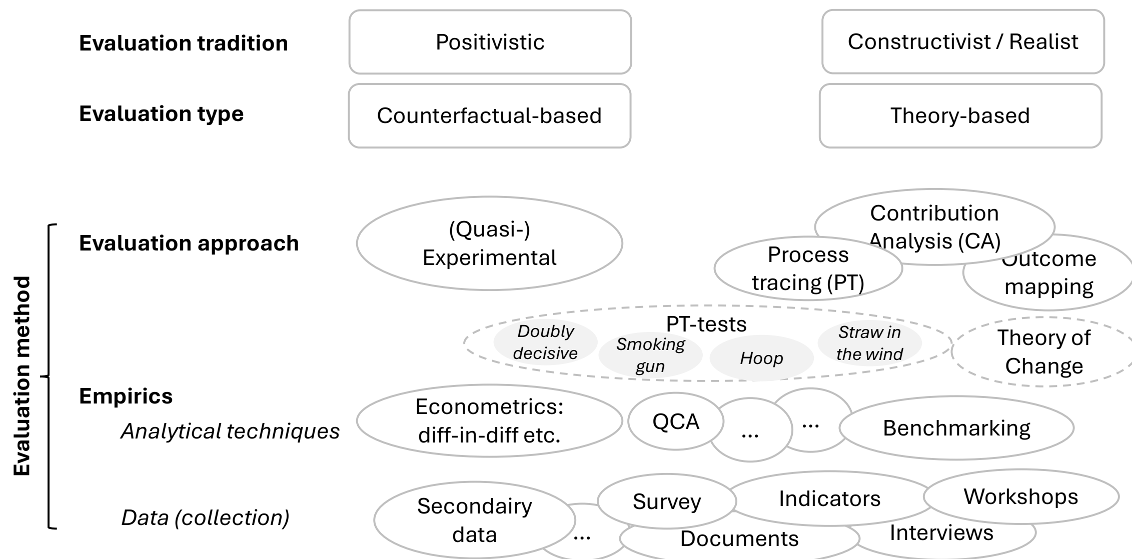
([422]) Janssen et al., 2022; Haddad et al., 2023.
([423]) van der Knaap, 2004; Treasury Board of Canada Secretariat, 2021
([424]) Dinges et al., 2022; Boni et al., 2023; Buckton et al., 2025
([425]) Janssen et al., 2022; Haddad et al., 2023; Rohracher et al., 2023.
([426]) Blamey et al., 2007.
([427]) Haddad et al., 2023.
([428]) Douthwaite et al., 2007; Miedzinski et al., 2022.

Theory-based evaluation can be employed at different stages of the policy cycle. Ideally, this starts at the policy design stage, for instance by defining an envisaged policy outcome (which is a condition for achieving the ultimately desirable societal impact) and reasoning backwards to identify policies that can generate the outputs that can cause the outcome to occur. In practice, policymakers may start from the policy inputs that they are responsible for or familiar with, rather than from what they want to achieve; however, even then, it is essential to spell out the logic that connects means and ends. Then, when monitoring and evaluating the policy, the TOC provides a basis for defining relevant indicators for quantitative or qualitative analysis. Based on the learnings resulting from such analyses, the TOC may be adapted. An in-depth understanding of why certain causal mechanisms do (not) work, or to what extent (e.g. up to what level of output), helps to determine what kind of policy adaptations are most needed.

Methods for testing theories of change

Identifying the envisaged causal mechanisms between policy inputs and policy outcomes is an important first step in evaluation. The next step consists of assessing these linkages empirically. Drawing on a recent study on evaluating comprehensive and adaptive innovation policy mixes ([429]), Figure 12 provides an overview of concepts related to applying theory-based evaluation approaches (on the right) ([430]). For the sake of clarity, it also contains concepts related to counterfactual-based evaluation (on the left).

Figure 12: Overview of evaluation methodology concepts



Source: Vankan et al., 2024.

As can be seen at the top of the figure, theory-based evaluation's focus on uncovering causal mechanisms can be contrasted with the counterfactual-based evaluation type, rooted in a positivistic

([429]) Vankan et al., 2024.
([430]) This subsection draws extensively on the core of a Dialogic policy report, which is currently only available in Dutch (Vankan et al., 2024).

evaluation tradition. These different evaluation types typically rely on different evaluation approaches, which the European Commission's *Evaluation Handbook* of 2024 defines as the overall logic for addressing matters of causation and attribution.

Counterfactual-based evaluation preferably relies on experimental methods as typically found in the domain of medicine or physics. Since actual or natural experiments are scarce in innovation policy, evaluators in this tradition usually resort to (combinations of) econometric techniques such as propensity score matching, difference-in-difference or regression discontinuity analysis. These analytical techniques work best with large amounts of data, hence the common use of secondary data as found in, for example, the databases of statistical agencies.

Theory-based evaluation comes with a different repertoire of suitable evaluation approaches, originating from various policy fields. An important distinction here is whether the TOC is developed or appraised from left to right (i.e. from inputs to outcomes) or from right to left. The former is relevant in contribution analysis and process tracing, two complementary evaluation approaches for systematically determining the contribution of interventions to observed outcomes or impacts ([431]). Contribution analysis is an approach used to systematically develop 'contribution claims' about the causal influences of a (policy) intervention. The approach takes the creation of a TOC as a starting point. It is then important to collect empirical data for all elements of that TOC and to analyse it in such a way that a picture emerges of how likely it is that the intervention has influenced observed outcomes. Process tracing has a different origin but has many similarities to contribution analysis. Typically, process tracing investigates which combination of factors is necessary and sufficient for the occurrence of a causal mechanism. The aim is to make statements about the influence of policy that are as reliable as possible, based on empirical indications that certain results and links are occurring. The empirical evidence is stronger if there are indications for successive elements in the TOC that the expected developments are occurring, without this being entirely attributable to other factors. The main difference between this and contribution analysis is that process tracing has four concrete tests for causal inference.

Outcome mapping or harvesting follows the opposite route: evaluators focus on outcomes and try to find out which factors contributed to the occurrence of those outcomes. The reasons for the occurrence of those factors are then examined. In this way, the research should ultimately identify the required policy inputs. Outcome mapping or harvesting is usually not used when a clear TOC has been drawn up but rather when it is also necessary to explore what kind of (behavioural) changes have occurred.

In terms of concrete analytical techniques, theory-based evaluations typically rely on steps that involve both developing a TOC and testing it. This testing can be done based on literature (is it plausible that X leads to Y?) and also empirically, often through collaboration between policy stakeholders and evaluators. The essence of that empirical analysis is then to inspect whether reality is consistent with what the TOC describes. Some evaluation approaches distinguish a series of concrete tests, for example to exclude alternative explanations for observed developments. These tests can be carried out using all kinds of techniques, based on qualitative and/or quantitative data. There is a relatively

([431]) Befani et al., 2014.

close relationship between some analytical techniques and data types (econometrics benefits from large data files with many variables), but there are also data types that are a bit more difficult to place. For example, surveys and indicator overviews can be used for many types of analyses and, thanks to large language models, there are more and more opportunities to perform quantitative analyses on (unstructured) texts.

The most important takeaway is that theory-based evaluation of TIP needs to be based on the careful use and combination of different methods, depending on which ones work best for the elements and linkages in the TOC. Here, it should be noted that a concept such as contribution analysis (evaluation approach) is of a completely different order from an econometric regression technique (analysis technique) or a survey (data collection method). A mixed-methods evaluation methodology based on approaches like contribution analysis and/or process tracing automatically comprises different types of methods and tools, which can be used to explain processes and, in specific instances, make causal inferences. This approach implies that a strong contrast between theory-based and counterfactual-based methodologies does not necessarily apply at the levels of techniques and data types. While it is close to impossible to utilise econometric approaches in assessing the overall impact of a TOC, it might be feasible to use such approaches in conducting empirical tests on elements of a TOC (e.g. as part of process tracing).

Conclusions

A key implication of the reflections provided is that designing a TIP evaluation is not just a matter of picking a readily available method (e.g. quasi-experimental econometrics, qualitative comparative analysis); it is about selecting and operationalising an approach that guides the use of techniques and data sources that are specific to the elements and linkages of a TIP's change theory that needs to be assessed. Ideally, this includes all elements and linkages, with some of them lending themselves to methodologically rigorous tests better than others.

Reasoning from our aim of informing MEL practices, it is important to note that evaluating TIP requires not just the careful consideration of methodological issues – as presented here – but also a fundamental reorientation of evaluation processes, protocols and culture ([432]). Haddad et al. ([433]), for instance, found in their work on Swedish TIP attempts that, while Vinnova incorporated some new practices, 'some cross-cutting challenges remain in becoming more aligned with TIP: (1) conceptualizing systems and outcomes, (2) developing transformative theories of change, and (3) addressing system-level additionality and directionality'. Baarslag et al. ([434]) contend that it is insufficient to apply quick fixes every time evaluators run into the limitations of established evaluation culture and practice; the proper MEL of TIP and other challenge-led innovation policies starts with structural adaptations of governance and organisational structures and institutionalised assumptions and practices. Baarslag et al.'s findings are consistent with the findings of a recent study by Andersen et al. ([435]), who find that, in general terms, the use of alternative evaluation approaches is constrained

([432]) Kroll, 2019; Rohracher et al., 2023; Buckton et al., 2025.
([433]) Haddad et al., 2024, p. 12.
([434]) Baarslag et al., 2024.
([435]) Andersen et al., 2025.

by the institutional set-up of evaluation. Such organisational anchorage can narrow the scope of evaluation goals and methods.

By discussing possible ways to apply theory-based evaluation in the context of TIP, we contribute to this ongoing debate on directions for adapting evaluation culture and practice to foster reflexive policy learning. Of key importance is theory-based evaluation's role as more than just a methodology: it is an approach to developing, discussing, testing and updating views on causal mechanisms between policy inputs and policy outcomes. While it can support the analysis of policy effectiveness and efficiency, it also provides a framework conducive to policy learning and the discussion of practical arrangements for ensuring the evaluation is used to address and responds to the practical needs of policymakers (e.g. adjusting evaluation criteria, embedding theory-based approaches in monitoring and ongoing evaluation). Making constructive use of theory-based evaluation, regardless of the evaluation question or criteria, merits the reconsideration of protocols dictating when MEL activities will happen and by whom these will be executed.

AI-supported data management for monitoring platforms

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Monitoring platforms play a vital role in tracking and analysing data across diverse domains, from environmental emissions to research and innovation metrics. By aggregating information from multiple sources, these platforms generate insights that underpin evidence-based policymaking and strategic decisions. Despite their value, maintaining such platforms presents significant challenges. Data arrives in heterogeneous formats – both structured and unstructured – with varying levels of quality ([436]). Ensuring timely updates, performing quality control and maintaining the relevance of information often require extensive manual input from domain experts. Core challenges include integrating new datasets, keeping information up to date, ensuring data quality and detecting obsolete content, tasks that are typically embedded in resource-intensive workflows and prone to delays.

However, data management in monitoring platforms is not a purely technical exercise but also a strategic economic function. It shapes how societies understand trends, identify vulnerabilities and respond to challenges. A structured workflow, supported by automation and governed by expert oversight, is essential for platforms to fulfil their role as engines of transparency, efficiency and coordinated action in complex economic systems.

This paper explores how advances in AI, and large language models (LLMs) in particular, can enhance the data management workflow of monitoring platforms. Recent breakthroughs in generative AI (exemplified by models like Generative Pre-trained Transformer 4) have enabled a higher degree of automation in tasks traditionally performed by humans. LLMs have already demonstrated value in labour-intensive analytical tasks (e.g. qualitative data analysis) by reducing the time and errors involved in manual coding and interpretation ([437]). Building on a prototypical monitoring platform architecture and a five-step data management process (from initial data submission and relevance checks to detailed analysis, platform registration and ongoing maintenance), this paper identifies points where AI can streamline data ingestion, validation, integration and upkeep. In essence, the goal is to reduce the burden on human experts and improve the consistency and speed of data handling, without compromising quality.

The AI capabilities considered are:

- intelligent document and web data extraction;
- schema matching and merging;
- automated data cleaning and enrichment;
- natural language queries and summaries;
- predictive analytics;
- AI-driven decision support.

Collectively, these AI capabilities are mapped onto each phase of a data management workflow, highlighting a tangible path to partially automate and improve the platform's operations. By

([436]) De Bellis, 2023; Anderson et al., 2024; Fokoue et al., 2024.
([437]) Siiman et al., 2023; Bryda et al., 2024.

embedding AI capabilities into the monitoring process, the platform can ingest new information faster and with fewer errors, continuously clean and harmonise data and provide richer analytical outputs. This leads to a more efficient, scalable and responsive system that can keep policymakers and stakeholders up to date with high-quality information. Crucially, the integration of LLMs and related AI tools takes place under human supervision: experts define the rules, validate critical outputs and handle exceptional cases, ensuring that the trustworthiness and transparency of the platform's insights are maintained. Ongoing research highlights the importance of governing these AI-driven processes to mitigate issues like biased data or AI hallucinations ([438]). With appropriate oversight, the augmented monitoring platform can significantly strengthen evidence-based policy support by delivering timely, accurate and comprehensive data insights while optimally leveraging expert resources.

However, it should be noted that a specific implementation of a monitoring platform does not need to implement all outlined AI capabilities but must carefully select those capabilities that are essential in the specific monitoring context of that platform and evidently meet the budget restrictions of the implementation.

Across the EU, there are numerous valuable monitoring platforms for which experts are responsible for curating, validating and providing data and information for a wide range of users within specific contexts. In this context, their core function is to identify, collect and analyse information on monitored environments. To achieve these objectives, platforms gather data from a wide range of sources and integrate this information into comprehensive repositories. Ultimately, the goal is to establish global, publicly accessible monitoring systems that enable the continuous collection and dissemination of insights on monitored environments.

Such platforms are usually moderated by experts who follow a well-established workflow. When executing this workflow, they stick to a rigorous step-by-step process. Each step requires different skills and know-how. To gain meaningful insights, however, it is important to understand the process. In this paper, we provide a prototypical workflow for a monitoring platform.

As presented in this paper, AI enhancements transform a traditional monitoring platform into a smarter, more autonomous system. They automate routine tasks, augment expert analyses with AI-driven insights and ensure that the platform remains responsive to new data and changing information needs. This division of labour between algorithmic support and human expertise increases institutional productivity and improves the responsiveness of monitoring systems in fast-changing environments. Furthermore, the ability of AI to continuously learn and adapt over time supports long-term system resilience. As monitoring needs change and data landscapes shift, AI systems can be retrained to accommodate new data types, recognise emerging patterns and adjust validation parameters accordingly, ensuring that the platform remains future-proof.

We recognise the following potentials of integrating AI into the different steps of the data management workflow. By integrating AI into the submission step of the data management workflow, human experts can dramatically reduce manual review time, increase the consistency and reliability of

([438]) Luyi et al., 2023.

incoming data and expand the range of sources from which valid information can be accepted. At the same time, expert users remain in control of the final evaluation, but their task becomes more strategic and less procedural: reviewing flagged issues, interpreting complex trade-offs and making final inclusion decisions based on a higher baseline of structured, pre-validated input. In the step of relevance and completeness checking, AI enhances the process not just as a filter but as an intelligent interpreter, translator and validator, ensuring that the data entering is not only appropriate and accurate but also semantically and structurally aligned with the broader goals of the monitoring system (i.e. platform).

The integration of AI-powered data analytics elevates the detailed analysis step from manual inspection to intelligent, semi-automated evaluation. It ensures that only datasets that are analytically robust, methodologically sound and policy related are allowed to progress into the platform's core systems. At the same time, it empowers human experts by providing them with tools that enhance interpretability, predictive insight and strategic decision-making, thereby safeguarding the integrity and impact of the monitoring process. AI technologies transform the registration process from a manual, rule-intensive step into a dynamic, intelligent integration layer. They accelerate onboarding, enhance semantic alignment and ensure that validated data becomes a first-class component of the platform's analytical and visual environment, all while reducing administrative overhead and ensuring consistency across the system. Finally, AI transforms maintenance from a reactive, manual process into a proactive, intelligent governance layer. It ensures datasets remain up to date, relevant and structurally sound while providing the platform's operators with powerful insights to manage data life cycles strategically. This makes the platform not only sustainable but also capable of continuous learning and adaptation, an essential quality in dynamic policy and economic environments.

In conclusion, the integration of AI into platform-based data management is essential not only for handling data at scale, but also for maintaining the analytical and economic integrity of monitoring systems. It represents a strategic enabler of the building of responsive, high-quality and expert-informed platforms capable of supporting complex decision-making in dynamic policy and economic environments. However, it should be noted that a specific implementation of a monitoring platform does not need to cover all outlined AI capabilities but must carefully select those capabilities that are essential in the specific monitoring context of that platform and evidently meet the budget restrictions of the implementation.

Conclusions: reforming European governance, enhancing competitiveness and protecting the EU social market economy model

From a 'triangle of sadness' ([439]) ***to a 'triangle of hope'***

In this report, based on the rich collection of analyses authored by independent experts, we have examined the triangular relationship between capitalism, sustainability and democracy, paraphrasing the title of Joseph Schumpeter's 1942 seminal publication *Capitalism, Socialism and Democracy*. There are many inherent tensions today between capitalism, sustainability and democracy, but we argue that these tensions can be resolved so that capitalism, sustainability and democracy can not only coexist but support and reinforce each other. This mirrors Schumpeter's idea of capitalism needing institutional scaffolding (welfare state, regulation, rights) to remain legitimate.

Looking at the three forces individually, we have argued that, while such scaffolded capitalism appears to have been one of the most successful systems for economic value creation and development, it is not sufficient for societal cohesion and political stability. More so, when confronted with globalisation, deindustrialisation and digital monopolies, capitalism appears to mutate into some form of technology-powered mercantilism capitalism, as in the United States, or state capitalism, as in China. In Europe, these trends have weakened the EU's economic base – echoing Schumpeter's concern about capitalism's loss of entrepreneurial dynamism – and led to social and territorial inequalities, fuelling political discontent and undermining democracy, just as Schumpeter predicted would happen should capitalism fail to deliver widely shared benefits.

Back in 1942, Schumpeter wrote 'the competition that matters is not price competition but competition from the new commodity, the new technology, the new source of supply, the new type of organization' ([440]). Today, as argued here, the only competition that is lasting and worth pursuing is one grounded in innovation, broadly defined and premised on sustainability, tackling climate change and declining biodiversity. In the absence of a global rules-based world order, the radically new geopolitical environment calls for a new enlightened and revamped notion of industrial policy. The latter will need to encapsulate both top-down strategic vision and mission orientation with bottom-up energy in the form of reinforced public–private partnerships capable of exploiting the latent potential found at the regional and local levels, valorising the EU's regional diversity as a source of innovation, product differentiation and value creation.

For capitalism to be compatible with sustainability, price signals need to capture the costs of emissions, resource depletion and loss of biodiversity. Otherwise, capitalism risks undermining sustainability. Europe needs, and is in a strong position to develop, a model of capitalism that is compatible with sustainability. If it does not seize this opportunity, it will become defensive, over-regulated and vulnerable, creating fertile ground for populism and more authoritarian, state-driven models, echoing

([439]) This is a reference to Ruben Östlund's 2022 movie *Triangle of Sadness*, a parable on globalised, capitalist society illustrating, in Ben Rendich's words, both 'the arbitrary, transmutable nature of power dynamics' and 'the ease and readiness with which people either defer to or realign themselves within a given or shifting status quo'. (Rendich, 2022).

([440]) Schumpeter, 1942, Chapter VII.

Schumpeter's warnings. In short, capitalism tends to become adversarial to sustainability by sending the wrong market signals, undermining long-term competitiveness and opposing the green transition instead of making the two complementary and self-reinforcing.

Turning to democracy, we see it as the most effective system for guaranteeing personal freedom; providing public goods, notably education and health; ensuring social mobility and the rule of law (accountability, checks and balances, protection from the state); and distributing economic wealth to safeguard societal cohesion and political stability. In this sense, capitalism and democracy need each other. For capitalism to thrive and evolve into a dynamic, market-driven economy based on Schumpeterian innovation, the concept needs sufficient social acceptance, for example by providing quality jobs and decent salaries. To ensure a strong middle class in Europe's rapidly ageing society, democracy needs to enhance capitalism's value in contributing to individual welfare and well-being, especially for the young. European democracy must reconnect to its foundation of rational and respectful public debate fuelled by a common sense of purpose.

In the Anthropocene, sustainability is a prerequisite for both democracy and capitalism in the long term, though there is clear friction between these two concepts in short-term practice. Democracy can promote sustainability, since it is a mechanism for holding decision-makers accountable for failing to ensure sustainability and it gives them legitimacy to lead economic and societal transformation. But democracy can also work against sustainability, particularly when disinformation and populist campaigns decry climate change challenges or pit sustainability against people's livelihoods and short-term interests, or if democracy fails to ensure that the short-term costs of achieving sustainability are distributed fairly and proportionally.

The dynamic triangular relationships between capitalism, sustainability and democracy, as presented in our introduction, provides a simple but powerful framework for understanding the geopolitical positioning and differences between the major economic players in the world: the United States, focusing on a more full-blooded version of capitalism at the expense of sustainability, while transforming democracy along the way; China, by contrast, seeking to increasingly align state-run capitalism with sustainability but at the expense of democracy and open society; and Europe, trying to combine sustainability and democracy at the expense of raw capitalism.

Realising a successful iteration of this last combination, as illustrated in the Fair and Sustainable Economy scholars' different papers, presents formidable policy challenges for Europe. Key questions are how to re-energise reformed capitalism with sustainability and democracy, embedding creative resource efficiency and place-based innovation into the old social model, and how to make capitalism resilient, rather than self-defeating, and an efficient economic system for the good of society. Without such revitalisation, Europe's social market model will drift into stagnation and political instability, if not outright rejection by the left-behind and discontented people and places that perceive these transitions, their pace and reforms as a threat. People seem willing to accept a perceived lack of

fairness if they are optimistic about a better future – Hirschman's tunnel effect ([441]); however, when the future looks bleak, it becomes more important than ever that large segments of the population do not perceive that they are unfairly treated. In short, it is an urgent time for Europe to show that capitalism, sustainability and democracy can reinforce each other in Schumpeter's terms.

Ultimately and fundamentally, the survival and flourishing of democracy hinges on the perception of fairness and the promise or prospect of a better future. While the former is firmly the responsibility of a functioning democracy, the latter critically relies on capitalism – with its unique ability to drive innovation and technological development – and sustainability. Europe outperforms China and the United States in equality between people or regions and social mobility – key determinants of the perception of fairness. It is in the prospect of a better future that Europe's weakness lies.

The next subsection returns to the question raised in this report's introduction: to what extent will the EU be capable of addressing the various challenges sketched out above given its institutional set-up and current multilevel policy governance structure?

The EU: locked in policy governance complexity

The analysis presented here highlights the need for a fundamental reform of the EU's multilevel governance model, not only because of the many missing integration elements, as highlighted in both the Letta and Draghi reports, but also because of the lack of common purpose going beyond economic integration and remaining competitive. The politicisation, even weaponisation, of international relations, driven most visibly by the current US administration, fundamentally and deliberately challenges the EU as not only an economic but a political entity.

In a recent speech ([442]), Mario Draghi, noticing the growing scepticism with respect to the EU project, put it as follows:

> *… it is important to ask: what is this scepticism really directed at? In my view, it is not scepticism about the values on which the European Union was founded – democracy, peace, freedom, independence, sovereignty, prosperity, fairness … the scepticism concerns the Union's ability to defend those values. This is partly understandable. Models of political organisation, especially supranational ones, emerge at least in part to solve the problems of their own time. When those problems change to the point of making existing structures fragile and vulnerable, those structures must themselves change.*

The EU, as the strongest manifestation globally of a supranational institution, is confronted with a surge in neo-nationalistic policies and autocratic regimes in not just the Global South but also the United States and the rest of the Western world. The analysis presented here points to the difficulties

([441]) According to Hirschman (1973), 'In economic terms, we are all driving in the tunnel and, in every society – whether developed or developing – some people are surging forward, while others are stuck in a seemingly endless traffic jam … Inclusive growth is what all nations need to promote, and design policies and institutions to make that type of growth happen. Sustained uneven growth, on the other hand, is a recipe for potentially serious social conflict.'

([442]) Draghi, 2025.

and intrinsic weaknesses of the historically grown European multilevel governance structure in addressing the new geopolitical challenges resulting from dynamic interactions between capitalism, sustainability and democracy, as described in the previous sections. The current European governance structure resembles from this perspective first and foremost a historically grown institutional locked-in situation, whereby the EU remains 'a regulatory giant but a political (or military/economic) dwarf', an 'investor dwarf' ([443]) with a budget of barely 1 % of its gross domestic product. In our own contribution on 'Multilevel governance and geopolitical challenges'[444], we describe in quite some detail how the current governance structure emerged.

During the second half of the 20th century, the institutional process governing the European Union was shaped by the need for gradual economic and political integration, whereby the overall supremacy of Union law over national legislation ('direct applicability', mainly through regulations) represented the logical expansion and direction of the integration progress. Then, 20 years ago, this process came to a halt, resulting in the 2007 Lisbon Treaty, contradicting Jacques Delors's 1988 prediction in the European Parliament: 'Ten years hence, 80 % of our economic legislation – and perhaps even our fiscal and social legislation – will be of Community origin'. As Schwaag Serger et al. note ([445]):

> *A quarter century further in the 21st Century, one can only conclude that the Lisbon Treaty did not prepare the EU well for the 21st Century; on the contrary: the institutional complexities with respect to the multiple policy governance structure enshrined in the Treaty made the EU particularly ill equipped to handle crises.*

In the former European Commission President Jean Claude Juncker's terms, the Lisbon Treaty represented an 'objective success and atmospheric disappointment' ([446]), by which he meant that, even though the treaty provided rational reforms and enhancements to the EU's institutional framework, it did not correspond to what was expected and gave at least the perception of scepticism.

Specifically, the Lisbon Treaty conveyed scepticism as to how the EU would be able to tackle crises as they emerged. As became clear, the EU's multilevel governance structure not only lacked essential further integration elements, such as a European capital market, a banking union, a European energy and digital – telecoms in particular – union or single regulatory regimes in areas of common strategic interest; it also created a multilevel regulatory burden resulting in over-regulation: a phenomenon described by Draghi as one of 'gold-plating' between the EU and its Member States ([447]). This trend to over-regulate could be said to have had a particularly negative impact on the dynamics of innovation, the Schumpeterian process of 'creative destruction' ([448]). As Foray et al. ([449]) have argued, traditional policymaking in Europe and at the European Parliament in its regulatory technology assessor role has focused on *ex ante* regulation as a precautionary principle: acquiring advance warning of potential negative effects with respect to the potential security, health and environmental risks for consumers

([443]) Quote attributed to Andrew Moravcsik, Princeton University.
([444]) Schwaag Serger and Soete, 2025
([445]) European Commission: Joint Research Centre, Schwaag Serger et al., 2025.
([446]) *Le Soir*, 2 July 2007, 'L'invite de Lundi', p. 18.
([447]) Draghi, 2024, p. 30.
([448]) Schumpeter, 1942.
([449]) Foray et al., 2025.

and more broadly users of particular new technologies. The latter are typically analysed as new physical devices. Such an *ex ante* assessment process is, however, problematic when dealing with new forms of digital innovation, such as AI, which go beyond physical products but involve the development of disruptive business models involving new consumer experiences and impacting nearly all forms of economic activity, ranging from healthcare and education to governance and social interactions. Examples of such digital innovation include digital platforms, social networks, AI technologies, autonomous driving and many more. As Foray et al. argue, a new form of 'innovation assessment' is needed, addressing a much larger series of questions that can only be answered *ex post* ([450]):

> *How are these innovations changing the concerned social interactions and practices? To what extent can these innovations influence large-scale behavioural tipping? Is there any issue raised by processes of creative destruction or are negative externalities dominant leading rather to processes of destructive creation … The central Innovation Assessment problem and specificity, relative to Technology Assessment, is that these are all questions which are difficult to answer* ex ante*: understanding the effects of these innovations – their 'social properties' – requires full scale deployment in society ….*

From this perspective it can be argued that, in addition to regulatory gold-plating, as highlighted by Draghi, the EU's intrinsic tendency to apply *ex ante* precautionary technology assessment principles to digital innovation has further contributed to its structural failure to innovate and increase its productivity. The results are a growing competitiveness gap with China and the United States, particularly in key strategic sectors ([451]), and a falling-behind in the scale-up of promising European start-ups.

Some concrete lines of policy action

These internal policy failures have been painfully exposed following the installation of the new Trump administration in the United States and the sudden politicisation, even weaponisation, of international trade and investment. It could be argued that current US policy increasingly aligns with China in undermining the EU's multilevel governance structure, contributing to internal policy differences between Member States and eroding the democratic legitimacy of EU governance in the digital arena ([452]). As Tukker noted in his paper ([453]):

> *Social media are already used to support policy actors aligned with Europe's competitors (particularly Russia and the US). Discrediting individuals, inciting street protests, and indeed, influencing elections may be possible at surprisingly low costs. It is a realistic prospect that Europe or its member states may be played apart, or that member countries will change to regimes friendly to the EU's adversaries, without any use of traditional force.*

([450]) Foray et al., 2025.
([451]) See the JRC's 2025 edition of the EU industrial R & D investment scoreboard.
([452]) Mair et al., 2019.
([453]) European Commission: Joint Research Centre and Tukker, 2025, p. 9.

In short, and contrary to some of the EU's own internal diagnosis that 'Europe has shown a remarkable ability to respond to a succession of crises' ([454]), we would argue that the EU's multilevel policy governance structure has often prevented the EU from taking swift, effective policy action and has also made the EU particularly vulnerable to political turmoil. As aptly put by Rhen, current governor of the Bank of Finland and former Commissioner for Economic and Monetary affairs, 'muddling through may prevent you from tumbling down', but it is not enough for the EU any more ([455]).

Considering this situation, there is, in our view an urgent need for a more fundamental reassessment of the EU's multilevel policy governance structure. These would have to follow a number of basic principles: first, the need to focus on outcome rather than on processes in policy making; second, the recognition of the importance of reaping scale advantages in all areas of decision making rather than on cumbersome processes of political integration per se; third, focus on 'making things' rather than primarily on 'breaking things' although the latter might precisely be what is needed when dealing with bureaucracy, multi-level regulation, legislation and decision-making; fourth follow a policy line of pragmatism by clearly advocating the latter as in the case of coalitions of the willing.

In terms of **concrete lines of action**, which could be implemented in the short term, we propose the following to take up the Chinese and US challenge:([456])

- **Position Europe in AI technology for society, industry and science.** Several Member States have launched large-scale national initiatives pertaining to AI technology and its industrial applications. The EU should welcome such initiatives and could act here as an honest broker in a pragmatic and outcome-oriented way, creating momentum for integrated initiatives based on a new 'coalition of the willing', searching for economies of scale and scope, diversification through experimentation and support for integrated new supply chains. Pooling resources can enable and encourage EU-based firms to develop AI products and services, while at the same time accelerating the widespread adoption and adaptation of AI in firms across the EU. In doing so, the EU should focus less on getting the right regulatory framework in place *ex ante* than on allowing experimentation and assessing the impact of the new digital innovations in *ex post* fashion. In parallel, the need for major productivity growth in public services, particularly relevant in the European context, offers major opportunities for new AI products and services focusing on government technology. Proactive policies will also be needed today to manage the major labour market disruptions likely to be triggered by AI not least for university-educated, early career workers[457].

([454]) European Commission, 2025a.

([455]) Rehn, 2020.

([456]) The wording is inspired by Jean-Jacques Servan-Schreiber's 1967 book, where he outlines the risk to Europe of becoming irrelevant in a global market dominated by US multinationals.

([457]) As Brynjolfsson et al. (2025), point out based on US labour statistics: "we uncover substantial declines in employment for early-career workers (ages 22-25) in occupations most exposed to AI, such as software developers and customer service representatives. In contrast, employment trends for more experienced workers in the same occupations, and workers of all ages in less-exposed occupations such as nursing aides, have remained stable or continued to grow". In short, AI appears to disproportionately substitute for new, graduate employees and workers using codified knowledge, including in the words of Brynjolfsson et al. "both the "book-learning" that forms the core of formal education and the insights in digital company data that can be codified

- **Address the EU's innovation gap and science fragmentation.** Member States and the EU have committed themselves to significant investment in defence over the coming years. A substantial part of this investment should be allocated to science and technology development. The European system of civilian-only R & I should be reorganised to reap broader synergies with defence-oriented R & I, promoting dual-use opportunities, increasing the capacity of disruptive technology development and facilitating the emergence of new start-ups focusing on innovations. At the same time – and to strengthen the role of open, independent science in addressing global challenges – the EU should reinforce its science base by pooling national funds for breakthrough fundamental science, positioning itself as a global top science hub to attract international scientists, talent and firms, enhancing cooperation.

- **Connect industrial policy to territories for place-based economic rejuvenation.** The EU has large potential for productivity development in its diverse network of regions and territories. Therefore, it must connect its new industrial policy to bottom-up initiatives in regions, cities and rural communities with a view to increasing productivity in areas where Europe still leads, while incrementally transforming existing industries in all territories that adopt an outcome-oriented approach. Building on bottom-up creativity and endogenous capacities, with a strong focus on governance and institutional capacity building, the next generation of smart specialisation strategies will have to play a central role in Europe's realisation of productivity and competitive sustainability, with a renewal of European solidarity now also including security and the defence of its borders. The EU's diversity has real economic potential for reindustrialisation and productivity growth, if policies combine top-down and bottom-up approaches embracing experimentation and product differentiation, while strengthening local cultural identity.

- **Reap Europe's opportunity in competitive sustainability.** The US administration's current focus on fossil fuels and its partial withdrawal from renewable energy and broader sustainability aims provides a significant opportunity for European industry. The EU must match its strength in environmental technologies with demand for sustainable products and services, through lead markets, while ensuring that EU firms are not disadvantaged through unfair competition (e.g. from China). It should work with a range of policies – including resources, incentives, price mechanisms, regulations, capabilities and opportunities – to induce changes in business models, market signals and consumer preferences. EU investment in energy production and integrated decentralised grids, combined with incentives for a circular economy and urban mining, has become an essential strategy for security and autonomy. The European Green Deal set the direction for connecting EU strategic investment better to bottom-up smart specialisations in regions, cities and rural communities. The costs and benefits of EU policy must be distributed proportionally across social groups and territories.

- **Unite and partner**. **F**irst, enlarging the single market should remain a top priority as argued in the Letta report. US tech firms benefit from huge economies of scale and scope advantages in their domestic markets. By contrast, the EU market is still fragmented, on both the demand and supply

by AI. AI may be less capable of replacing tacit knowledge, the idiosyncratic tips and tricks that accumulate with experience, but which are never digitized." (Brynjolfsson, et al, 2025) For Europe, such a generational-education impact risks undermining the social contract of the welfare state.

sides. Enlarging the Single Market and further strengthening trade, science and innovation cooperation and partnerships with relevant countries and regions in Europe and around the world will increase the competitiveness of European firms, boost economic growth and strengthen Europe's attractiveness but also international leverage and agency. Second, the EU should encourage member states, companies or other relevant actors to form 'coalitions of the willing' or allow smaller countries and regions to act as 'speedboats' to team up to accelerate technological development, take the lead in developing innovation-friendly regulation and reform, and drive strategic investment partnerships (e.g. in defence, mining of critical minerals etc).[458]

Reforms needed – reopening the European debate

The EU's current multilevel governance structure lacks essential further integration elements, such as a European capital market, a European energy union and single regulatory regimes in areas of common strategic interest, as highlighted by Draghi and Letta among others. It also needs simpler governance that constantly asks at what level of governance common challenges are most effectively addressed. How can subsidiarity be reconciled with the current geopolitical context? How should competences be allocated between Member States and the EU to ensure that the Union can effectively compete with China and the United States, respond to rapidly changing circumstances and defend itself, while safeguarding a functioning democracy and driving sustainability? What should the minimal fiscal room for manoeuvre be for the EU as opposed to its Member States? Is there anything one can learn here from the United States or from other economic and political unions? And, more fundamentally, is it still appropriate for the EU to prioritise incremental economic integration, focusing primarily on achieving trade benefits?

This last question becomes particularly relevant at a time when economic development, resilience and well-being on the one hand, and security and defence on the other hand, have become increasingly intertwined and co-dependent. An equally relevant question is how to best combine bottom-up impetus and transformative power (place-based agency) with national and EU-level policies and actions. In short, as argued here, the EU's multilevel policy governance structure has often prevented the EU from taking swift, effective policy action and has made the EU particularly vulnerable to political turmoil. Hence the need for a fundamental reassessment of the EU's multilevel policy governance structure.

The various contributions of the scholars are undoubtedly inspired by and largely aligned with the main messages from the reports coordinated by Mario Draghi on the future of competitiveness and Enrico Letta on the future of the single market, while taking a critical stand on some aspects. However, focusing on the interaction of capitalism with sustainability and democracy, this publication has a broader conceptual scope than Draghi and Letta. It highlights Europe's distinctive combination of social market-based capitalism with sustainability and a well-functioning democracy, within the context of increasing geopolitical pressure on security. As a result, this publication argues that broader and bolder reforms of EU's governance are needed to assert and safeguard the EU's global independence and unity.

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[458] See also Lausberg and Riekeles, 2025.

While the triangular relationship between capitalism, sustainability and democracy is fraught with tensions, it also brings opportunities. Europe – given its social model, integration project and normative power – could forge a path where capitalism is realigned with sustainability and democracy, provided the EU reforms governance, fosters innovation and renews solidarity. For the EU today, the lesson is that, unless it revitalises innovation and maintains social legitimacy, its social market model could drift into stagnation and political instability. But, with reforms, Europe could prove Schumpeter wrong by showing that capitalism, sustainability and democracy can reinforce each other to ensure prosperity, security and well-being.

Lessons to be learnt from the emergence of Germany, the EU's largest Member State

These immediate lines of actions should be accompanied by broader, more fundamental questions and reflections on the future of the European institutional framework, particularly the current multilevel policy governance. Is the latter structure still appropriate for the 21st century and for addressing the new common geopolitical challenges the EU and individual European countries find themselves confronted with? Is it still appropriate to pursue an incremental economic integration process whose focus is mainly on achieving trade benefits? This question becomes particularly relevant at a time when economic development, resilience ([459]) and well-being ([460]) on the one hand, and security and defence ([461]) on the other hand, have become increasingly intertwined and co-dependent. Is the sanctity of subsidiarity in the current geopolitical context still a useful concept in deciding on the allocation of competences between Member States and the European Commission? What should the minimal fiscal room for manoeuvre be for the European Commission as opposed to its Member States? Is there anything one can learn from the United States or from other economic political unions?

We conclude with a broader historical reflection, suggested by Dutch journalist Caroline de Gruyter ([462]), on parallels between the current geopolitical situation and the emergence of Europe's largest country: Germany. As de Gruyter observes, in the Middle Ages, what is now called Germany was a patchwork of autonomous domains, principalities and city states. There were more than 100 such mini-states in total, all sovereign; today they are merely a relic of central Europe's historical and cultural governance diversity. However, from the 17th century onwards, these small states were under pressure. They were surrounded by ever stronger and bigger states and empires. Neighbours, including France, England, Spain, Holland, Portugal and later the Austrian Empire, wielded centralised power, allowing them to collect increasing tax revenue as they conquered more colonies, build impressive fleets and use trading companies to project their power far beyond their borders. The German mini-states were, by contrast, united in what was called the Holy Roman Empire ([463]): a powerless and entrenched entity that could not measure up to its ambitious neighbours, let alone adapt to a changing world. The Holy Roman Empire's main purpose was to keep the peace between the German mini-states. None of these states was willing to cede power to a central authority or put money into communal facilities. While the Holy Roman Empire had beautiful rituals, it was not a state and had no

([459]) Benczur et al., 2023; Heriaud et al., 2025.
([460]) Benczur et al., 2024.
([461]) Tavares da Costa et al., 2023.
([462]) de Gruyter, 2025.
([463]) Voltaire described this empire as neither holy nor Roman nor an empire.

officials, no army and no tax revenue. As a result, these small states were at the mercy of rulers like Napoleon, the Russian tsar or the Ottoman sultan. In the end, the Holy Roman emperor stepped down, preferring to focus on his other empire, the Habsburg Empire, which did have a state, a small army and a functioning bureaucracy. At the Congress of Vienna, in 1814–1815, the Holy Roman Empire ceased to exist ([464]). In many ways, de Gruyter explains, the EU in today's geopolitical environment, with the new autocratic regimes in China, Russia and the United States resembles, the Holy Roman Empire in the 17th century.

The focus should be on improving the agility and simplification of the current European multilevel policy governance framework, including designing new policies addressing Europe's vulnerability, going, if necessary, beyond what was agreed upon in past European treaties. As Ricardo Hausmann (2025)[465] put it in a recent policy pamphlet, ultimately this implies striving for a European identity:

> *To endure as an economic, political, and military force in a world increasingly dominated by continental powers, Europe must complete its common institutions…: a viable state requires a political community. Without a collective "we," taxation feels like extortion, laws are perceived as an imposition by outsiders, and military service becomes difficult to justify. Why contribute, comply, or sacrifice if the beneficiaries are not "us"?... This sense of "us" is not a rhetorical flourish; it is the intangible social scaffolding that supports collective action… The EU has already created a vast internal market and an elaborate – arguably cumbersome – regulatory system. But it has failed to develop a commensurate political identity … Europe cannot achieve strategic autonomy without a central authority able to act on its behalf, and such an authority cannot survive without a well-defined political identity…*

We leave it to the reader to agree with Ricardo Haussman. What is clear is that ultimately, we as Europeans, do not want Europe to become a continent increasingly resembling the Holy Roman Empire in its governance. So let us start the discussion and debate on developing a new, purpose-driven institutional framework, future-proofing the European model.

([464]) The states were incorporated into the German Empire in 1871.
([465]) Hausmann, 2025

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