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EU Competitiveness: Navigating Challenges and Seizing Opportunities

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Transatlantic Economic Relations in a Trumpian World

January 20, 2025 is the formal start date of a Trumpian world. Given the character of Donald Trump and his recent wild announcements ranging from ambitions with Greenland to threatening tariffs on even the closest US allies like Canada, it is anybody's guess what he will do next.

However, one issue that Donald Trump has been consistent about for decades is trade policy. He is the self-declared "tariff man" – nearly 40 years ago, Trump went public with a proposal to tax imports from the perceived main competitor at the time, Japan (CNN, 1987). A second consistency is his disdain for legal niceties like the rules of the World Trade Organisation.

This has understandably created anxieties in Brussels. The EU is the largest exporter in the world, even larger than China. EU exports account for about 25% of EU GDP, much more than for the US. The US is also the largest export market for the EU. All this seems to suggest that Europe has much to fear on the trade front.

However, upon closer inspection, the Trump II Administration could, if handled well, present more opportunities than threats for Europe.

Trade policy is one of the few areas in which the EU can act as one entity. The key question now is how it should react to the threat of a barrage of tariffs from the US. Economic analysis shows that reacting to a foreign tariff with a tariff of your own only inflicts further damage. The two rationales for a tit-for-tat response strategy are traditionally that it might deter the other side from starting a tariff war and that it is necessary to show domestic interest groups who are at the losing end of foreign tariffs that their interests are being taken into account.

This traditional analysis might have been useful in the past, when countries used the tariff instrument sparingly to protect specific industries. However, this time things are really different. Part of the Trumpian obsession with tariffs is that the US is losing out in global trade because other nations have much higher tariffs. Whether or not the US has lower tariffs (especially after the ones Trump himself instituted) than the EU or China can be disputed. What matters is that Trump has the impression that EU tariffs are 50% higher than those of the US (Trump, 2023). Higher tariffs for the EU are meant to give the impression of a high value, but the 50% is the relative difference between an average of 3.5% for the US and 5% for the EU (Puccio, 2015). These low numbers were generally accepted as a starting point when, not so long ago, the EU and the US were negotiating the transatlantic investment and free trade agreement (TTIP).

Given the fixation of Trump on reciprocity, it might still be worth it to offer to lower some of the remaining EU tariffs, notably its 10% import duty on cars (European Commission, 2024). Brussels should offer to reduce this rate to the 2.5% charged by the US (Congressional Research Service, 2021), or potentially even zero.

EU leaders might have to swallow their pride. But they should follow the example of the approach used by the predecessor of Ursula von der Leyen, who successfully defused a transatlantic trade war during the first Trump Administration (Gros, 2018).

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If this is done, Europe could actually benefit substantially from a second Trump Administration increasing tariffs on imports from China. Tariffs of 60% on all Chinese imports (with only 10%-20% for other countries) have been mooted during the election campaign (Cass, 2024). What tariffs Trump will impose is anybody's guess. But one element is clear. While Trump disdains Europe and thinks that it should pay for the American security umbrella, the general hostility towards China is much stronger and bipartisan. It is thus likely that in any case, tariffs on China will be much higher than tariffs on Europe.

EU producers would be among the main beneficiaries of high China tariffs because these tariffs would give them an advantage over the Chinese competition in the largest market in the world. This can already be seen in the US automobile market, where EU companies are doing well (ACEA, 2024) given that Chinese cars have effectively been shut out of the market already. Moreover, if the Trump II Administration favours internal combustion engine cars, it would offer some respite to the European automotive industry, whose weak point is battery electric vehicles (Chinese electric vehicles are subject to a 100% tariff in the US).

Another element making US tariffs on EU goods less threatening is that European manufacturers have large investments in the US. This applies in particular to the European (mostly German) producers of high quality cars. US tariffs on EU cars would make these US-based operations more profitable. This would admittedly be at the expense of EU employment, but the higher profits from US operations would at least somewhat offset the pressure on profitability European manufacturers are experiencing in the Chinese market.

European policymakers should thus keep cool heads and concentrate on defusing unavoidable tensions instead of posturing about tit-for-tat retaliation.

Keeping transatlantic economic relations on an even keel would achieve little if many other countries were to follow the US example. About 100 years ago, the US made the Great Depression even worse by increasing its tariffs, thus starting a global tariff war that led to a spiraling down of global trade. However, this time is likely to be very different. Most other countries have no interest in following the US example, as it does not make sense for the many small open economies that form the backbone of global trade. Even China has little incentive to impose tariffs on imports from Europe or other countries. It is thus likely that the tariff war Trump looks forward to winning will remain mainly a bilateral US-China affair. However, although these are the two largest economies in the world, trade between them accounts for only a small percentage of global trade. US imports of goods from China amount to about US \$500 billion, equivalent to 0.5% of global GDP and 2% of global trade (World Bank Group, 2025; WTO, 2024).

EU policymakers should thus stop bemoaning the death of the rules-based trading system and instead concentrate on the mundane task of defusing the trade conflict with the US while remaining open to the rest of the world.

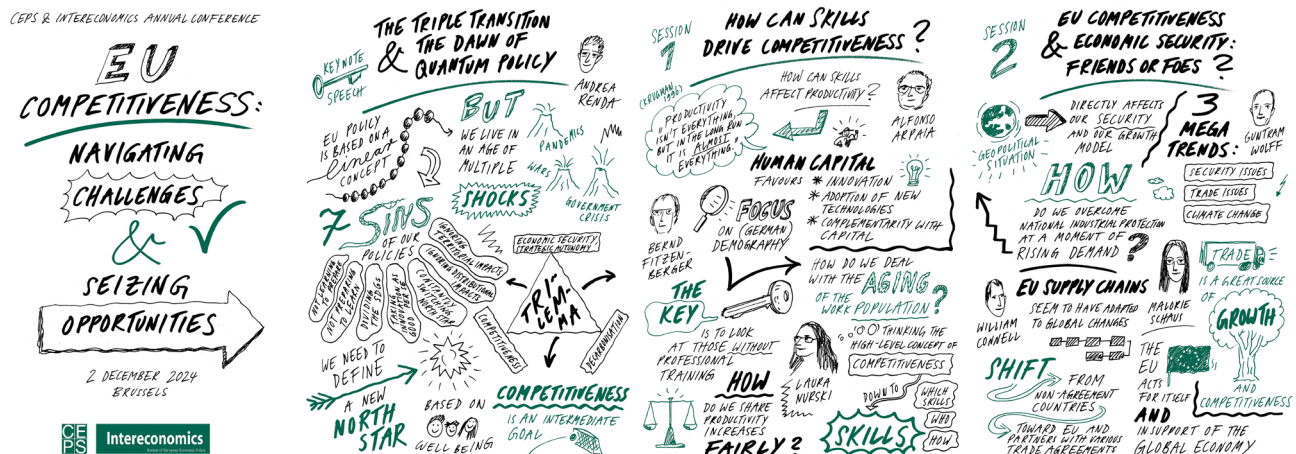
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EU Competitiveness: Navigating Challenges and Seizing Opportunities

This Forum features contributions from the participants in the 2024 joint annual CEPS-Intereconomics conference.



The Triple Transition and the Dawn of Quantum Policymaking

Andrea Renda, Centre for European Policy Studies, Brussels, Belgium.

How to Ensure a Skills-Based Future for European Competitiveness

Laura Nurski, Centre for European Policy Studies, Brussels, Belgium.

Cinzia Alcidì, Centre for European Policy Studies, Brussels, Belgium.

How Skills Can Drive Competitiveness

Alfonso Arpaia, European Commission, Brussels, Belgium.

Labour and Competitiveness in Germany: Embracing the Transformation to Boost Productivity

Bernd Fitzenberger, Institute for Employment Research (IAB), Nuremberg; and Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany.

Christian Kagerl, Institute for Employment Research (IAB), Nuremberg, Germany.

Boosting the European Defence Industry in a Hostile World

Juan Mejino-Lopez, Bruegel, Brussels, Belgium.

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External Vulnerability Index: A Tool to Assess Trade Weaknesses

William Connell Garcia, European Commission, Brussels, Belgium.

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The EU Trade and Investment Policy: Navigating Challenges and Seizing Opportunities

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Andrea Renda

The Triple Transition and the Dawn of Quantum Policymaking

As we enter a new year, it is crucial to reflect on the challenges of the past and reconsider the foundations of economic and public policy. The past year has raised significant doubts for economists and policymakers, prompting the need to rethink their approaches to effective policymaking – precisely the mission of think tanks and policy journals.

The role of scholars and policymakers has shifted dramatically over the last five years. When the European Green Deal launched in 2019, the prevailing approach adhered to the Tinbergen principle – that we could focus on one major policy goal without having to consider other objectives while working towards it. Decarbonisation, for example, was treated as an independent objective, with less focus on potential trade-offs. However, the reality of modern policymaking is far more complex. Trade-offs are now an unavoidable and immediate concern for policymakers, making it essential to move beyond simplistic, goal-driven frameworks.

From linear policymaking to quantum policymaking

Traditional economic policymaking has long been guided by principles such as cost-benefit analysis, GDP growth and market failure correction. While these methods have shaped regulatory approaches worldwide, they often fail to account for distributional and territorial impacts. Economists have typically monetised costs and benefits, calculated net present values and selected policy options based on maximised efficiency. However, this narrow focus is increasingly insufficient in an era of unpredictable macroeconomic shocks and global governance complexities.

One major limitation of traditional policymaking is its reliance on a single future projection – extrapolating the

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present into the future without accounting for potential disruptions. Policies are often designed for long-term implementation without adequate mechanisms for adaptability. Additionally, EU policymaking has traditionally taken a broad, union-wide perspective, often overlooking the specific territorial impacts of regulations. While recent impact assessments have acknowledged these concerns, many legacy approaches persist within the European Commission.

The preference for cost-benefit analysis remains strong, largely because it provides a controlled and quantifiable framework for decision-making. However, alternative approaches, such as multi-criteria analysis, offer more nuanced and adaptive strategies for evaluating policy decisions. Over time, shifting paradigms have recognised the increasing complexity of economic reality. A singular focus on GDP growth or economic efficiency no longer suffices as the sole objective of policymaking.

The global policy landscape has already begun to evolve. Many countries have adapted the regulatory impact analysis model, originally developed under the Reagan Administration, to fit their national contexts. This gradual shift signals a broader recognition that economic policymaking must go beyond rigid efficiency models and incorporate more comprehensive, adaptable frameworks. The challenge ahead lies in integrating these new approaches into mainstream policy discussions, ensuring that economic decision-making reflects the multifaceted realities of governance in a rapidly changing world.

The implementation of regulation as a blueprint for public policy has expanded globally, influencing legislative processes in parliaments and congresses. At the EU level, cost-benefit analysis – originally designed for federal regulation in the United States – was applied to directives such as the Bolkestein Directive and asylum-related legislation. From the early 2000s to around 2015-16, there was a clear methodological mismatch, as tools were used in contexts for which they were not designed.

Goals-based strategies

A major shift in public policy theory has been the shift from purely expanding economic growth, as per the Washington Consensus, to a goal-based strategy. Previ-

ously, the focus was on reducing costs and driving GDP growth through domestic markets, institutions, technology and innovation. However, the Millennium Development Goals and later the Sustainable Development Goals (SDGs) underscored the need for broader objectives beyond growth alone.

Despite this, the current rhetoric still largely reflects Washington Consensus principles. The 2023 State of the Union speech by Ursula von der Leyen, for instance, focused on cost minimisation and growth, with limited mention of decarbonisation. This reflects a broader uncertainty about the direction of policy.

The shift towards goal-based policymaking aims to create a clear vision, followed by specific actions to achieve it. The EU has attempted this approach, albeit inconsistently. The Lisbon Strategy, launched with the ambitious goal of making Europe the most competitive knowledge-based economy, was later revised pragmatically to focus on growth and jobs. The Europe 2020 strategy faced challenges due to financial and sovereign debt crises, leading to its gradual decline. In 2015, the SDGs provided a new framework, followed in 2019 by initiatives such as the Green Deal and Digital Decade.

However, setting broad policy goals without accounting for evolving realities can be problematic. The SDGs were intended to be integrated and indivisible, yet EU policies like the Green Deal have selectively prioritised certain elements while neglecting others, such as strong institutions, territorial and social impacts, and human capital. This selective approach creates gaps in the broader vision of sustainable development.

As policymakers now work to redefine medium-term goals, competitiveness has emerged as a potential central focus. However, questions remain: Can competitiveness be reconciled with multiple policy objectives? Should it be the sole priority? As of December 2024, there is no clear consensus among policymakers and scholars.

Navigating uncertainty: Rethinking policymaking to prepare for future shocks and crises

Anticipating future shocks is crucial for effective policymaking, yet this consideration remains absent from traditional paradigms. In an era that some optimists call a “polycrisis” and pessimists term a “permacrisis,” policymakers must adapt to uncertainty rather than rely on rigid long-term plans. The challenge ahead lies in developing policy frameworks that remain flexible and responsive to an unpredictable global landscape.

In the face of unpredictable shocks, policymakers must consider the cascading effects that could follow, even if these outcomes are difficult to foresee. A core practice in foresight is imagining various potential futures and the consequences of such events, which may range from catastrophic to more manageable scenarios. One pressing question is whether to prioritise preparation for the worst-case scenarios, despite their lower likelihood, in order to reduce risk and safeguard against potential disasters.

For instance, Cass Sunstein, a prominent figure in cost-benefit analysis and former regulatory czar under the Obama administration, has proposed a strategy to avoiding disastrous scenarios. In his book *Averting Catastrophe*, Sunstein (2021) argues for adoption of a “maximin” approach, which focuses on protecting against the most severe outcomes, even if their probability is low. This approach contrasts with traditional cost-benefit analysis, which typically weighs risks according to their likelihood. In policymaking, we may need to move beyond a single “baseline” future and instead consider alternative scenarios. A policy option that works best in the most likely future may perform poorly if unexpected shocks occur. Therefore, a second-best policy, which is less optimal in a linear scenario but better suited to alternative futures, might prove more robust in the long term.

Experts in risk analysis suggest that we are entering an era where shocks – whether environmental, digital or geopolitical – are becoming more frequent and interconnected. The notion of a single, isolated crisis is being replaced by a new normal in which multiple crises occur simultaneously, such as conflicts stretching from the Middle East and Syria to Ukraine. Just over a year ago, we could not have predicted the level of instability we now face, making long-term forecasting even more challenging. In planning for 2028, for instance, many expected stability, yet in retrospect, the past few years have been marked by unpredictable events, including pandemics and geopolitical upheaval.

The unpredictability of the future is further emphasised in the realm of technological innovation. Consider the rapid evolution of artificial intelligence (AI); when the European Commission first worked on the AI Act in 2020, the landscape was vastly different, with no mention of advanced models like GPT. By the time the legislation was finalised in 2023, new technological advancements had already reshaped the conversation. The full implications of AI developments by 2026 remain uncertain, highlighting the challenges of crafting legislation that can keep pace with rapid change. While some regula-

tory bodies, such as the European Medicines Agency, have demonstrated an ability to adapt, this flexibility is not widespread across the Commission.

Which “North Star”?

Ultimately, the future is inherently unpredictable, and relying on linear extrapolation of the present is a flawed strategy. Policymakers must account for a range of potential futures and be prepared for surprises, embracing adaptive approaches that allow for flexibility and resilience in the face of uncertainty.

Over the course of the von der Leyen Commission, I decided to track how often the European Commission changed its strategic direction. I focused on official documents, such as the industrial policy review from May 2021, which revealed two different definitions of key concepts within the same document (European Commission, 2021). This highlights the shifting priorities within the Commission, which began with a focus on strategic autonomy and resilience, particularly during the pandemic. With the onset of the war in Ukraine, the focus shifted towards economic and comprehensive security.

Originally, the Commission framed its efforts within the context of sustainable development, addressing it across multiple policy areas such as regulation, industrial policy and foreign affairs. However, despite these ambitions, none of these objectives have been fully realised. More recently, discussions have centred around the green, digital and social transitions, but the dominant focus remains on stripping the term “competitiveness” of its qualifications, such as “sustainable competitiveness” or “competitive sustainability”.

In discussions with several experts, I asked whether the concept of competitiveness in the EU includes resilience or sustainability. Despite widespread interest in decarbonisation as a crucial aspect of future competitiveness, the Commission has not made significant progress on this front. The ultimate goal, I believe, should be focused on well-being – specifically people, planet and prosperity – as outlined in EU treaties, with these being intermediate goals subject to change over time.

In policymaking, we often encounter what is referred to as a “trilemma”. One key example is the challenge of achieving competitiveness alongside decarbonisation and economic security. As economist Dani Rodrik (2000) suggests, it may be possible to achieve two of these goals, but not all three simultaneously. Mario Draghi’s (2024) response was to propose a hefty budget – €800

billion annually – to potentially make this work. However, such resources are unlikely to be available given the pressing need to allocate funds to other priorities, especially in the age of Trump 2.0.

As we look ahead, a different policy mix will likely emerge at the EU level. In summary, the key challenges we face are evident. First, we have not yet learned to prepare for future shocks, nor have we built adaptive policies. The focus on SDGs has led to fragmentation, as seen with the replacement of the Green Deal with the Clean Industrial Plan, which has not fully delivered on its promise. Additionally, there has been an overemphasis on innovation as an end in itself, rather than innovation that aligns with our ultimate goals.

Moreover, the frequent shifting of strategic priorities makes it difficult to maintain a clear direction. In a metaphorical sense, changing course every 15 minutes is like navigating without a consistent North Star. The Commission has also failed to address the distributional and territorial impacts of its policies, something that many now recognise as a mistake.

As we enter an era where economic decisions are increasingly complex, the assumption of simple, linear choices no longer holds. Economics, as traditionally understood, assumes that individuals’ well-being is independent of others, but in reality, well-being is interdependent. This shift in thinking, rooted in the works of economists like Joseph Schumpeter and Friedrich Hayek, signals a need for a more nuanced approach to public policy. The coming years will demand more flexible and adaptable strategies, as the old models of economics and policymaking no longer suffice.

Economics is the only social science that fails to directly integrate the social element into its methodology. In practice, policy impacts are far more complex than often assumed. Each community or territory responds to rules and policies in different ways, influenced by local governance and community organisation. This became evident during the COVID-19 pandemic, where similar restrictions had vastly different effects depending on how they were implemented at the local level.

Rethinking policy monitoring: Towards quantum policymaking

Understanding these varying impacts requires continuous monitoring. To ensure policies are achieving their intended outcomes, the European Commission includes evaluation sections in its policies. However, there is a need for a more serious, granular approach to policy

monitoring, ensuring that data is produced and used effectively to enable policy learning.

This is where “quantum policymaking” comes into play. In much the same way that quantum physics explores entanglement and superposition, policy impacts are entangled and require constant observation. Policies cannot be understood in isolation; they need to be monitored over time to assess whether they are delivering the desired results.

In terms of policymaking, the EU must transition to goal-based frameworks. While the 2030 agenda is still ongoing, there is little discussion about what comes next. The SDGs were finalised ten years ago, but it remains unclear what the 2040 agenda might look like. Although the 2030 agenda is not yet fulfilled, the focus must shift towards well-being as the North Star, with intermediate goals aligned to this vision. These goals must be constantly monitored and adjusted if necessary, acknowledging that policy impacts are dynamic and interdependent.

The shift towards goal-based policymaking contrasts with the traditional focus on market failures. Rather than waiting for markets to fail, we need to proactively pursue legislative goals, guided by multi-criteria analysis and trade-off assessments. While cost-benefit analysis is still useful for certain regulatory acts, it is not suitable for goal-based policymaking, where criteria and goals should align.

The traditional Tinbergen principle no longer applies. Instead, modern policymaking deals with multiple trade-offs, alternative futures and the need for agile, dynamic and multi-stage approaches. The focus should be on place-based innovation and policy-centred governance, considering the unique needs and circumstances of different regions.

Take, for instance, industrial policy. The concept of Industry 4.0, which has been central to European policy discussions for years, focuses on digital technologies in factories and supply chains. However, it often overlooks the social and environmental dimensions. A shift towards Industry 5.0, which emphasises human-centred, sustainable and resilient industrial transformation, is necessary. This approach not only considers technological advances but also prioritises jobs, the environment and broader societal impacts.

The traditional approach to industrial transformation often overlooks crucial factors like environmental impact, governance and territorial concerns. As we deepen the

integration of digital technologies in industries, it is no longer acceptable to consider these as afterthoughts. Our policymaking must fully account for the trade-offs involved in industrial change, ensuring that sustainability and societal impacts are central to the process.

For nearly a decade, expert groups within the European Commission, particularly the expert group on the economic and societal impact of research and innovation (ESIR) in DG Research and Innovation, have been producing papers on the economic and societal impacts of research.¹ These discussions have led to a broader understanding of competitiveness – one that includes resource and material efficiency and stays within planetary boundaries. This view has gained attention, particularly within the European Commission and the Council, as a more comprehensive way of thinking about competitiveness. It aims not just at economic growth but at well-being-related outcomes, aligning with the EU’s treaty-based goals.

To support this shift, new indicators are being developed to measure competitive sustainability, with contributions from institutions like Cambridge (Cambridge Institute for Sustainability Leadership, 2024) and the Joint Research Centre (Benczur et al., 2025). The goal is to establish a more multidimensional view of competitiveness, one that prioritises well-being rather than narrow economic indicators like income. This perspective draws on the utilitarian foundations of economics, which originally focused on well-being but have since been skewed towards income as a proxy – a choice that has been contentious.

A further example of this shift is the concept of mission-oriented policymaking. This approach, gaining traction in the UK under the Starmer government, focuses on setting broad, sectoral goals. In the field of AI, for example, the EU has defined criteria for “trustworthy AI”, which includes respect for fundamental rights and orientation towards societal and environmental well-being.

The challenge, however, is that many AI systems today, including GPT models, do not meet these criteria. To ensure AI development aligns with societal goals, policymakers must incorporate these trade-offs into both design and regulation.

¹ https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/esir_en#documents.

The territorial dimension of policies

Finally, the territorial dimension of policy is becoming increasingly important. Research on the geography of discontent, led by figures like Andrés Rodríguez-Pose, explores how different regions across the EU can achieve innovation and competitiveness based on their unique capabilities. This reimagining of innovation policy focuses on the specialisation of each region, considering its potential for well-being alongside economic development.

As technologies become more sophisticated, their production tends to concentrate in geographical hubs. For emerging fields like quantum computing, success depends on a combination of infrastructure, skills and well-developed financial markets. Addressing these regional disparities is critical to ensuring that innovation benefits all areas of society, not just the hubs where advanced technologies are concentrated.

In Europe, the development of advanced technologies, particularly AI, has become increasingly geographically concentrated. Four main hubs – London, Paris, Eindhoven and Munich – dominate the AI landscape, with London leading by far. However, these hubs do not collaborate as closely as they should. Instead, they often look to American institutions rather than working together within Europe. One promising exception is the emerging partnership between Belgium and the Netherlands, which could potentially create a future European Silicon Valley, driven by companies like imec and ASML. However, policymakers have not yet fully realised the potential of these collaborations, as evidenced by the limited funding support from the European Commission and national governments for key industrial players like imec.

This geographic concentration also has political implications. For example, in the last French election, areas that voted for far-right parties largely corresponded with regions outside these technological hubs, underscoring the political discontent in regions outside the main urban centres. These patterns reflect the fact that large portions of the economy and territory have been overlooked by policymakers, leading to protests from groups like truck drivers and farmers who feel excluded from the formulation of policies.

This issue is particularly evident when we model climate and environmental policies. Such models must go beyond basic environmental impact assessments and consider territorial and distributional effects. They must also align with Europe's technological frontier. The challenge

today is to balance these multifaceted goals, which is something scholars, researchers and policymakers need to support in order to address the complexities of modern industrial policy.

Redefining competitiveness: A long-term vision for sustainable and inclusive growth

The long-term goals of public policy are not merely about competitiveness, a point emphasised in economic theory and public policy manuals. Rather, competitiveness should be seen as an intermediate goal that leads to broader objectives, such as the preservation of various forms of capital, including environmental and social capital. Some countries, like New Zealand and Sweden, have already defined such long-term goals with specific indicators. In the EU, there is growing interest in extending the time frame for policy evaluation, moving beyond short political cycles to consider a couple of decades. This would allow for more robust and sustained policy development.

Once these long-term goals are set, the EU can backcast to shape its agenda, creating industrial transformation pathways. These pathways will need to be flexible, ready to adapt as realities change. As Europe works towards these goals, it must prepare for future shocks and ensure that policies can be adjusted when necessary.

Mission-oriented innovation will play a key role in this process. The EU must blend its competitiveness fund and other resources to support large-scale projects with clear societal and economic objectives. This approach requires careful planning, including stress testing and regular updates to situational awareness. While this framework is straightforward in theory, its practical implementation will be challenging, as it requires aligning multiple instruments towards common goals – a task that has not always been achieved.

Looking ahead, Europe can learn from recent developments in the US, such as the Inflation Reduction Act, which incorporates employment-related conditionalities alongside environmental goals. This legislation has set a precedent for integrating social objectives into industrial policy, something that the EU should consider as it moves forward.

Finally, understanding the economic geography of Europe will be crucial. Not every region can be expected to become a technological hub like California, and policies must recognise the unique capabilities of each territory. The concept of regional innovation engines,

similar to the US approach, could help foster development in all parts of Europe, rather than concentrating innovation in a few select areas. This approach would take into account the legacy and specialisation of different regions, enabling each to contribute to Europe's broader goals.

In conclusion, Europe must embrace a more proactive and coordinated approach to industrial policy, balancing competitiveness with well-being and sustainability. By learning from both successes and failures, the EU can avoid the pitfalls of replicating models that may not be suitable for the given context. Economic theory and public policy must rise to meet the challenge, ensuring that Europe remains competitive while securing a sustainable and inclusive future.

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Laura Nurski and Cinzia Alcidi*

How to Ensure a Skills-Based Future for European Competitiveness

Competitiveness is a multifaceted concept that can be applied both at the firm and country level. In its essence, it refers to an ability to compete in (global) markets for goods or services. But competing for market share can only ever be a means to an end. For a firm, the end goal of being competitive is to ensure its survival or to earn higher profits. For countries, the end goal of competitiveness is to ensure prosperity and high living standards for its citizens.

Competitiveness must not be fully equated with productivity, even though they are linked. Productivity is an absolute or standalone measure – the more productive you are, the more output value you create with given inputs. Competitiveness is a relative measure, calculated in comparison to others, i.e. the more competitive you are vis-à-vis others, the better you are at attracting customers, gaining market share and generating monetary value.

Over time, the concept of competitiveness has grown to include sustainability as well, thereby expanding from a short-term ability to compete to a long-term ability to prosper. Indeed, it is now recognised that being competitive can undermine future competitiveness when it leads to the overuse of natural resources. Attracting market share now might decrease the availability of necessary resources for producing and attracting market share in the future.

Likewise, Mario Draghi (2024) argues in his recent report (aptly named “The Future of European Competitiveness”) that strengthening competitiveness should preserve so-

cial inclusion as well. This aligns with the idea that a country’s competitiveness is also about ensuring prosperity and high living standards for its citizens.

Bridging the firm-level perspective (of attracting market share and being profitable) with that of the macro-level (of creating prosperity for citizens) generates – on the surface – a peculiar discord: at the firm-level, labour is an input to competitiveness, while at the macro-level labour consists of the citizens who should benefit from competitiveness. This is a form of cognitive dissonance that must be resolved in order to inform coherent policymaking – something that Draghi attempts to address.

When presenting the report, Draghi emphasised that competitiveness can no longer be equated with measures such as unit labour cost, a metric often used to compare the EU with other countries, such as the US or China. While a lower unit labour cost suggests that a country can produce more cost-effectively, implying higher competitiveness in global markets, it leads to a narrow focus on minimising labour costs to sell at lower prices.

However, aiming for low labour costs is only one of several ways in which firms (or countries) can compete on the global market. A low-price strategy, or *operational excellence*, relies on reducing input costs, streamlining operations and reducing waste in time or materials. With this view, labour is an input to production and a cost that must be minimised. Such a firm strategy – when applied on the macro scale – seems hard to reconcile with inclusive and sustainable competitiveness.

Other competitive strategies put less focus on cost reduction (Treacy & Wiersema, 1993). A strategy of *product leadership*, for example, aims to attract customers not by offering the lowest price but by offering the best product, with the newest features and highest quality. Companies such as Apple and Tesla compete with this strategy, and their customers happily pay the extra price for their high-end products and complementary services.

Likewise, *customer intimacy* is a strategy that offers the most customised service and personalised experiences. Amazon and Zalando are known for their personalised recommendations, broad and diverse product offerings and premium services such as fast shipping and free returns. Similarly, Dutch e-commerce player Coolblue is not the cheapest in the electronics market but its buying guides,

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after-sales support and multichannel (online-offline) experiences have still ensured its rapid growth.

The idea of alternative competitiveness strategies that put higher value on human capital and innovation at the firm level can be translated at the macroeconomic level, aligning with Draghi's argument.

There are three main reasons why this should be the case. First, in many global markets, EU companies cannot compete on labour costs with low-wage countries. This is a competition that the EU will inevitably and always lose. Second, competing on the lowest price contradicts the very essence of a social market economy, which is central to the EU project. A key EU goal is to ensure that economic growth is widely shared and social justice is maintained. Very often, low prices are the result of low labour standards or poor working conditions. Finally, in a modern, advanced economy, sustainable growth is not driven by being the cheapest – it is driven by innovation. For innovation-driven growth, labour is not just a cost, it is human capital that generates returns and requires investment.

Taking this view, skills, which define labour and human capital, are a central asset for competitiveness. Put another way, expanding the notion of competitiveness to include a wider variety of firm-level competitive strategies (beyond low labour costs) offers concrete starting points to inform skills strategies and policies. This allows for specific skill categories to be identified that can support diverse competitive strategies as well as push innovation forward.

From a macroeconomic viewpoint, shifting away from a concept of competitiveness centred on costs – in particular labour cost – implies acknowledging that the concept of successful comparative advantage (e.g. associated with cheap labour) is more complex than the one described by traditional Ricardian models (Costinot & Donaldson, 2012). The likelihood of developing a comparative advantage in advanced sectors like aircraft manufacturing is not merely based on the availability of low-cost labour, as it might be in sectors like coffee production. Instead, factors such as existing industrial capabilities (e.g. producing cars) are crucial. Introducing economic complexity as a new paradigm implies that a particular good's successful production requires that various elements are in place (Balland et al., 2022).

While skills and human capital fit well in this approach, they are not standalone drivers of competitiveness. A highly skilled workforce, isolated from other enabling factors, will not automatically enhance productivity or drive new production strategies. Several complementary factors must exist, including institutional and infrastructural capacity, the availability of resources and local supply chains, and last but not

least cross-industry interactions. The concept of relatedness – which refers to the interconnections between different economic activities – is especially powerful in explaining economic diversification and technological upgrading.

Adopting this framework means that, when transitioning from the macro concept of competitiveness to the micro-level strategies of firms, a deep understanding of sectors and their interrelations is crucial for addressing the challenges raised above.

Sectors as the playing field for skills and innovation

An economic complexity approach can offer insights into how different regions in Europe specialise, while also guiding policymakers on where the potential for growth lies and what is needed to unlock it (Balland & Renda, 2023). By examining the existing capabilities within specific regions, it is possible to map out sectors that are primed for growth and innovation. This led to the introduction of the Smart Specialisation Strategy in 2010 as part of the Europe 2020 Strategy for Growth and Innovation (Balland et al., 2019). It has since become a cornerstone of the EU's cohesion policy.

The goal is to enable member states to focus on the development of industries in regions that already hold some capabilities and target resources effectively, guiding regions to concentrate on sectors where they can achieve the greatest competitive advantage by building on existing strengths. Once these trajectories are clear, the corresponding innovation strategies and resulting skills needs for each sector and region can be determined.

Industrial policy can play a crucial role in this context. In line with the economic complexity paradigm, the demand for specific skills is shaped not only by firms' competitive strategies but also by industrial policies at the local, national and EU levels, which, in turn, influence the sectors and activities that are prioritised.

Furthermore, the interaction between sectors and regions, as well as the connections between regions themselves, are key. For instance, if a region is identified as a hub for renewable energy technologies, it becomes essential to understand its relation to industries that provide supporting services, such as installing and maintaining energy solutions or access to raw materials. And of course, the availability of a workforce skilled in energy storage, grid management and sustainable engineering becomes crucial.

By steering industrial development, policy also shapes the demand for the relevant skills. Approaching development with these interconnected factors in mind, educa-

tion and training programmes can be designed to equip workers with the competencies necessary to drive innovation and growth. This alignment ensures that the labour market supports strategic industrial choices, rather than being influenced solely by external pressures.

This vision aligns with the EU's broader goals of social inclusion and regional cohesion. Prioritising innovation-driven models that emphasise product leadership and customer intimacy can spur the creation of high-skilled jobs in regions that need them the most. Ultimately, this approach has the potential to rejuvenate economies hit by deindustrialisation and foster sectors that are critical to the EU's competitiveness and strategic autonomy. As the green and digital transitions accelerate, demand for specialised skills is growing, particularly in fields like renewable energy and artificial intelligence (AI). A well-thought out, smart specialisation policy can help regions build on their unique strengths while addressing the evolving needs of the labour market, thus promoting competitiveness, ensuring an equitable distribution of the benefits of innovation and preparing the EU workforce to meet future challenges.

Skills for inclusive competitiveness

Draghi puts forward several policy proposals for bridging existing skills gaps, though his report remains high-level on the types of skills needed for inclusive competitiveness. The skills that he specifically highlights that should be reinforced are digital skills, green skills, specialist skills (including STEM), transversal/soft skills and managerial skills.

While some of the above skill categories are well defined (such as digital or STEM), others could stand to benefit from being more precisely conceptualised, especially the so-called transversal or soft skills. These are sometimes referred to as the skills that uniquely qualify humans, that cannot be automated and that make humans complementary to technology, such as in AI-complementary skills. While evidence suggests that personality traits, goals, motivations and preferences are all important determinants of economic success (Heckman & Kautz, 2012), there is currently very little agreement on the precise definition of "soft skills" (Marin-Zapata et al., 2022).

Considering which types of human activities could support competitive strategies like product leadership and customer intimacy allows us to zoom into these skills in more detail. Descending from firm-level strategies to worker-level skills requires a stopover at a middle-level analytical construct, namely the level of organisational structure.

Table 1
The link between competitive strategies, organisational structures and skills

Strategy	Structure		Skills needs (examples)
	Teams	Jobs	
Operational excellence (low cost, large volume)	Functional and hierarchical division of labour	Simple jobs	Higher-level skills mostly needed at the top of the hierarchy, not at the bottom
Product leadership (innovation, R&D)	Cross-functional product-oriented teams	Complex jobs	Technical skills, problem-solving, teamwork and collaboration
Customer intimacy (customisation, responsiveness)	Cross-functional market-oriented teams	Complex jobs	Communication, client service and information processing

Source: Authors' own elaboration.

Management science has come to understand that organisational success depends on aligning an organisation's structure with the strategic goals of the business – often referred to as "structure follows strategy" (Chandler, 1969). Organisational structure is the organisation's design, including its hierarchy, various departments and reporting relationships. It follows then that this structure shapes the activities, tasks and decisions that must be executed in a job, which in turn determines the types of skills needed. In short, as structure follows strategy, skills need to follow structure.

Table 1 summarises the link between competitive strategies, firm structures and skills needs. In the low-cost strategy, high-skilled managers and process engineers standardise work processes and meticulously design jobs that require little decision-making or skill. Think, for example, about the Fordist factories during the Scientific Management revolution. In these settings, skills needs are high at the top of the hierarchy but low at the bottom, putting downward pressure on wages and increasing inequality.

A product leadership strategy, however, requires cross-functional teams dedicated to specific products. The interdisciplinary collaboration within these teams facilitates the development of new products, new features, higher quality and new production methods, thereby advancing innovation. These teams are made up of complex positions that require not only technical skills but also problem-solving, teamwork and collaboration.

Similarly, a customer intimacy strategy requires cross-functional teams dedicated to specific market segments,

whether defined by region, demographic or behavioural patterns. Such teams make sure that specific market segments are serviced in a personalised, responsive and customer-centric way. Again, these complex jobs require skills like communication, client service and information-processing.

By working through this chain of thought from strategy to structure to skills, two implications emerge. First, one can be more specific about exactly which types of skill categories can support which types of competitive strategies. Second, the skills required for the latter two strategies are more supportive of shared prosperity and human flourishing than the skills required for a purely low-cost strategy.

This leads us to formulate three key questions, namely: How can EU companies and governments determine what their skills needs are, especially future ones? Who needs to upgrade their skills or acquire new skills? And, finally, how can all this be achieved?

Strengthening strategies for closing the skills gap

By expanding the notion of competitiveness beyond low labour costs, we have clarified that innovation is the linchpin between competitiveness and skills. We have also explained that economic complexity theory requires this innovation to be organised at the sectoral level through smart specialisation. The EU needs the skills that can support these competitive strategies in smartly specialised regions that build on innovation in product and service design.

The general categories of skills that support these innovation strategies are shown in Table 1. What remains is to identify *what* specific skills the EU labour market needs, *who* should be acquiring those skills and who makes that decision, and *how* the development of such skills should be pursued, considering both firms and public policies.

What: Identifying skills needs through skills intelligence

Skills intelligence refers to strategically using data on workers' abilities to understand and anticipate labour market trends. It involves collecting, analysing and applying insights on skills, as well as identifying current workforce proficiencies and emerging trends. According to Draghi, this is crucial for diagnosing problems and determining how to address them. In recent years, both the public and private sectors have invested in improving skills intelligence to support both organisational agility and economic competitiveness.

For a comprehensive skills intelligence system to support firms, individuals and the economy, three areas need fur-

ther development: skills taxonomies, data sources and skills anticipation methods (Alcidi, 2024).

Taxonomies

A key challenge is establishing a coherent categorisation of skills and tasks. At the European level, theoretical advancements have been made by the Joint Research Centre and Eurofound (Fernández-Macías & Bisello, 2022; Rodrigues et al., 2021). In practice, multiple skills taxonomies still exist, complicating efforts to combine different data sources. This is particularly relevant for the green and digital transitions, where skills for new jobs are not yet fully understood. In the green transition, the lack of clear definitions of "green jobs" and "green skills" has led to a consensus favouring the term "skills for the green transition" (Urban et al., 2023).

Similarly, the impact of generative AI on the EU labour market is complex, as it affects not only repetitive but also intellectual tasks (Nurski & Ruer, 2024). While generative AI is unlikely to replace jobs entirely, it will replace or augment certain tasks, making it crucial to identify the specific skills that remain relevant and those that can complement machines. The concepts of AI-complementary skills, transversal skills and soft skills also need to be given better definitions before data can be collected.

Data sources

New data collection methods, such as web-scraped big data, are transforming skills intelligence. Online job postings provide insights into labour demand, while CV platforms capture parts of the labour supply. These sources enable faster and more cost-effective analysis than traditional methods, like surveys, which are often delayed. However, internet-based data are not collected for statistical purposes and can include irrelevant information or biases.

Academics agree that new sources should complement and be integrated with traditional ones for a more complete analysis. A key challenge for integrating data sources is the underdevelopment of a unified common language for skills. Coordinating data linkage efforts and improving procedural standards would enhance labour market analysis, supporting better insights into skills development and employment outcomes.

Skills anticipation

The ultimate objective of skills intelligence is to map current skills in the demand and supply of labour and anticipate future needs. For businesses, educational systems, training providers and policymakers, skills anticipation

represents a key tool for making informed decisions by projecting tomorrow's most in-demand skills and preparing for change.

There are different ways to approach such skills anticipation (Nurski et al., 2024). *Forecasting* projects future employment trends based on historical data, assuming past trends will predict the future. *Automation risk analysis* focuses on assessing which tasks in current jobs are susceptible to automation. *Strategic foresight* develops multiple future scenarios based on key drivers of change, helping policymakers to create robust strategies adaptable to different outcomes. *Discourse analysis* examines public debates and narratives to understand the perspectives of different stakeholders on the future of work. Finally, *backcasting* starts by setting a desired future goal and working backwards to identify the necessary steps to achieve that goal, providing a structured path for long-term policy development.

All five of these methods can be combined to create comprehensive future anticipation strategies.

Who: Focussing on adults, SMEs and managers

Transformations brought about by the digital and green transitions demand more frequent and systematic updates or upgrades of skills, and in some cases, complete reskilling. A growing number of individuals will no longer remain in the same job or perform the same tasks throughout their working lives. Education systems alone are therefore insufficient to address these changes, which affect everyone from low-educated, low-skilled workers to those who are highly educated and skilled. However, the different groups face different challenges.

Adult and lifelong learning

Analysing the results of the Adult Education Survey reveals that time and money are the primary barriers to training but these barriers vary across demographic groups (Güner & Nurski, 2023). Women often cite family obligations, while health and age are significant barriers for older individuals. Low-educated people frequently point to other reasons, such as not meeting training prerequisites, lacking internet access or negative past learning experiences. Policymakers must address these barriers to increase training participation among low-skilled individuals.

However, the most common reason for not participating in training is a lack of interest, particularly among low-educated individuals, who often do not see the need for it. Lifelong learning, a relatively new concept for most peo-

ple, requires a significant shift in mindset, even among the highly skilled. Without a supportive organisational culture, this shift is difficult to achieve. Organisations must create environments where continuous learning is encouraged and seen as integral to both personal and professional growth, making learning a key part of daily operations rather than an isolated activity. Crucially, this should be recognised as a way to nurture human capital and value for the organisation, which ultimately contributes to competitiveness.

SMEs

The shift towards lifelong learning is particularly challenging for small companies, which often lack the resources to support continuous employee development. This is crucial, as there are around 23 million small companies in the EU, accounting for over 50% of jobs. Employees in these smaller firms participate less in adult learning than those in larger companies, making them more vulnerable to market changes.

A 2020 CEPS study (European Commission et al., 2020) identifies four key challenges that hinder small and micro companies from investing in adult education and training: financial and time obstacles, informational deficiencies, constraints in the supply of training specific to these companies, and market failures affecting investment in adult education and training. In micro companies, the lack of time and financial resources is especially pronounced. Even when financial resources are available, employees taking on multiple roles cannot participate without affecting operations. Human resources (HR) management and skills development are often handled by the owner-manager, who balances these responsibilities with operational and managerial matters, and in practice struggles to organise training activities for their staff.

Managers

The Draghi report highlights the critical role of management in effectively deploying human capital within organisations. Management's ability to identify, reward and retain talent influences employees' motivation to acquire new skills. However, managerial skills go beyond incentivising training. First, managers control training budgets and decide which programmes employees can attend, often in line with learning and development frameworks developed by HR departments. Second, they make strategic decisions that guide organisational activities that create tasks for workers. Third, managers design jobs, assigning tasks and responsibilities to their employees. This job design not only dictates the skills required in vacancies but also creates opportunities for

on-the-job learning. By assigning tasks slightly beyond an employee's usual scope, managers enable skills development without employees needing to take time off work. Thus, managers play a central role in shaping skills needs, development and utilisation in the workplace, directly influencing both individual growth and organisational success.

How: Policy instruments for addressing underinvestment in training

Labour is a form of capital that requires continuous investment, especially in the context of the twin digital and green transitions. While the need for skills investment is not new, the pace and complexity of these transitions make it more crucial than ever for firms and individuals alike. Companies will play a critical role in making sure their employees have the right skills to support the company's competitiveness and success. However, the central question is whether the market alone can provide the necessary levels of training to support these transitions. The answer is likely no, due to several significant market failures that inhibit optimal training investment (Brunello & De Paola, 2004).

Underinvestment by firms

One of the key market failures lies in the *free-rider problem*, particularly in firms' investment in transferable, non-firm-specific skills. When companies finance training that enhances skills that are transferable across the industry, they risk losing their investment when employees leave for other employers. This creates an underinvestment in training, as firms are reluctant to bear the costs when other companies might benefit. Incomplete contracts, which cannot fully guarantee a return on training investment, exacerbate this issue.

Policymakers can and should intervene in several ways: first, by implementing institutional frameworks like dual learning systems, apprenticeships or payback clauses that secure returns on training. Second, they can reduce the financial burden of training through grant schemes or tax incentives. Third, mandatory sectoral training funds or firm-level training budgets can ensure that all companies invest equitably in workforce development.

Underinvestment by workers

Market failures also inhibit workers from investing in their own training. *Credit constraints* can prevent workers, and even more so the unemployed, from financing their skills development, an issue that can be mitigated through individual learning accounts or adult education grants. Work-

ers also face *signalling problems*, where their skills and qualifications may not be visible to potential employers.

Policymakers can address this by promoting skill accreditation systems and micro-credentials that provide transparent and verifiable skills records. Additionally, *imperfect information* about the skills needed in the labour market or available training opportunities hampers workers' ability to make informed decisions. Public employment services, improved online recruitment websites (private and public) and more sophisticated matching technologies can help workers navigate these gaps. Furthermore, workers may hesitate to invest in training due to *low expectations for new job opportunities*, particularly in areas with limited regional, sectoral or occupational mobility.

Addressing these market failures is essential not only for individual skills development but also for broader economic growth. As argued above, a well-trained workforce can drive innovation and improve competitiveness, especially in a rapidly changing global economy. Without adequate training, both workers and firms will struggle to adapt to new technologies and shifting market demands.

By fostering environments where continuous learning is supported, policymakers can and should ensure that European companies remain competitive, and their workers are equipped with the skills necessary for both current and future jobs. Skills development is a crucial factor in driving innovation and sustaining economic resilience, making it essential for long-term growth and global competitiveness.

Conclusions

Closing the skills gap requires clarity on what skills are needed, who needs them and how they should be developed. Skills intelligence can shed light on the what, but it needs better taxonomies, integrated data sources and varied anticipation methodologies. The who includes a diverse range of groups: adults needing to undertake lifelong learning, workers in SMEs with limited access to training and managers who shape skills development within their teams. Finally, the how should also include policy measures that overcome underinvestment in training by workers and firms due to market failures. Aligning these efforts will ensure that skills development fuels innovation, strengthens economic resilience and enhances competitiveness in a rapidly changing world.

Importantly, these efforts will not happen in a vacuum. The demand for specific skills is shaped by firms' competitive strategies, which are in turn influenced by policies and

regional contexts. A well-designed smart specialisation strategy can help regions leverage their unique strengths while addressing the dynamic needs of the labour market.

This approach promotes competitiveness, a fair distribution of the benefits of innovation and prepares the EU workforce to confidently meet the challenges of tomorrow.

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Alfonso Arpaia*

How Skills Can Drive Competitiveness

In *The Competitive Advantage of Nations*, Michael Porter (1990) argues that a nation's primary goal is to ensure rising living standards for its citizens. Achieving this goal hinges on the productivity with which capital and labour are utilised, which, in turn, relies on industries' capacity to innovate. This capacity is shaped, among other factors, by resources like skilled labour and infrastructure. Paul Krugman (1990) wrote in his book *The Age of Diminished Expectations*, "Productivity isn't everything, but, in the long run, it is almost everything" and emphasised that "a country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker" (p. 11).

Over the last decade, Europe has experienced strong employment growth, with an annual job expansion averaging around 1%, compared to just 0.3% between 2002 and 2013 (Figure 1). After 2014, employment growth became a key driver of economic performance, while productivity growth weakened. Employment rates for the 20-64 age group have risen to over 75%, nearing the 2030 target of at least 78% set in the European Pillar of Social Rights Action Plan. While this has supported income per capita growth post-pandemic, it is likely that because of ageing this mechanism will provide less support in the future. Productivity growth, therefore, becomes increasingly critical. Unfortunately, productivity growth in Europe has slowed significantly over the past 20 years.

As noted in Mario Draghi's (2024a, 2024b) report on *The Future of European Competitiveness*, the EU's persistently weak productivity growth – especially compared to other

advanced economies like the United States – is a major challenge, undermining competitiveness, job creation and economic resilience. Skills development is a key lever for reversing this trend. As stressed by President von der Leyen (2024) in her political guidelines, labour and skills shortages are among the many "structural brakes" on EU competitiveness. Promoting the diffusion of digital technologies, boosting investments, and establishing a Union of Skills focusing on adult and lifelong learning are among the strategic objectives of the new Commission.

This paper discusses how skills can contribute to productivity growth. First, it explores how improving the skills structure of the population – i.e. in the quality of human capital – can boost labour productivity growth, particularly in comparison to the US. However, these gains, may not be self-sustaining if they occur mostly in mature industries. Second, it examines the impact of human capital on productivity growth. The good labour market performance of the last decade has been characterised by persistently high labour and skills shortages. These shortages do not only constrain labour growth but may also delay or suspend critical investments with negative effects on productivity growth. Third, it explores how labour shortages influence total factor productivity (TFP) growth. Finally, the paper concludes with policy implications, focusing on the EU framework to support skills development.

Workforce upskilling and its contribution to productivity growth: Insights from growth accounting

The relationship between skills and productivity is extensively documented in the literature on economic growth. In Solow's exogenous growth model, productivity is determined by labour, capital and the efficiency with which these inputs are combined within the production process. Key drivers include capital deepening (more capital per worker), shifts towards a more skilled workforce and improvements in TFP, which reflect overall production efficiency as well as technological progress. A skilled workforce not only optimises the use of existing capital but also facilitates resource shifts from low- to high-productivity industries. This dynamic highlights the critical role of educational attainment and skills development in driving productivity growth.

Figure 2 shows the key drivers of hourly productivity growth, highlighting the EU's well-documented decline in productivity growth – both in absolute terms and relative

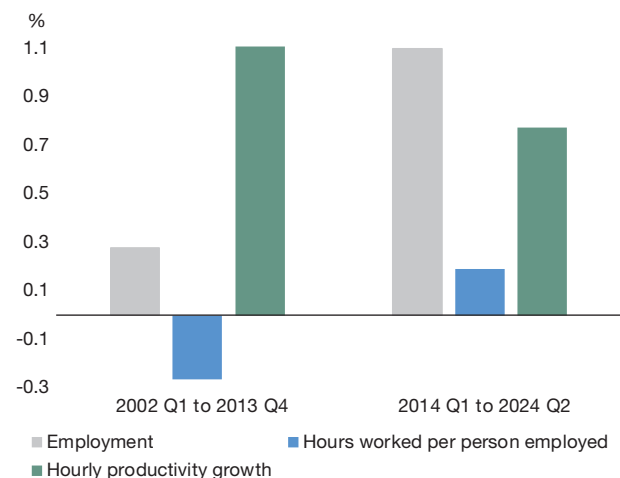
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Figure 1
Hourly productivity and employment growth (annual averages over the period)



Source: Eurostat, national accounts.

to the US. This decline is predominantly explained by declines in TFP growth and capital accumulation. A notable but often overlooked factor is the stronger contribution of labour composition changes to productivity growth in the EU compared to the US.¹ After the global financial crisis, rising unemployment among low-skilled workers

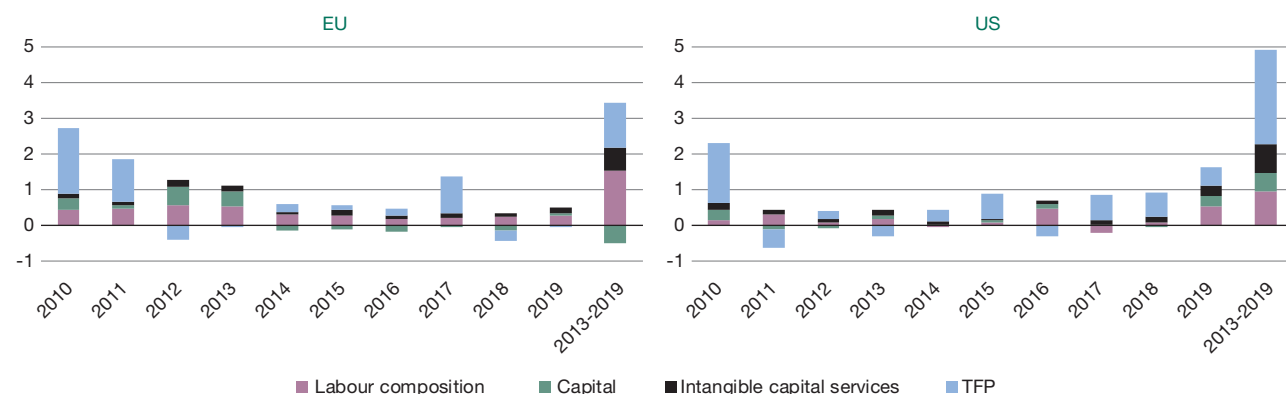
1 In EU KLEMS, the labour composition is calculated by weighting the total hours worked by different categories of workers based on their marginal productivity (the value of the services provided), approximated with their share in total compensation (Jorgenson & Griliches, 1967). This method accounts for both labour quantity and service value.

raised the average skill level of the employed, boosting productivity growth, as shown in Figure 2 (see Ward & Zinn, 2024). This trend persisted in subsequent years. Between 2013 and 2019, changes in labour composition contributed 1.5% to EU productivity growth compared to just under 1% in the US, consistent with studies highlighting its stable contribution in driving EU productivity growth (e.g. van Ark, 2017). Notably, during this period, human capital accounted for about 50% of hourly labour productivity growth in the EU compared to 20% in the US (Figure 3).

The EU-US difference in the contribution of labour to productivity growth largely stems from disparities in educational attainment. According to OECD data, in 2023, 50.7% US adults (aged 25 to 64) had tertiary education, compared to only 37.3% in the EU. As EU educational attainment continues to improve, the importance of the labour composition is likely to remain high. This highlights the importance of policies supporting workers' capabilities through education, training and skill development.

The contribution of labour composition varies across industries. Figure 4 shows the contribution of workforce skill upgrades to productivity growth in the EU and the US between 2013 and 2019. For the EU, notable contributions to industry-specific productivity growth (above 1%) are observed in several industries such as manufacturing of furniture; professional, scientific and technical activities; wholesale and retail trade; basic metals; and the manufacturing of wood, paper and food products. These industries, though varying in digital intensity, are primarily mid-tech sectors (Fuest et al., 2024), where Europe outperforms the US in both capital deepening and TFP growth.

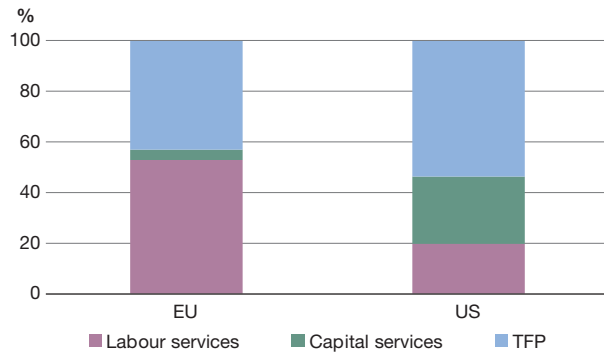
Figure 2
Labour productivity growth and its driving factors in the EU and the US
 in percentage points



Note: Due to data availability, the EU refers only to 11 member states: AT, BE, DE, DK, ES, FI, FR, IT, NL, SE, UK.

Source: EU KLEMS.

Figure 3
Contribution to hourly labour productivity growth in the EU and the US, 2013-2019



Note: Due to data availability, the EU refers only to 11 member states: AT, BE, DE, DK, ES, FI, FR, IT, NL, SE, UK.

Source: EU KLEMS.

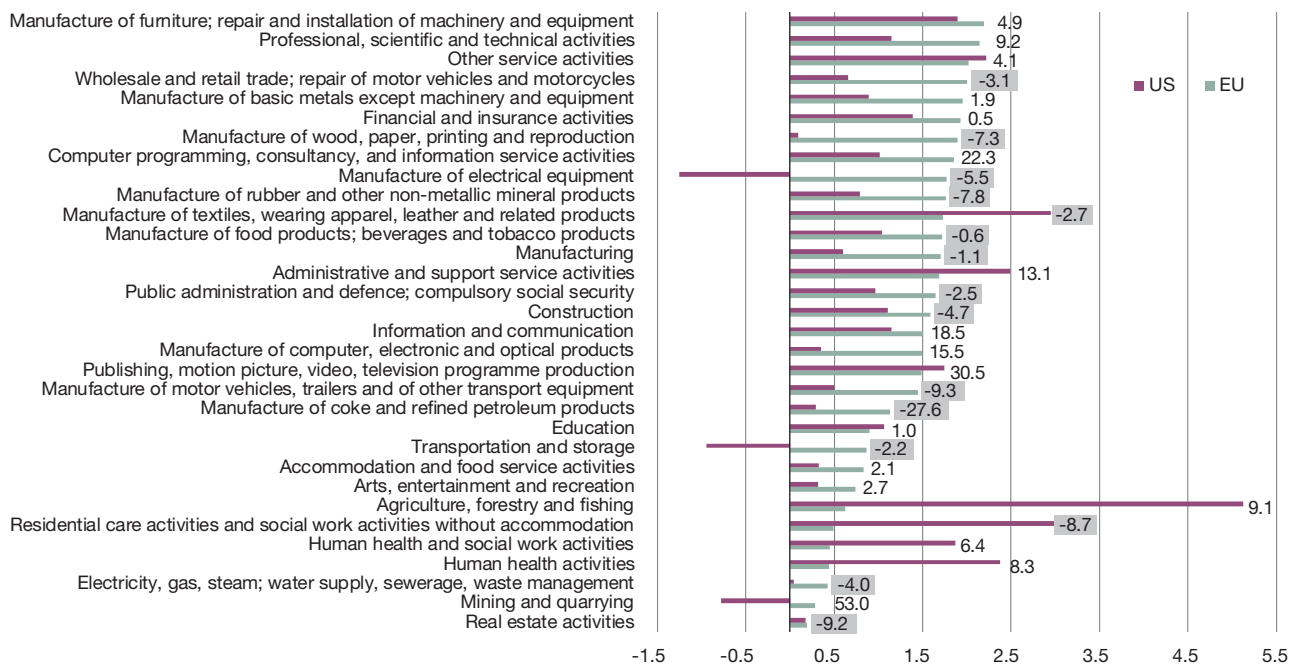
Conversely, in industries critical for the digital transition such as computer programming and information and communication (encompassing IT services and computer manufacturing), the upgrading of human capital remains insufficient to close the productivity gap with the US. Moreover, in digital-intensive sectors such as publishing,

motion picture and broadcasting, and administrative support, the US advantage is further amplified by the change in the composition of labour. This suggests that the EU's sectoral allocation of skills does not fully meet the needs of a dynamic and competitive economy. While improving educational attainment is essential, it alone is not enough to ensure sustainable productivity growth. Achieving this requires robust measures to facilitate the reallocation of resources, including skilled labour, across sectors.

The role of skills extends beyond the direct impact of more productive workers

Skill improvements not only make workers more productive but also enable a more efficient use of existing capital and facilitate the adoption of new production technologies. As highlighted by endogenous growth models, human capital is crucial for fostering innovation (Romer, 1990) and driving the adoption and diffusion of new technologies (Nelson & Phelps, 1966). A skilled workforce complements capital, particularly intangible assets such as R&D and software development, while generating positive externalities such as knowledge spillovers, which fuel growth in skill-intensive industries (Ciccone & Papaioannou, 2009). Moreover, skilled workers adapt

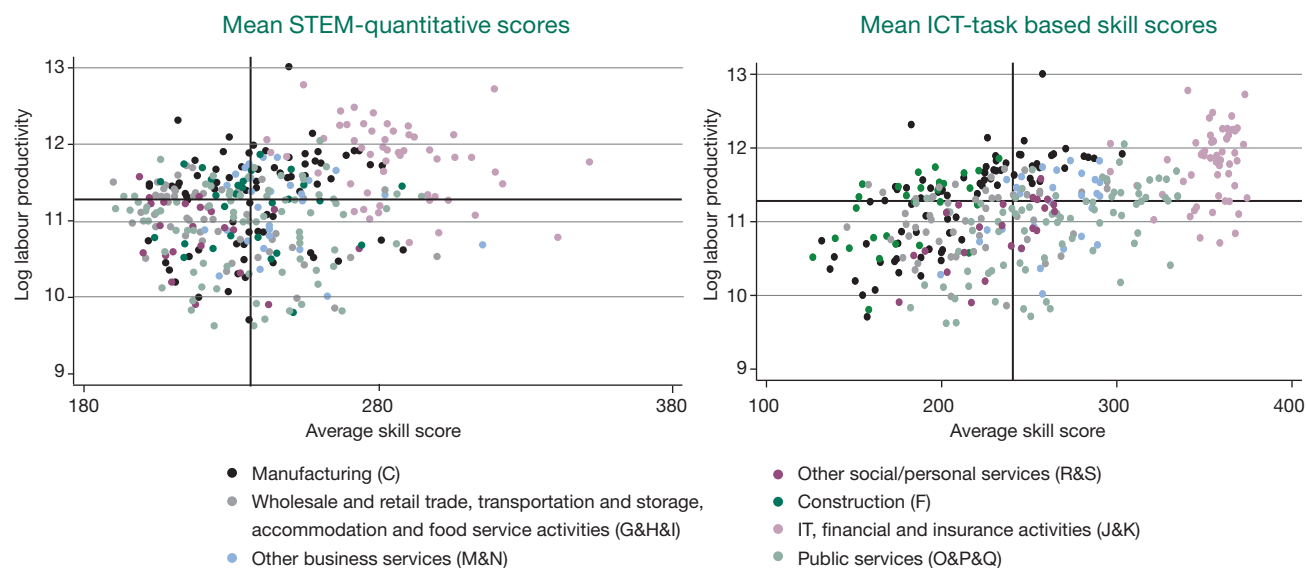
Figure 4
Contribution of changes in labour composition to labour productivity growth in the EU and the US, 2013-2019



Note: The numbers represent the growth of labour productivity due to capital deepening and TFP growth.

Source: EU KLEMS.

Figure 5
STEM and ICT skills and productivity for non-managerial workers in OECD countries



Note: Figures are based on country-specific averages by industry. Industries are colour-coded by industry clusters to aid the reader. Each marker represents a country industry marker. The horizontal and vertical lines represent the median value of productivity and STEM/ICT skill scores. Countries included in the analysis: AUT, BEL, CAN, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ISR, ITA, JPN, KOR, LTU, NLD, NOR, NZL, POL, SVK, SVN, SWE, TUR and first wave of USA. However, some industries are missing for EST, ISR, JPN, NZL and TUR (also KOR when estimating ICT skill scores). The sample consists of 343 observations.

Source: Cammeraat et al. (2024).

more rapidly to technological changes, acquire new competencies, and perform emerging tasks effectively. This adaptability enhances their contribution to TFP growth, underscoring the broader role of an educated workforce in fostering innovation and enabling the successful adoption of cutting-edge technologies.

The empirical evidence corroborates the positive impact of skills on TFP growth. Productivity is typically higher in countries with better education and training systems, and more educated and healthier workforce (Zymek, 2024). Innovation rates are also higher in more skill-intensive firms (Hall, 2013). The OECD (2021) reports that high-skilled employees account for about a third of the workforce in the most productive firms, more than twice as many as in the least productive firms. Several studies show that ICT-led productivity gains are more likely in firms that employ a relatively more skilled workforce, with a strong correlation between ICT-related human capital and firm productivity (Hagsten et al., 2016). The introduction of new practices and organisational changes also generate large increases in productivity in firms with a higher share of skilled workers (Biagi & Parisi, 2012). The role of soft skills is also particularly important. For France, Guadalupe et

al. (2022) find that TFP grew significantly in sectors with a high concentration of occupations requiring strong mathematical and social skills. In contrast, it declined in sectors where a large share of occupations involved low task intensity in these skills. Recent research also links higher technical and specialised skills (e.g. acquired in science, technology, engineering and mathematics (STEM) fields) to better productivity outcomes (Cammeraat et al., 2024). Figure 5 illustrates a positive relationship between STEM and ICT skill scores and labour productivity, with a large dispersion across country-industry pairs.

To assess the importance of skills upgrading, Table 1 presents the results of a panel regression examining the relationship between TFP growth and educational attainment for a panel of EU26 member states from 2009 to 2023. The findings show a significant positive correlation between TFP growth and the share of the population with tertiary education, even when accounting for the impact of TFP growth in the US, which is regarded as the global productivity frontier. The impact of educational attainment on TFP growth remains consistent across various model specifications. The estimated effects have substantial implications given the disparities within the EU and the EU-

Table 1
The impact of educational attainment and educational outcomes on total factor productivity growth

Panel a								Panel b		
Dependent variable TFP growth	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Dependent variable TFP growth	(8)	(9)
Educational attainment (-1)	0.22*** (0.03)	0.22*** (0.04)	0.29*** (0.05)	0.30*** (0.05)	0.29*** (0.05)	0.27*** (0.04)	0.25*** (0.04)	Educational attainment nine years earlier	0.15*** (0.04)	0.18*** (0.05)
TFP growth in the US		0.53*** (0.05)	0.58*** (0.20)	0.66*** (0.20)	0.6*** (0.20)	0.6** (0.2)	0.70*** (0.19)	TFP growth in the US	0.59*** (0.19)	0.66*** (0.19)
Log(TFP(-1))	-15.9*** (4.2)	-15.8*** (4.7)	-19.0*** (4.5)	-19.1*** (4.4)	-17.5*** (4.4)	-18.0*** (4.6)	-17.3*** (5.01)	Log(TFP(-1))	-12.5*** (3.86)	-13.4*** (4.34)
								Change in adult participation in learning in the four weeks before the survey (-3)	0.22** (0.095)	
								Participation rate in education and training (-1)		0.05* (0.025)
								Country fixed effect	Yes	Yes
PISA variables										
Mean score in mathematics (-1)			0.04*** (0.02)				0.04*** (0.02)			
Mean score in reading (-1)				0.05*** (0.01)						
Mean score in science (-1)					0.02* (0.01)					
Mean score in mathematics, the EU relative to the US one year earlier						0.006 (0.08)				
Mean score in mathematics, the EU relative to the US nine years earlier							0.23*** (0.08)			
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes			

Notes: Panel regression on 26 member states over the period 2009-2023. Panel-corrected standard error. * significant at 10%, *** significant at 1%.

Source: Author's own estimates based on AMECO for TFP growth and the OECD PISA for the average scores in science, mathematics and reading.

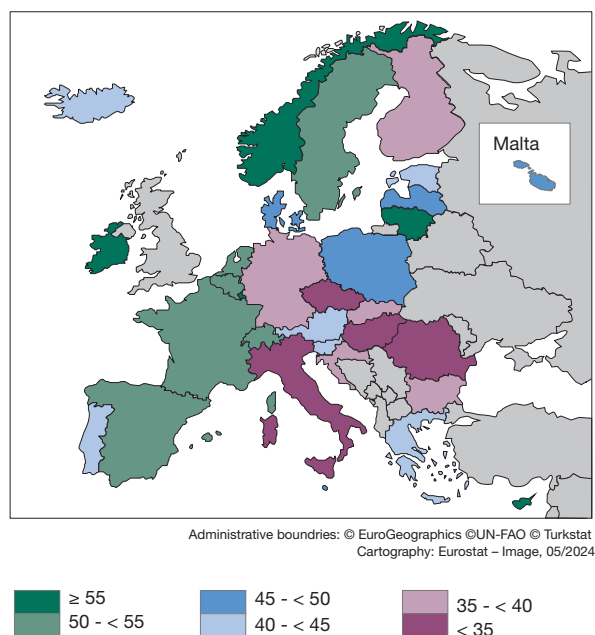
wide target of achieving a tertiary education attainment rate of at least 45% of 25- to 34-year-olds by 2030.² The supply of human capital varies considerably across member states (Figure 6). As of 2023, only 18.6% and 21.6% of the population aged 25-64 had attained tertiary education in Romania and Italy, respectively, compared to 54.5% in Ireland and 49.4% in Sweden. These disparities are even more pronounced among younger cohorts: for the 25-34 age group, the gap between the highest-performing country (Ireland) and lowest-performing country (Romania) reaches an outstanding 40.2 percentage points (pps).

² Council Resolution on a strategic framework for European cooperation in education and training towards the European Education Area and beyond (2021-2030) 2021/C 66/01.

Low participation in formal education significantly affects the logical-analytical and cognitive skills of the adult population. Countries with lower attainment levels underperform in PIAAC (Programme for the International Assessment of Adult Competencies) assessments of literacy and numeracy skills, limiting workers' potential productive capacity. For example, increasing the lowest tertiary attainment rate in the EU to match the highest level (a 36 pps rise) could result in a 7.9% increase in TFP growth. Between 2010 and 2023, Italy and Romania reported the smallest increases in tertiary attainment rates, at just 5 pps and 6.8 pps, respectively. In contrast, countries such as Belgium, Czechia, Greece, Spain, Croatia, and Hungary, achieved increases of around 10 pps. This smaller rise could potentially enhance TFP growth by 2.2 pps. For Italy, such an improvement would represent nearly

Figure 6
Tertiary education attainment, 2023

Percentage of population aged 25-34



Note: 2030 EU-level target is 45%.

Source: Eurostat, Education attainment statistics.

a tenfold increase in its average annual TFP growth over the same period (0.2%). This analysis highlights the critical importance of policies aimed at expanding access to higher education and fostering the development of skills closely aligned with labour market demands, particularly in countries with lagging attainment levels.

Increasing the years of education of the employed is necessary but not sufficient, as improvements in the level of education need to be effectively accompanied by advances in the quality of education. The PISA (Programme for International Student Assessment) survey, which assesses the proficiency of 15-year-olds in reading, mathematics and science, reveals significant disparities in educational performance across countries. Estonia leads the EU in all three dimensions, with Ireland also standing out as a top performer. Table 2 reveals significant heterogeneity in PISA scores across countries, with a strong rank correlation between mathematics and science scores (0.8) and between science and reading scores (0.8). However, the weaker correlation between mathematics and reading proficiency (0.6) suggests that these two core components of human capital are somewhat distinct, likely reflecting differences in school curricula and teaching methods.

Table 2
Mean score in PISA, 2022

	Mathematics	Reading	Science
EE	510	511	526
NL	493	459	488
IE	492	516	504
BE	489	479	491
DK	489	489	494
PL	489	489	499
AT	487	480	491
CZ	487	489	498
SI	485	469	500
FI	484	490	511
LV	483	475	494
SE	482	487	494
LT	475	472	484
DE	475	480	492
FR	474	474	487
ES	473	474	485
HU	473	473	486
PT	472	477	484
IT	471	482	477
MT	466	445	466
SK	464	447	462
HR	463	475	483
EL	430	438	441
RO	428	428	428
CY	418	381	411
BG	417	404	421
US	465	504	499

Note: Drops in PISA scores exceeding the average are marked in grey; improvements in PISA scores are highlighted in green.

Source: OECD.

The findings suggest that proficiency in one domain (e.g. reading) aids but it does not necessarily guarantee similar proficiency in others (e.g. mathematics), underlining the need for balanced curricular improvements to strengthen all aspects of educational quality. Table 2 illustrates that, with few exceptions (marked in green), proficiency in mathematics, reading and science has declined across all member states, with some (marked in grey) experiencing declines greater than the EU average. This deterioration in the quality of human capital may have negatively affected total productivity growth.

Columns 3 to 7 of Table 1 also account for the quality of the education systems as measured by PISA scores. These scores assess 15-year-old students and are not di-

rectly linked to the current human capital. Therefore, their impact on productivity growth typically emerges after five to ten years (Eurostat, 2024). Moreover, the positive correlation between PISA and PIAAC scores for the same generation suggests that student ability is a reliable predictor of adult test performance (Égert et al., 2024). Thus, PISA scores for individuals aged 20+ serve as a meaningful proxy for current human capital quality.³

In all specifications, the effect of the tertiary attainment rate consistently shows a significant positive effect on productivity growth. Proficiency in reading, mathematics and science also positively impacts productivity growth, but their effects are not jointly significant due to the correlation between themselves. A 58-point increase in the mean score in mathematics – the gap between the median and the minimum score in Table 1 – would raise TFP growth by about 2 pps. This coefficient remains similar in the specification with the score in reading. However, since the gap between the lower and the median score is larger (94 points), the marginal effects are higher: raising the reading proficiency of 15-year-old students from the lowest to the median score would boost TFP growth by nearly 5 pps. Similarly, an equivalent improvement in the mean score in science would increase TFP growth by about 1.5 pps.⁴ Finally, relative student performance also matters: a 10 pps increase in the mean score of EU countries relative to the US would result in a 2.3 pps rise in productivity after nine years.

These estimates do not account for the potential productivity gains from a more skilled workforce, as skills acquired through formal education take time to fully impact productivity. Investing in training and adult lifelong learning allows workers to adapt to evolving skills demand and helps employers to bridge gaps between required and available skills. This underscores the importance of education and training in driving productivity growth both within and across countries. While adult participation in education and training has increased in most member states, it remains far below the target set by the EU Action Plan of the European Pillar of Social Rights, which aims for at least 60% of adults to be in training annually. As of

2022, only two countries met this target, while the EU average lagged significantly behind at 39.5%.⁵

The Adult Education Survey (AES) reports participation rates in education and training for only five waves (2006, 2007, 2011, 2016 and 2022), limiting its use in regression analysis. Consequently, the EU Labour Force Survey (LFS) measure of participation rate in education and training over the last four weeks, available annually since 2000, is used to evaluate the relationship between adult learning and productivity growth. Robustness checks are conducted using the participation rate from the AES, assuming a constant rate between surveys.⁶

Columns 8 and 9 of Table 1 present estimates that evaluate the effect of adult learning on TFP growth. In both specifications, adult participation in education and training is positively associated with productivity growth. Specifically, an increase in the rate of change of the share of individuals aged 25 to 64 who received education and training over the past four weeks is estimated to raise TFP growth by 0.22%. However, this effect is not immediate, as it takes three years to materialise. The estimate implies that if the change in the share of adults participating in education and training had increased at the same pace as observed during the 2009-2023 period (i.e. 0.4 pps), productivity growth would have risen by 0.1 pp. Column 9 presents estimates of the impact of an increase in the participation rate in adult learning based on the AES. While the point estimate is less precise, it remains statistically significant at the 10% confidence level. It implies that a 10 pps increase in adult participation in education and training is associated with a 0.5 pps rise in TFP.

The effect of labour and skill shortages on productivity

Labour shortages persist across sectors and occupations, driven by structural shifts predating the pandemic.⁷ These changes stem from evolving occupational and skill demands fuelled by the digitalisation and the transition

3 The tertiary attainment rate may depend on the past quality of the education system. To account for this endogeneity, regressions were estimated factoring out the impact of PISA scores nine years earlier on the tertiary attainment rate. The adjusted attainment rate has a lower effect but remains statistically significant at the 1% level (0.2 for mathematics and reading score and 0.3 for science).

4 The gap between the lowest and the median score is higher than for mathematics (77) but the coefficient capturing its effect on TFP growth is lower (see Table 1).

5 Countries that achieved the target were Sweden (66.5%) and Hungary (62.2%).

6 The LFS indicator yields lower adult learning participation rates than the AES (European Commission, 2024b). In 2024, the Employment Committee Indicators Group endorsed the AES (excluding guided on-the-job-training) for monitoring EU adult learning targets, with a potential shift to LFS data to be reconsidered in 2025.

7 In certain sectors, such as healthcare and transport, poor working conditions emerge as a significant structural factor contributing to labour shortages; see section 7 of chapter 2 in the Employment and Social Developments in Europe 2023 report (European Commission, 2023a).

to environmental sustainability (Dorville et al., in press).⁸ Existing jobs are changing, new ones are emerging, and skill requirements are shifting, increasing demand for both specialised technical expertise and adaptable transversal skills (Draghi, 2024). Ageing further exacerbates shortages by reducing the labour supply and potentially hindering workers' capacity to adapt to technological advancements.

Skill shortages present a major obstacle to the EU effort to boost labour productivity growth. In innovative and high-tech sectors, the demand for skilled professionals is outpacing supply, as education and training systems struggle to keep pace with industry needs. Rapid technological advances further widen this gap by requiring specialised knowledge. These shortages are more likely to arise in innovative firms and sectors, where they can cause project abandonment, delays or even an outright inability to pursue innovation due to the lack of qualified personnel for R&D or the application of new technologies (OECD, 2024).

According to the European Skills and Jobs Survey (Cedefop, 2022), over eight in ten jobs demand at least basic digital skills, and almost seven in ten workers need basic or moderate digital skills. The survey also reveals that half of adult workers need to develop their digital skills, yet less than one-third undertook digital training during the 2020-2021 period.

Shortages are more pronounced in high-skill occupations (OECD, 2022, 2024). The *Employment and Social Developments in Europe 2023* report highlights a lack of specialised skills, particularly in STEM fields like ICT, crucial for technologies such as artificial intelligence, robotics and quantum computing. Skills gaps also hinder investment, with 51% of European firms in 2023 citing skilled staff shortages as a major barrier, compared to 47% of firms in the US (European Investment Bank, 2024).

The Digital Economy and Society Index (DESI) shows that four out of ten adults and every third person who works in Europe lack basic digital skills. Similarly, the lack of skilled workers in the "green sectors" can become a severe obstacle to the green transition. The success of the transition will crucially depend on the availability of workers with appropriate skills.⁹

8 For an early analysis of structural determinants of labour shortages, see chapter 3 of *Labour Market and Wage Developments in Europe, Annual Review* (European Commission, 2024c). For a deeper economic analysis, see Arpaia and Halasz (2023).

9 <https://digital-strategy.ec.europa.eu/en/policies/desi>.

Table 3

The impact of labour shortages on TFP growth

Dependent variable log TFP	Manufacturing	Services excl. wholesale	All NACE excl. wholesale
Labour shortages	-0.03*** (0.008)	-0.04 (0.027)	-0.035** (0.01)
Sample period	2009-2019	2009-2019	2009-2019
Country fixed effect	Yes	Yes	Yes
Period fixed effect	No	No	No

Notes: Panel-corrected standard error. * significant at 10%, *** significant at 1%.

Source: Author's own estimates based on AMECO for TFP growth and Business and Consumers survey data for labour shortages.

Skill shortages may hinder TFP growth by limiting the benefits of FDI (Blomström & Kokko, 2003), distorting the allocation of talent across firms (Marshall, 1980), and reducing knowledge diffusion (Shimer, 2007). They delay the adoption and effective use of new technologies and may reduce productivity by overburdening workers, with extra hours or extra tasks, due to fatigue and worsening job matching.¹⁰ Labour shortages discourage investment in general skills training (Mohrenweiser et al., 2013) and in advanced techniques due to the lack of an appropriate workforce. Shortages may also prompt firms to retain their workers delaying labour reallocation and further constraining productivity growth.¹¹

The regression results in Table 3 confirm the negative impact of labour shortages on TFP growth. Across all sectors, labour shortages hinder TFP growth, though the effect in services is estimated with greater uncertainty. This is not surprising, as services have diverse production characteristics. For the total economy, a one standard deviation increase in the share of firms unable to expand production due to labour shortages is associated with a 0.6% decline in TFP growth.

Conclusions

Investing in human capital and closing the innovation gap with the US are essential priorities for the EU (Draghi, 2024a, 2024b). R&D drives innovation, while a well-ed-

10 La Barbanchon et al. (2023) find that hiring difficulties negatively impact firms' employment, capital, sales and profits, especially in growing sectors and high-skilled jobs, by reducing job-matching effectiveness.

11 Cohen (2023) and the Federal Reserve (2023) report that US firms, facing labour shortages, retained workers despite expected demand declines to preserve hard-won talent amid ongoing staffing challenges.

ucated workforce fosters its dissemination. This paper advocates for policies that promote higher educational attainment, quality education and adult lifelong learning while ensuring alignment between supply and demand of skills to support sustainable productivity growth, especially in sectors crucial for the green and digital transitions. Improved guidance and access to high-quality lifelong learning enhance labour mobility, job matching and productivity growth.

Addressing skill gaps is essential to remove barriers to innovation and facilitate the adoption of new technologies. The European Social Fund Plus supports investments in jobs and skills, while the Just Transition Fund supports economic diversification and the restructuring of regions most affected by the shift to climate neutrality. Additionally, national Recovery and Resilience Plans, funded by the Recovery and Resilience Facility, are key to advancing R&D in green and digital technologies and strengthening human capital.

President Ursula von der Leyen's political guidelines (European Commission, 2024) and Mario Draghi's report on *The Future of European Competitiveness* stress the need to adapt education and training systems to meet evolving skill demands, particularly in sectors vital for the green and digital transitions (Draghi, 2024a, 2024b; European Commission, 2024c). Greater emphasis on adult learning and vocational education and training is crucial for upskilling and reskilling the workforce, preserving human capital in ageing societies and boosting competitiveness. Building a Union of Skills will be key to achieving these goals.

Reforming education and training systems to better align with labour market demand, including through refocusing EU funding for skills development, is crucial for equipping the workforce with the skills needed to adopt and disseminate new technologies, with a focus on basic skills, particularly in STEM fields. A new Action Plan on Basic Skills and a STEM Education Strategic Plan will aim to improve performance and increase the number of STEM teachers. Amid an ageing population, it is important to harness the potential of underrepresented groups and attract talent from outside the EU, as highlighted in the action plan on labour and skills shortages (European Commission, 2024a). This is particularly important in occupations facing EU-wide shortages to sustain growth and resilience. The EU Talent Pool will facilitate connections between job seekers from outside the EU and employers with vacancies in shortage occupations (European Commission, 2023b). The Skills Portability Initiative will facilitate the recognition of qualifications and the free movement of talent within the EU.

The European Skills Agenda provides a strategic framework to address upskilling and reskilling needs across the EU. Its flagship initiatives such as the Pact for Skills, the individual learning accounts (Council of the European Union, 2022b) and micro-credentials (Council of the European Union, 2022a) aim to foster skill acquisition and adult participation in education and training, ensuring a better alignment between skills and job market demands. Their timely implementation along with measures to enhance fair intra-EU mobility and attract global talent will enhance workforce adaptability to structural changes, particularly those driven by the green and digital transitions. These efforts will improve smooth labour reallocation, productivity and competitiveness, and support higher and sustainable wage growth while fostering better working conditions across the EU.

Finally, supporting the shift to high-productivity sectors requires balanced regulations that protect workers during periods of structural change while enabling labour market adaptability. Well-designed severance payments, job search support, and financial security during periods of unemployment can mitigate the uncertainty associated with job losses, encourage workers to embrace transitions and enhance workers' confidence in navigating these changes. Stable employment also motivates firms to invest in training and encourage workers to acquire new skills. Combining employment protection with targeted retraining and reskilling initiatives helps to address skills gaps, promote transferable skills, and facilitate a smoother and more equitable transition to a dynamic economy.

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Labour and Competitiveness in Germany: Embracing the Transformation to Boost Productivity

Despite the current economic weakness and Germany being seen as the “sick man of Europe”, the country’s labour market has proved to be fairly robust so far. Dependent employment has continued to rise – albeit at a slow pace. At 77.4%, Germany had one of the highest employment rates of all OECD countries in the first quarter of 2024, a plus of 1.6 percentage points compared to the fourth quarter of 2019 (OECD, 2024).

Yet, the economic weakness is now clearly visible in the labour market. The number of vacancies fell from a record high of 2 million in the fourth quarter of 2022 to 1.3 million in the third quarter of 2024. Although the unemployment rate is much lower than the OECD average, it is now rising, too. The combination of falling vacancies and rising unemployment has dimmed the job prospects of the long-term unemployed (those unemployed for more than a year) compared to pre-COVID-19 levels. This is particularly true for low-skilled individuals (those without a vocational or university degree), whose unemployment rate is about 20% and who make up 60% of the long-term unemployed. At the same time, there is a shortage of skilled workers and many of the vacancies for jobs requiring their expertise remain unfilled.

This policy paper presents some key empirical facts about the German labour market and examines various challenges, with a special focus on skills as a key driver of competitiveness. In addition to skill shortages, Germany also faces rapid demographic change, with an ageing labour force, while simultaneously navigating the challenges of digitalisation and decarbonisation. High energy

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prices in the aftermath of the Russian invasion of Ukraine have slowed down productivity growth, weakening exports. The risk of deglobalisation weighs heavily on the German economy, putting pressure on its competitiveness in key industries.

Employment and total hours are above pre-COVID-19 levels

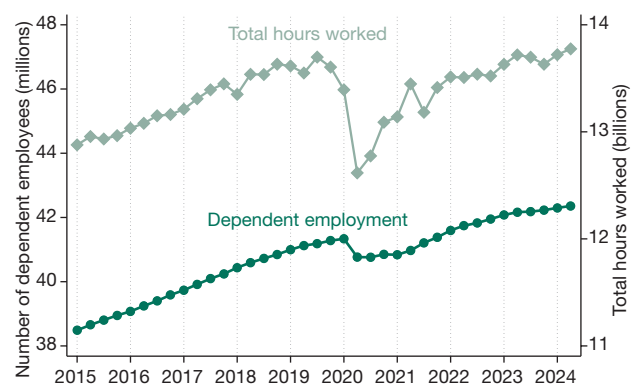
Employment development continues to be positive in Germany. From 2015 to the second quarter of 2024 (see Figure 1), there has been strong growth in total dependent employment (+10%) and total hours worked (+7%). This overall upward trend was disrupted by the COVID-19 pandemic but has resumed, especially for dependent employment. Recently, the increase of dependent employment has been almost exclusively driven by individuals with a migration background, already illustrating the repercussions of the increasingly ageing German population.

In the case of dependent employment, the pre-pandemic level was surpassed in the third quarter of 2021. In contrast, for hours worked, the most recent figures are only a sliver above 2019 levels. The pandemic-induced decline in total hours was stronger and lasted longer than the decline in employment, due mostly to the intense use of short-time work (*Kurzarbeit*). Taken together, these trends imply a decrease in the number of hours worked per employee, owing to an increase in part-time work. This is partly due to the higher labour force participation rates among women, for whom part-time work is common. While dependent employment is still growing, self-employment has been falling for a while, and is well below its pre-pandemic level.

Productivity growth is slow

Figure 2 shows aggregate productivity growth since 2000, as captured by GDP per worker and GDP per hour worked. Apart from the crisis in 2009/2010, productivity grew quickly during the 2000s, in almost parallel fashion for both workers and hours. Throughout the 2010s, a gap between the two measures opened up, with hourly productivity increasing at a higher clip than per capita productivity. Productivity per worker has been stagnant since 2017 and, hence, since well before the pandemic. COVID-19 itself registers as a one-year blip. Because of

Figure 1
Dependent employment and total hours works in Germany



Notes: Quarterly data. Self-employed are excluded.

Source: Destatis (2024a).

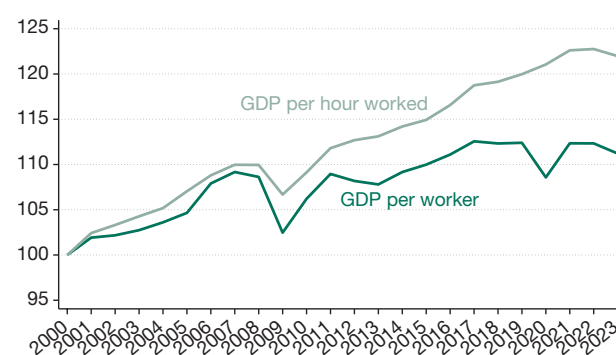
the short-time work policy reducing the number of hours worked, productivity per hour continues to increase until 2022 but falls in 2023. Overall, the poor productivity growth is a major concern regarding Germany's competitiveness. Particularly in countries outside of Europe – like in the US, China or the rest of Asia – productivity has been growing much more, eroding Germany's relative standing as a manufacturing hub.

To foster productivity growth, there is a need for investment, especially with regards to the digital transformation. Recent research has examined the impact of the pandemic on digital transformation. Gathmann et al. (2024) show that the COVID-19 pandemic led to a push in digital investments in German firms. These investments were complemented by firm-provided training and helped firms to insure employment and to avoid short-time work. Most of these digital investments, however, were undertaken by high-performance firms, suggesting that the crisis deepened the digital divide between firms. Arntz et al. (2024) confirm the finding on the digital divide and moreover show that investments in frontier digital technologies were actually adversely affected by the pandemic. In a similar vein, the German Council of Economic Experts (SVR, 2024) is concerned about the low investment level both in the private and the public sector, which is likely to be one of the main contributions to the current subdued state of the economy, in particular for the weak economic development in manufacturing.

For years, employment in Germany has been growing particularly sharply in the health, care and educa-

Figure 2
Aggregate productivity growth in Germany

Index, 2000 = 100



Notes: Annual data. Real gross domestic product divided by number of dependent employees and by total hours worked.

Source: Computed based on data from Destatis (2024a) and Destatis (2024b).

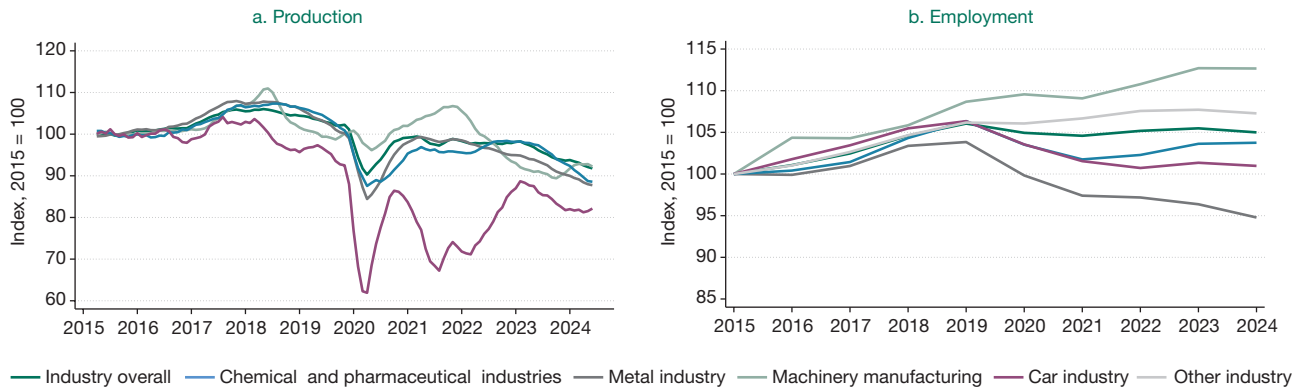
tion sectors, parts of the economy which tend to exhibit relatively slow productivity growth (Bauer et al., 2024). In contrast, employment in higher-productivity sectors – such as manufacturing, which we discuss in greater detail below – increased to a lesser degree and is now shrinking. This reallocation of employment towards lower-productivity sectors is likely to contribute to weak productivity growth – although there is a lack of credible empirical evidence on this issue.

Stagnation in manufacturing industries

Manufacturing industries have formed the backbone of the German economy in the past. Yet, these industries have been stagnating for some time now. Figure 3 illustrates the generally negative developments in production and employment that have been happening since about 2018. The important car industry in particular shows a marked downward trend in both measures, especially for production. Similar adverse changes can be observed for the metal industry and for machinery manufacturing.

Production and employment increased during the COVID-19 pandemic in the chemical and pharmaceutical industry. Employment continued to increase persistently until 2024, while production has shown a negative trend since 2022. However, this masks the heterogeneity between the chemical and pharmaceutical industries. The latter is still expanding, whereas production in the chemical industry is shrinking. Industry production overall recovered in 2021 after COVID-19 yet stayed below its prior levels. After stagnating until early

Figure 3
Industry production and employment in Germany



Notes: Panel (a) shows 7-month moving averages of the monthly production index; panel (b) shows annual employment.

Sources: Destatis (2024c); Federal Employment Agency (2024).

2023, overall industry production is now contracting as well. Industry employment has been flat since 2020 after a very small decline between 2019 and 2020.

Two key immediate reasons account for the poor economic performance of manufacturing industries (SVR, 2024): the weakness of exports, especially the fall in exports to China, which has been ongoing for a while; and increased energy prices since and due to the Russian war of aggression against Ukraine. On top of that, the car industry has been hit by a deteriorating demand for electric cars while simultaneously facing stiff competition from Chinese automakers – both in China and worldwide. Productivity is at best inching upward in manufacturing, a fact possibly tied to a lack of investments in frontier (digital) technologies (Arntz et al., 2024). Altogether, key manufacturing industries paint a picture of a loss of competitiveness (SVR, 2024).

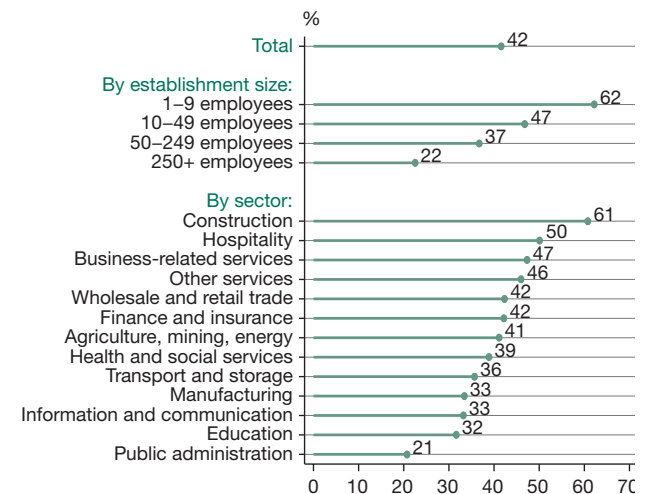
Skilled labour shortages despite economic weakness and low reallocation rates

Despite the economic crisis, there still is a shortage of skilled labour and, as previously mentioned, service industries such as health, nursing and education absorb an ever-increasing number of employees. Drawing on survey data from the IAB Establishment Panel, Figure 4 shows the share of unfilled vacancies for skilled workers in 2023, thereby illustrating the continuing skills shortage.

The total share of unfilled vacancies for skilled positions (those requiring a vocational training degree or a tertiary

degree) stood at 42% in 2023. Labour shortages are particularly pronounced in smaller firms as well as in the construction and hospitality sector. In manufacturing, the share amounts to one third, a relatively low figure compared to most other sectors. Large firms and the public sector find it easiest to fill vacancies for skilled workers.

Figure 4
Share of unfilled vacancies for skilled workers in Germany in 2023



Notes: Share of unfilled vacancies among all vacancies for skilled workers a firm would like to fill. Positions for skilled works are those requiring completed vocational training or a tertiary degree.

Source: IAB Establishment Panel.

Arguably, the shortage of skilled labour by itself is likely to contribute to subdued economic growth, hampering investments as well as productivity growth.

This relationship could be driven by a low rate of reallocation to new, innovative jobs that are associated with higher productivity levels. Bennewitz et al. (2022) show how the reallocation of jobs, or turnover, i.e. the sum of job separation rates and hiring rates, fell during the pandemic. Moreover, the hiring freezes in 2020 prompted a later increase in the number of vacancies until the end of 2022, among which a large share could not be filled (Kubis, 2022). At a time when the necessity of an economic transformation receives a great deal of attention, the employment reallocation that would be expected to go hand in hand with such a transformation is not apparent in the data at all. To the contrary, the process of transforming the economy is slowed down by meagre job mobility.

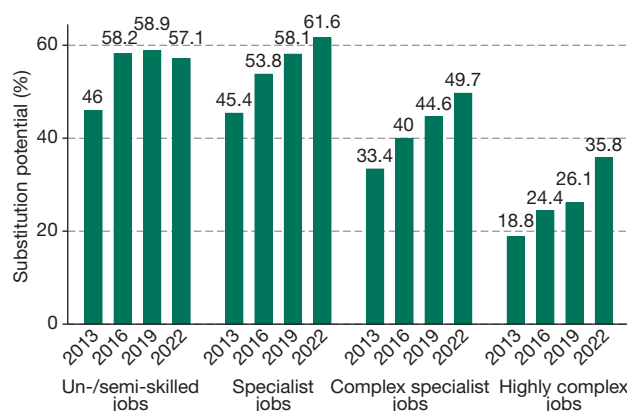
The rescue measures – such as short-time work for the labour market – successfully stabilised the labour market during the pandemic; however, they also potentially contributed to slowing down the transformation process. But as of now, there is no empirical evidence on whether the widespread use of short-time work actually negatively affected reallocation in Germany.

Embracing the transformation induced by digitalisation and decarbonisation

Digitalisation and decarbonisation are drivers of change in the economy and the labour market. They provide opportunities for growth and new jobs, while also threatening existing jobs. Figure 5 displays substitution potentials and their change between 2013 and 2022, split by the requirement level of an occupation. Generally speaking, occupations involving simpler tasks are at greater risk of being replaced by digital technologies, while highly complex tasks are less vulnerable. This is because digital technologies can perform programmable tasks and this is most easily implemented for simple routine tasks, which make up the majority of work in un- or semi-skilled jobs. In 2013, 46% of all tasks performed in un- or semi-skilled jobs could theoretically be replaced by digital technologies, while this applies to only 19% of all tasks in highly complex jobs (see Figure 5).

However, accounting for progress in digital technologies over time, more complex tasks can also be replaced. Thus, the substitution potentials are increasing noticeably for complex specialist jobs and highly complex jobs, while stagnating from 2016 onwards for un- and semi-skilled jobs. In 2022, 57% of all tasks performed in un- or semi-skilled jobs (plus 11 percentage points compared to

Figure 5
Potential for digital substitution in various jobs in Germany



Notes: The substitution potential measures the share of tasks that can theoretically be replaced by computers and digital technologies. This information was extracted using text mining methods from the German occupation-net (BERUFENET) for the years 2013, 2016, 2019 and 2022. The information is available for eight-digit occupations and can be retrieved for individual occupations on <https://job-futuromat.iab.de/>.

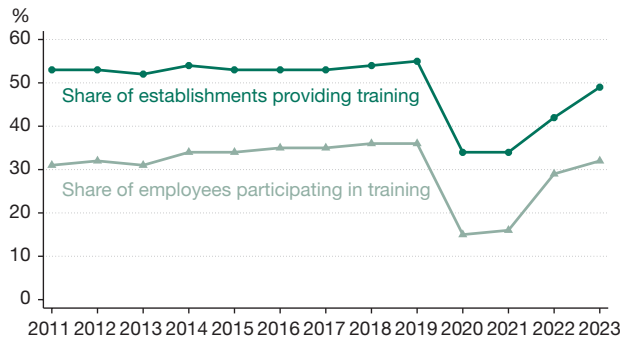
Source: Data taken from Grienberger et al. (2024).

2013) can be replaced by digital technologies, whereas this applies now to 36% of all tasks in highly complex jobs (an additional 17 percentage points).

The use of digital technologies can reduce employment in occupations with high substitution potentials and can thus positively impact labour productivity. However, this has not yet happened at a large scale and it is unlikely that jobs will completely disappear (Grienberger et al., 2024). Rather, the use of digital technologies changes the tasks performed in an occupation (the job content) and expands the scope of business activities. Correspondingly, employees will have to work effectively with and adapt to (new) digital technologies. Therefore, training the workforce's digital skills is crucial for tapping the potential to increase productivity and make the digital transformation a success.

Similar to the digital transformation, the ecological transformation – associated with the goal of decarbonising the economy – requires new skills, for instance so-called green skills. The greenness-of-jobs index, developed at IAB based on the German occupation-net (BERUFENET), provides one measure of the prevalence of green skills and how they are distributed across occupations and industries. Based on this indicator, there is evidence that occupations involving green skills have been growing disproportionately over the last decade and that the number of apprenticeships in greener oc-

Figure 6
Establishment-provided training in Germany



Source: IAB Establishment Panel.

cupations has been increasing notably (Brixy et al., 2023).

Labour, in particular human capital, is a driver of productivity. The transformations of the economy and the labour market require changes in the tasks performed in existing jobs and increased mobility to new jobs. For both stayers and movers, training and more versatile skills will be necessary in an ever-changing world of work. Only by embracing the transformation this way and grasping its opportunities can the stagnation of productivity be overcome and growth prospects improved.

The slump in (vocational) training

Even though there is a clear need for more training, measures of various types of training suggest that this is simply not happening. This deficit poses a major challenge for a successful transformation of the German economy.

First, we consider the provision of further training by firms for the existing workforce that nominally completed their job training in the past. With rapid advances in technology, lifelong learning is becoming all the more important. Figure 6 displays the amount of firm-level training based on the annual IAB survey of establishments, the Establishment Panel. During the 2010s, the share of establishments providing training remained relatively constant, while the share of employees participating in training increased continuously from 31% in 2011 to 36% in 2019. After this period of growth in the share of worker participation in firm-level training with little volatility, there was a sharp drop in firm-level training during the pandemic and a subsequent slow recovery. Training in 2023 (a distinctly post-pandemic year) is still markedly lower than in 2019: both the share of establishments providing training and the share of employees participating in training is lower, by six percentage points and four percentage points, respectively.

Figure 7
New apprenticeship contracts in Germany



Notes: The data are from Federal Institute for Vocational Education and Training (BIBB).

Source: Weller et al. (2024).

Second, we turn to the German vocational training and education system, often considered a source of German competitiveness. The apprenticeship system also shows signs of ailing. As Figure 7 attests, after a strong decline in the early 2010s and a period of moderate growth later in the decade, the number of new apprenticeships fell sharply during COVID-19. Following the pandemic, there was a slow recovery until 2023 and the number of new apprenticeship contracts declined again slightly in 2024, staying below half a million every year since 2020. The number of new apprenticeship contracts matches in 2024 is more than 10% lower than in 2019.

The fact that both firm-level training and the number of new apprenticeship contracts have not returned to their pre-COVID-19 levels points to a considerable lack of investment in the skills of the workforce. In this context, the developments in schooling outcomes are discouraging as well: PISA test results have become worse in Germany over time (OECD, 2023), and there is a substantial number of adolescents every year that are leaving school without obtaining a certified school degree.

While human capital is one of the most important assets that the German economy has, there is a significant threat that this asset could deteriorate further during the transformation process. This suggests that relatively high unemployment rates and acute skill shortages might coexist in the future. Given the projected decline in the labour force population due to demographic change, Germany cannot afford a high degree of mismatch in the labour market. Strong investments in and incentives for training and education are hence needed to counteract the current negative trend. With the

advances in artificial intelligence, the potentially disruptive next round of labour market effects is soon on its way.

Conclusions

Transformation pressures driven by digitalisation and decarbonisation are changing the labour market. Despite the currently weak economic development of Germany, the shortage of skilled workers is likely to worsen due to an ageing workforce, even with a high employment rate compared to other countries. At the same time, key manufacturing industries are exhibiting subpar economic performance, and productivity is stagnating. To effectively address these problems, Germany needs to embrace the transformation by actively fostering the transition to new business models and jobs, especially in manufacturing. Greater physical investment is needed, especially in digitalisation, which needs to go along with greater employee mobility and further training for employees. This way, labour productivity can increase significantly, thereby saving on manpower without sacrificing prosperity and simultaneously securing employment in well-paid jobs. Both improvements of and investment in education and vocational training are urgently needed. Otherwise, Germany – the largest European economy – will continue to lose its competitiveness and thus not overcome its sluggish economic growth.

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Boosting the European Defence Industry in a Hostile World

War has returned to Europe. As there is no clear end in sight to the war in Ukraine, the question of armaments has become of central importance. Failing to deter Russia, or to support Ukraine adequately, would leave Europe at a major strategic disadvantage for decades to come. Wolff et al. (2024) showed that Russian military industrial capacities have increased significantly in the last two years. Production of key weapon systems now exceeds the levels of Russian material losses in Ukraine.¹ The United States's top general in Europe has estimated that Russian military production outpaces that of the combined West (Cavoli, 2024). For example, he estimated that Russia now produces and refurbishes more than 1,000 tanks per year, by far surpassing the combined production of all Western countries. Wolff et al. (2024) even suggest that Russia produces up to 1,500 tanks per year. Cavoli (2024) also estimated that Russia now has a substantially greater capacity than at the beginning of the war in 2022, despite its significant losses. To achieve this massive production boost, Russia has systematically increased its spending on armaments. Russia now spends 30% of its budget on its military, rising to 40% if domestic security costs are factored in. Spending is now estimated to be above \$120 billion per year. In purchasing power parity terms, this spending is substantially larger and close to that of the European Union.

While Europe and the combined West in principle have the resources to outperform Russia because of their larger GDP, the mobilisation of fiscal resources and the commitment to stay the course on a longer-term basis is still lagging. European defence spending has increased substantially in the last few years; however, after years of underinvestment, it will take time for production capacities to be brought online and for stocks to increase again. Fig-

¹ At the same time, Russia is also incurring substantial losses of material.

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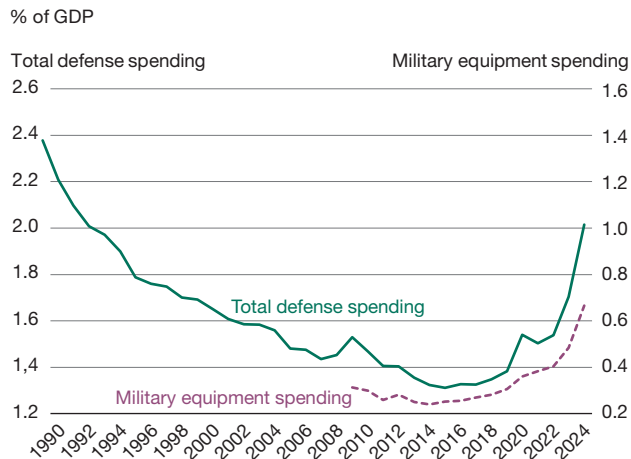
ure 1 shows European Union defence spending (including personnel, operational and military equipment spending) and spending on military equipment. With falling defence spending since the end of the Cold War, budgets for equipment spending became extremely small, with on average only 0.3% of GDP dedicated to it. For many years, Germany in particular invested only a very small proportion of its defence spending in military equipment. According to NATO figures, the share was only around 13% until 2019, compared to 25% in France. It was not until 2022 and 2023 that the share of investment in defence equipment increased significantly. However, Germany remains behind the United Kingdom and the US. In Poland, spending on equipment now even exceeds 50% of total defence spending. In 2024, eight NATO countries (seven EU countries and Canada) did not reach the minimum overall defence spending target of 2% of GDP. This includes Italy and Spain, the third and fourth largest EU economies.

Fiscal data shows that governments have been able to adjust defence budgets in response to the war, and these increased budgets have also translated into larger budgets for equipment purchases. Wolff et al. (2024) documented a substantial increase in military procurement in Germany, in particular from September 2023 to June 2024. Yet, ordered quantities remain small, especially when compared to Russian output or to lost capabilities in the last few decades (Wolff et al., 2024). Ordered quantities are also relatively low in France and other key European countries.

The new EU Commissioner for Defence and Space starting in late 2024 will have to squarely face the main challenges to push for the cost-effective and rapid rearmament of Europe, ideally based on a shared strategic analysis. Together with the EU's top foreign policy official, the High Representative of the Union for Foreign Affairs and Security Policy, the new Commissioner for Defence and Space must deliver a white paper on the future of European defence identifying financing and capability needs in defence.

The mission letter from the European Commission President Ursula von der Leyen is ambitious: the white paper shall frame “a new approach to defence and identify investment needs to deliver full-spectrum European defence capabilities based on joint investments, readying the EU and Member States for the most extreme military contingencies” (European Commission, 2024a).

Figure 1
Defence spending and spending on military equipment in the EU



Notes: "Defence spending" refers to total EU27 defence expenditure from 1989-2023 and defence spending by EU NATO members in 2024. "Equipment spending" refers to spending by EU NATO members. The Czech Republic, Sweden and Finland are not included for 2009-2013 because of unavailability of data. EU members Austria, Cyprus, Ireland and Malta are not NATO members.

Source: Wolff et al. (2024).

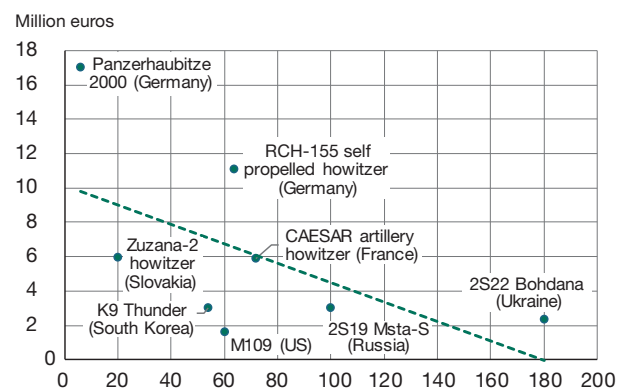
Why a European defence market would make sense

European governments order relatively small quantities of weapons and ammunition. As a result, it is difficult to benefit from economies of scale, which would in principle lead to faster and cheaper production and higher production numbers. This is also the result of a fragmented market for defence products, in which each EU country orders separately. For example, if the procurement of artillery shells is not bundled and standards differ slightly, or if militaries tailor systems to unique national criteria that do not substantially reflect mission requirements, then national industries will remain the main producers for the needs of national armies and will produce in relatively small quantities at relatively high cost. Scale economies result from industrial production processes that require large-scale purchasing. Moreover, governments need to commit over the long term to buy certain quantities, in order for industry to invest in production capacities. To illustrate the relation between scale and price, Figure 2 shows the relation between prices and units produced per year for selected howitzers. European production remains low while prices are among the highest, possibly indicating the lack of scale.

Towards a defence industrial strategy

The Commissioner for Defence and Space will have to build on this plan and develop a feasible strategy. For this,

Figure 2
Self-propelled howitzer cost per unit and annual production capacity



Note: Production capacity per year should be considered a lower bound estimate.

Source: Bruegel, based on information released by companies and specialised press in terms of purchase agreements and delivery dates. Contact the authors for details.

a realistic and conceptual understanding of the specific characteristics of defence industrial policy is necessary. Advancing military industrial policy is a complex endeavour in any country. Figure 3 conceptualises the dual goals of defence industrial policy. It aims to create the material means needed to deter opponents, enable military operations abroad and support allies such as Ukraine. These goals are defined by a country's security and defence policy. But industrial policy goals, and in particular electoral preferences, also determine objectives such as job creation, local development and broader innovation aims. Marrying these two separate types of objectives is already difficult at the national level, where local development goals might not be aligned with economic efficiency or security targets.

Designing a defence industrial policy at the EU level is complicated even more by the institutional separation between industrial policies and security and defence

Figure 3
Conceptualising defence/military industrial policy



Source: Bruegel.

policies. EU decision-makers are responsible for many aspects of industrial policy rulemaking (state aid, competition, cohesion), often with a significant and leading role for the European Commission. However, security and defence policy is largely a national competence (Leonard et al., 2019) and the most relevant cooperation framework is and remains NATO.

When it comes to defining strategic interests in security and defence, the EU is far from reaching a clear, shared understanding. At the EU level, there is some coordination and a so-called “strategic compass” – an action plan to strengthen EU security and defence policy – has been approved (EU External Action Service, n.d.). Yet, the security interests of EU member states are, and remain, different. Although Russia’s military threat is growing, it is still perceived as much less worrying in some parts of the EU than others. This lack of shared strategic interest will obviously affect the work of the new Commissioner for Defence and Space and of the High Representative of the Union for Foreign Affairs and Security Policy.

The EU treaties make clear that national governments largely retain the competence for industrial policies and market-design questions in the defence/security field. For example, Article 346 (2) of the Treaty on the Functioning of the EU (TFEU; 2012) stipulates that

any Member State may take such measures as it considers necessary for the protection of the essential interests of its security which are connected with the production of or trade in arms, munitions and war material; such measures shall not adversely affect the conditions of competition in the internal market regarding products which are not intended for specifically military purposes.²

Nevertheless, in practice, the EU is already involved at many levels in defence markets and defence cooperation, and has been able to overcome political and legal obstacles.

Why Europe needs to build its domestic defence industrial base

A core practical question for European policymakers is the extent to which they want to favour European producers

² This does not prevent the EU from having a security and defence policy, however, with the TFEU foreseeing in Article 2(4) that “The Union shall have competence, in accordance with the provisions of the Treaty on European Union, to define and implement a common foreign and security policy, including the progressive framing of a common defence policy”. Yet, the European defence strategy, such as the strategic compass, certainly does not carry the same weight as NATO or national strategies.

when procuring weapons and ammunition at the national level. There is a strategic interest in building up an industry that can provide well-functioning and full-spectrum armaments to the armies of EU countries. Commission President Ursula von der Leyen has promoted the simple principle that on defence, “Europe must spend more, spend better, spend European”, as well as noting that the forthcoming proposals in the white paper on the future of European defence should respond to “the most extreme military contingencies”, suggesting that she endorses the paradigm shift of boosting domestic industrial capacities by assigning to it military procurement and output planning, in order to address the EU’s underinvestment and production gaps (European Commission, 2024a).

The basic idea is that increasing the demand for weapons developed and produced in the EU will strengthen the European defence and technology industrial base, leading to greater strategic autonomy. Such a move is even more important at a time when the US military industrial base is facing difficulties in sufficiently ramping up production. Jones (2024) argued that the war in Ukraine has shown the deficiencies of the US defence industrial base and that the US would not be prepared for a conflict in Taiwan. Moreover, a preference for European suppliers will be even more pronounced if NATO comes under strain during the second Trump Administration. Finally, an argument for a European preference is that the military industry can have some positive innovation effects on the wider economy.

However, there are three important counterarguments against a Europe-first strategy. First, a European preference in arms purchases might lead to slower than necessary arrival of some critical weapon systems. Second, European preference could also lead to the purchase of weapon systems that are inferior to the best available on the world market, especially if there is no additional growth in the industry. Third, European preference could result in paying higher prices for weapon systems that could be produced more cheaply elsewhere.

Given the political re-orientation of the United States under Donald Trump, a build-up of the European defence industrial base appears warranted. Moreover, there is a clear practical reason why Europe needs to further boost its domestic industry: the capacity limits of the US industrial base.

To better understand US capacities, Burilkov et al. (2024) examined specifically the production and sales of two major weapons systems representing high-end capabilities that are central to NATO and Europe’s deterrence of Russia: Patriot air defence missiles and F-35 fighter jets.

Russia is a peer competitor with large land forces, a sizeable air force including the most modern (fifth generation) fighter jets, an integrated air defence network and a vast arsenal of long-range precision munitions (Wolff et al., 2024). High-end capabilities are essential for NATO and Europe to meet the Russian challenge. Burilkov et al. (2024) show that large shares of US-produced weapons, such as shells for tanks and artillery as well as air defence missiles and their components, are currently being sold to Europe and Israel. If Trump wants to re-calibrate US defence sales, for example to increase domestic stockpiles or to increase supplies to allies in Asia, then Europe could face shortages in arms availability. The US foreign military sales (FMS) data³ documents a total of 1,119 Patriot missiles sold under five contracts since Russia's invasion of Ukraine in February 2022. This number is separate from and does not include all the missiles sent from US stockpiles to Ukraine as these can be provided through emergency aid procedures. Burilkov et al. (2024) also show that delivery delays of F35 have substantially gone up with more than 90% of deliveries coming late in 2023.

Towards a joint approach to European defence

It has become urgent to move beyond the current piecemeal approach to European defence. The forthcoming white paper on the future of European defence needs to spell out how production capacity will be increased, how costs will be reduced, how Europe will strengthen its main military-technological capabilities and how the necessary fiscal resources will be mobilised. These are major factors in a war of attrition such as that in Ukraine. Wars of attrition are the norm between peer competitors, implying that the Russian threat to the EU presents the same problem set as is currently unfolding in Ukraine. The EU white paper will need to take positions on the main trade-offs and be specific to make rapid progress. The following elements will be crucially important to achieve these goals.

Focus on funding for defence

Achieving scale and cost effectiveness requires funds, both for demand and supply.

On the demand side, the fiscal constraints faced by European countries affect the credibility of governments' long-term commitments. This is the case with Germany's medium-term budgetary planning for defence (Wolff et al., 2024) and other EU countries without clear political

majorities and with uncertain budgetary prospects (e.g. France and Spain). On national funding, fiscal rules could incentivise debt issuance to pay for defence spending but this could raise debt sustainability concerns (Pench, 2024).

Exempting from fiscal limitations some spending for EU-agreed defence priorities might be a way forward. Expensive investments with EU-wide impact, such as air defence, could be financed through EU debt (Steinbach & Wolff, 2024). The debate on the next EU budget cycle (from 2028 into the mid-2030s) will be an opportunity to prioritise such investments. For the EU as a whole, increases in defence spending for the next five years will have to amount easily to €500 billion if Europe wants to shed its dependence on the US security umbrella.

On the supply side, some weapon companies and particularly small and medium-sized enterprises still face financing constraints (European Commission, 2024b). Improving access to finance for these companies should be a priority. Institutions such as the European Investment Bank should reconsider a current prohibition on providing financial support to defence-only projects. This would also give a positive signal on defence investment to the overall financial sector (Draghi, 2024). More broadly, the negative stigma that defence companies are still confronted with among investors and civil society needs to be prioritised, so that funding can reach not only the big defence companies but also mid-sized companies and start-ups, which are essential for innovation and the mass production of drones, counter-drone systems and electronic-warfare and intelligence-gathering solutions.

Push back against economic nationalism while addressing security concerns

We recommend the more-integrated markets approach rather than a war economy. Markets tend to be more efficient than governments in allocating resources, with governments having a clear role to play addressing market failures. However, achieving market integration is difficult. It is hard to limit the scope for economic nationalism in the EU because the EU treaties (Article 346(2) TFEU) explicitly allow countries to deviate from single market rules for security reasons. To enable greater market integration, legitimate security concerns need to be addressed, for example through security treaties among major producer countries, establishing rights and safeguards.

Fostering a political agreement among key countries to increase joint purchases, possibly with pooled funds, is necessary to reduce unwarranted national biases in military procurement. While there have been EU-level efforts

³ The data covers FMS contracts since 2008. It restricts the military sales agreements to those signed after Russia's invasion of Ukraine (February 2022). See <https://www.dsca.mil/major-arms-sales/archive-date>.

on joint procurement (the European Defence Industry Reinforcement through common Procurement Act, EDIRPA), these are rather small. The EDIRPA budget for example was set at €310 million, which is minimal, even compared to the approximately €25 billion in equipment procurement by Germany in 2024. The March 2024 European Defence Industrial Strategy proposal looks set to face similar financial constraints (Wolff, 2024). National procurement offices will issue different specifications even for the same basic product. Beyond the reform of national procurement offices, more joint EU procurement, for example through the European Defence Agency, could lead to greater market integration.

Moreover, despite being a global standard-setter, the EU plays no role in standards for weapons. As a consequence, weapons production is fragmented and more expensive than necessary and interoperability is low, complicating logistics and undermining combat effectiveness. EU countries have provided Ukraine with ten different howitzer types and currently manufacture five different versions versus only one in the US (Draghi, 2024). While NATO has established standardisation agreements for artillery, these are clearly not enforced. Enforcement by the EU of NATO standardisation agreements in EU countries could thus further contribute to market integration.

Fragmented EU export rules could undermine market integration.⁴ Current rules on arms-related exports, both within and outside the EU, would benefit from more solid legal underpinning in a directive or regulation with transposition dates and/or enforcement tools. This would ensure effective standardisation and greater alignment of national policies. To account for the risks related to weaker ethical considerations while standardising export rules, post-shipment onsite inspections (Bromley et al., 2022) enforced by an EU agency could guarantee a level playing field across EU countries.

Towards “intelligent European preference” for more innovation and strategic autonomy

The EU should avoid procuring only European, but there are strategic justifications for more procurement from resident firms.⁵ Such “intelligent European preference” can increase industry capabilities and foster innovation while reinforcing strategic autonomy,⁶ but it needs to account for comparative advantages and disadvantages. For some products,

4 Rules on exports to Israel or Saudi Arabia highlight how such national rules are sometimes used deliberately for political purposes and export promotion. Harmonised rules at the EU level appears the only way to overcome such incentives.

5 See, e.g. Calcara et al. (2023) for an academic discussion.

6 See, e.g. Caverley and Kapstein (2023).

cheap and scaled-up production remains of paramount importance (e.g. artillery shells for Ukraine). Procuring arms from third countries remains perfectly reasonable, especially if the security of supply is high and interoperability with European systems can be reasonably guaranteed.

Ukraine and its defence industrial base are of great importance to the EU defence strategy and could be transformative for the EU’s military industrial capacity. For many products, Ukraine is the cheapest producer, and is also the most innovative and advanced (e.g. modern drone warfare). The UK should also be considered an integral partner for the European defence industrial base. Finally, as long as the EU remains dependent on the US security guarantee, it needs to carefully calibrate how building its own defence industrial base will impact US political perceptions.

Supply chain security

The EU could play a role in securing defence supply chains by regularly monitoring and assessing risks of over-dependency. Since the start of the war in Ukraine, the European Commission has discovered significant vulnerabilities, for example, in relation to the security of the supply of explosives and propellants. It would be a natural role for the EU to issue alerts on limits in production capacities. The EU is aware of the importance of assessing security risks, such as those for dual-use technologies. The EU economic security strategy, for example, sets out critical technology areas and requests risk assessments from member states (European Commission, 2023a, 2023b). There exist, however, challenges in addressing these issues (Chimits et al., 2024). Some of the competences required remain at the national level – for instance, foreign policy responsibility – making a common and effective response more difficult.

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William Connell Garcia and Victor Ho

External Vulnerability Index: A Tool to Assess Trade Weaknesses

International supply chains have become increasingly important to policymakers, academics and business leaders over the last five decades due to their capacity to improve efficiency gains. Indeed, companies have fragmented production across multiple locations worldwide to reduce costs, achieve economies of scale, mitigate risks and gain access to foreign inputs, enabled by greater capital mobility, technological advancements in logistics and telecommunications, and a global shift towards trade liberalisation. The EU's trade openness and its role as a promoter of fair global trade (see Figure 1) highlight the critical importance of well-functioning international markets and supply chains to ensure its sustainable economic growth and resilience. However, recent events such as the COVID-19 pandemic and geopolitical tensions have undermined the previously optimistic outlook on some sensitive global supply chains, leading to concerns about vulnerabilities and dependencies.

The European Commission responded to this evolving landscape originally by publishing a new trade strategy and updating its industrial strategy in 2021. These policy documents aimed at enhancing the transition towards a more resilient and globally competitive EU economy. The adoption of an Open Strategic Autonomy approach by the European Commission has raised awareness of concepts such as “exposure”, “excessive dependencies”, and “strategic autonomy” within sensitive economic sectors. Public policy responses have emphasised the need to consider risks and dependencies in critical areas. The EU has experienced further supply challenges stem-

ming from Russian military aggression in Ukraine, the Israel-Hamas-Hezbollah conflict, and trade weaponisation strategies from countries like China and Russia. As a result, de-risking and economic security have become central to the EU's strategy. Reducing dependencies and enhancing security have been identified as key transformational imperatives to boost EU competitiveness in the Draghi Report (2024). These priorities also feature prominently in the Competitive Compass (2025), which outlines flagship measures to translate this vision into action.

Countries all over the world have started addressing challenges to their economic security¹ and for this reason, it is important to understand recent patterns in international trade. Recent research has pointed to signs of trade fragmentation including Blanga-Gubbay and Rubínová (2023) who argue that since the Russian military aggression against Ukraine in 2022, trade has exhibited a growing fragmentation along geopolitical lines, suggesting the emergence of friendshoring. Along the same lines, Gopinath et al. (2024) emphasise the significant decline in economic linkages among countries belonging to distant geopolitical groups, especially since Russia's invasion of Ukraine. Freund et al. (2023) and Alfaro and Chor (2023) investigate the dynamics of US supply chains as a result of the US-China trade tensions and observe a reallocation of US imports from China to certain low-wage countries, like Mexico and Vietnam. Nevertheless, they highlight that these nations appear to maintain strong economic ties with China, underscoring the enduring indirect exposure of the US to the Chinese market. For the EU, Arjona et al. (2024) highlight that the EU has shown an important reduction in imports from non-agreement partners, such as Russia and China, and an increased reliance on neighbouring and distant agreement partners (see Figure 2).

The global trading environment and recent EU political initiatives highlight the need for enhanced resilience and adaptability. Consequently, it is important to develop data-driven approaches to continue identifying and monitoring EU vulnerabilities compared to its main trading partners. By tracking vulnerabilities, policymakers can develop timely, agile and responsive strategies, and navigate the complexities of a rapidly changing global market.

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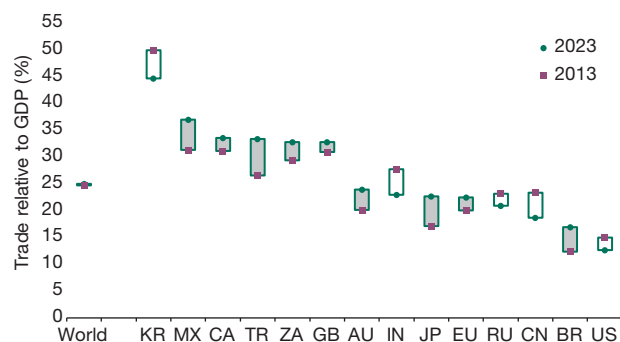
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¹ See, for instance, the analysis by Global Trade Alert, which monitors public policies that affect global trade.

Figure 1
Trade in goods and services over GDP for major trading entities in 2013 and 2023



Notes: The ratio of the average value of exports and imports of goods and services to GDP is considered. The world excludes intra-EU trade and refers to 2022 instead of 2023. The EU figures exclude intra-EU trade.

Sources: Eurostat, International Monetary Fund (Balance of Payments and International Investment Position Statistics) and the World Bank.

This paper proposes a monitoring tool based on trade data that would allow for the identification and measurement of external trade vulnerabilities. This monitoring tool should also enable comparisons over time and across the EU’s major global trading partners, providing a dynamic perspective on evolving trends of foreign vulnerabilities. To this end, the External Vulnerability Index (EXVI) has been developed. The EXVI is a composite indicator that assesses the external vulnerability of traded products within a region, spanning various sectors and supply chains. It quantifies economic vulnerabilities to external shocks by analysing a region’s trade dependencies and trade competitive positions. High scores, with a maximum of 1, signal a high risk of foreign vulnerability, while low scores, with a minimum of 0, indicate a lower risk of external vulnerability.²

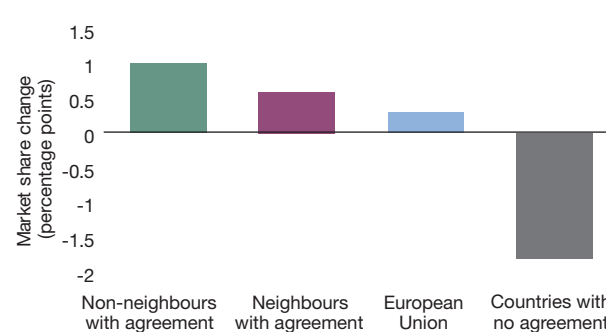
Building the EXVI

Pillar 1: Risks related to foreign dependencies

The first pillar is composed of two indicators, which aim at measuring the concentration of trade flows and the degree to which a country relies on imports relative to its exports. By doing so, it provides insights into an economy’s exposure to external risks, such as supply chain disruptions or the emergence of new trade barriers. Economies that rely excessively on foreign inputs, which at the same time are highly concentrated on a limited number of trading partners, are more vulnerable to external shocks.

² Other papers looking at the EU’s foreign dependencies include: Arjona et al. (2023), Jaravel and Méjean (2021), Reiter and Stehrer (2021).

Figure 2
Changes in the EU market shares across trading groups for all products from 2021 to 2023



Notes: The classification of countries is based on information on the various trade cooperation agreements of the EU. These include countries with trade agreements that may be in place or provisionally applied, as well as those countries that recently signed Raw Material Partnerships or signatories of the recent 2022 Joint Statement on Cooperation on Global Supply Chains. Besides the UK and EFTA countries, EU neighbours are identified based on information regarding European Neighbourhood Policy and Enlargement.

Source: Arjona et al. (2024).

The first indicator used in this pillar is the Herfindahl-Hirschman Index (HHI). This aims at measuring the level of diversification of imports by analysing the diversity of trade partners for the country’s imports. A high HHI indicates a higher dependency on fewer countries, making the economy more vulnerable to external shocks. The first indicator for country *i* and product *k* in year *t* is calculated as follows:

$$HHI_{i,t}^k = \sum_{j=1}^N s_{j,t}^2 \tag{1}$$

where $s_{j,t}^2$ is the share of imports from the trading partner *j* in the total imports of country *i* for product *k*. A HHI closer to 1 indicates a higher concentration of imports, while a HHI close to 0 indicates more diversification of imports.

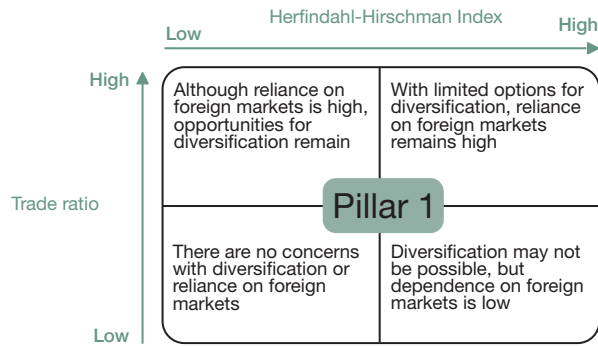
The second indicator used is the trade ratio (*TR*), which aims at showing the relative size of imports compared to exports for a given country. This ratio can be used to assess trade reliance in the economy. The second indicator for country *i* and product *k* in year *t* is calculated as follows:

$$TR_{i,t}^k = \frac{\text{Total imports}_{i,t}^k}{\text{Total exports}_{i,t}^k} \tag{2}$$

A ratio higher than 1 indicates that a country is running a trade deficit, whereas a ratio lower than 1 indicates that the economy is running a trade surplus.

Figure 3 illustrates the four quadrants into which products can be categorised, offering a simplified view of the coun-

Figure 3
Dependency risk



Source: Authors' own elaboration.

try's classification in terms of dependency risks for specific products. In this case, we are interested in identifying products with limited options for diversification, combined with a high reliance on foreign markets. In Figure 1, this situation is identified by the top-right corner scenario. Other options exist that highlight lower risks of foreign dependencies. For instance, the top-left quadrant identifies products with a high reliance on foreign markets but with a significant potential for diversification. The bottom-left quadrant indicates products with neither excess dependency concerns nor diversification issues. Meanwhile, the bottom-right quadrant highlights products with a low trade ratio, which makes them less risky despite the observed high concentration on a specific origin.

Pillar 2: Risks related to a weak global market position

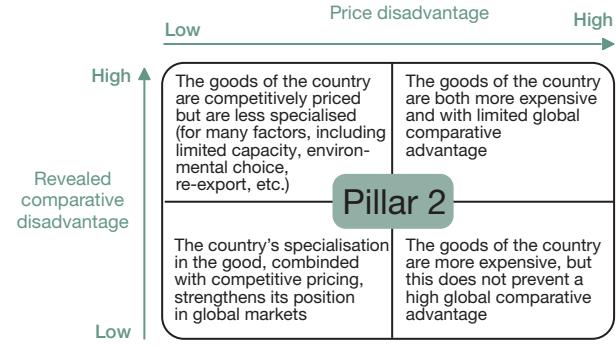
The second pillar evaluates the risks arising from a weak standing in global trade for each product traded. It focuses on two dimensions, namely the revealed comparative disadvantage and the price differences.

The first indicator of this pillar is the revealed comparative disadvantage (RCD), which aims at identifying products in which a country is less competitive relative to other countries. A higher value indicates a comparative disadvantage, implying that a country is less competitive globally in exporting that product. The RCD indicator is calculated by taking 1 minus the revealed comparative advantage (RCA) indicator, which measures what a country is "good at exporting" compared to the rest of the world. This indicator is calculated for each individual country *i* as follows:

$$1 - RCA_{i,t}^k = 1 - \frac{Exports_{i,t}^k / Exports_{i,t}}{Exports_{w,t}^k / Exports_{w,t}} \quad (3)$$

where *k* means product, *w* is world and *t* is year. In terms of interpretation, a lower value suggests a stronger export spe-

Figure 4
Global position risk



Source: Authors' own elaboration.

cialisation, whereas a higher value implies the product is relatively less important in the export structure of the country.

The second indicator is the price competitiveness index (*PCI*). This indicator measures the price competitiveness of the traded goods of a country relative to its imports. A higher ratio can indicate a price disadvantage, which is important when evaluating the vulnerability to foreign markets, as it affects the capacity of the country to reduce its foreign dependencies. It is important to highlight that a price disadvantage can also originate from a country producing higher quality products, which is not necessarily linked to a vulnerability. To understand the magnitude of the vulnerability, we need to combine it with the *RCD* indicator. This would enable us to identify products with higher risks of foreign vulnerabilities. The indicator for country *i* and product *k* in year *t* is calculated as follows:

$$PCI_{i,t}^k = \frac{\bar{P}_{i,t}^k (exports)}{\bar{P}_{i,t}^k (imports)} \quad (4)$$

where $\bar{P}_{i,t}^k$ is the average unit price. In terms of interpretation, $PCI_{i,t}^k > 1$ suggests an economy that exports higher prices than it imports, indicating in principle a price disadvantage.

Figure 4 provides the interplay between these two indicators, which are shown in a 2x2 matrix. The most vulnerable quadrant is once again the top right, where the country's goods are both more expensive than those of foreign competitors and are paired with a limited comparative advantage. All the other quadrants represent options characterised by relatively lower levels of vulnerability. The top-left quadrant represents goods that are competitively priced, but the country exhibits lower levels of specialisation. This may result from many factors such as limited production capacity, deliberate national policies prioritising safety or environmental considerations, or the nature of the goods being primarily re-exported. The bottom-left quadrant

shows a favourable situation where the country has a high degree of specialisation, and this is combined with competitive pricing. This combination of factors minimises the country's vulnerability. Finally, the bottom-right quadrant displays a situation in which the goods of the country are more expensive, but this does not prevent the country from achieving a high global comparative advantage. This may not necessarily indicate vulnerability, as it could instead reflect differences in the quality of goods produced.

Obtaining the product, sectoral and national level EXVI

To ensure a standardised analysis, the methodology addresses indicators that fall outside the 0 to 1 range. These indicators are adjusted using winsorisation at a 90% level, a statistical technique that minimises the influence of extreme outliers consequently, minimising the effect caused by anomalous data points. Winsorisation is done on all HS6 product categories combining all three regions (EU, US and China) in a specific year. After winsorisation, a min-max normalisation strategy is applied to rescale the data, standardising it to a common range between 0 and 1 to enable consistent comparisons across variables.

$$Indicator_{normalised} = \frac{X - X_{min}}{X_{max} - X_{min}}$$

where X_{max} , X_{min} will be determined by the regions we would like to include in the analysis. Initially, we will start with the EU, as well as with its main trading partners, the US and China.

In order to aggregate the two indicators in the two pillars, the methodology employs a geometric mean. This method captures the multiplicative interaction between the two indicators, which is useful in this application, as we want to ensure that both indicators are important for the overall risk of vulnerability. In our quadrant, this is shown in the top-right corner. In other words, the geometric mean emphasises balance, suggesting that if either indicator within a pillar is low, the composite score of the pillar will be low.

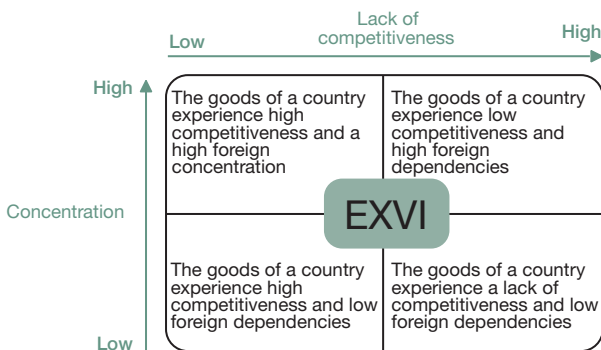
$$Pillar\ 1_{i,t}^k = (TR_{i,t}^{k^{w_1}} * HHI_{i,t}^{k^{w_2}})^{\frac{1}{(w_1 + w_2)}} \quad (5)$$

where $w_1 + w_2$ represent the relative importance of each indicator. This exercise assumes that both indicators are equally important, that is $w_1 = w_2 = 0.5$. The same approach is applied to the indicators in Pillar 2 and to the aggregation of the two pillars, resulting in the product-level EXVI.

$$EXVI_{i,t}^k = (Pillar\ 1_{i,t}^{k^{w_1}} * Pillar\ 2_{i,t}^{k^{w_2}})^{\frac{1}{(w_1 + w_2)}} \quad (6)$$

where again this exercise assumes that $w_1 = w_2 = 0.5$.

Figure 5
External Vulnerability Index



Source: Authors' own elaboration.

The final matrix is displayed in Figure 5. As before, the greatest risk of external vulnerability is observed in the top-right quadrant, where a country's goods face both risk factors, namely low competitiveness and high foreign dependency.

The calculation of the indicator using HS6-level products aggregated into broader baskets offers a practical framework for analysing vulnerabilities in strategic supply chains. This approach is particularly relevant for assessing supply chains targeted by major policy initiatives such as the Chips Act, the Net Zero Industry Act (NZIA), and the Critical Raw Materials Act (CRMA), which will be detailed in the next section. To align with these policies, we have selected a specific set of products within each of these supply chains, based on the assumption that all components are equally essential. Given the low substitutability of these products, a simple average is applied to derive the EXVI. Cross-country comparisons, especially between the EU, the US and China, provide valuable insights for policymakers, highlighting potential areas of strategic vulnerability and informing the design of more resilient supply chain strategies. Furthermore, differences in EXVI scores across countries could serve as an indicator of relative vulnerability to supply chain disruptions in relation to our main trading partners.

Empirical application using three sensitive supply chains

This section focuses on three areas prioritised by EU policymakers since the release of the EU's 2021 trade and industrial strategies.

The first area concerns raw materials, which are central to the functioning of several global supply chains. In April 2024, the

EU adopted the Critical Raw Materials Act,³ defining a list of critical raw materials (CRMs), which are considered important for the wider EU economy, and a list of strategic raw materials (SRMs), which are relevant in support of EU green, digital, defence and space applications and which present risks of dependencies. The focus on raw materials by policymakers is justified by their extensive range of applications and the rising global demand for some of these products such as aluminium, copper, silicon, nickel and manganese and the concentrated supply of many of these materials. Moreover, the Act aims, among other measures, to increase and diversify the EU's CRM supply, including by substituting strategic raw materials. Specially, it sets a benchmark for 2030, stipulating that no more than 65% of the EU's annual consumption of any given strategic raw material should originate from any single third country. In practical terms, the Act aims to reduce the risks associated with these products by strengthening global supply chains. It also seeks to continue to negotiate and implement Industrial Strategic Partnerships, as well as to develop sustainable trade and investment agreements.

A second sensitive area highlighted by EU policymakers refers to the supply chain of semiconductors.⁴ In mid-2023, the EU adopted the Chips Act, which aims at reducing the EU's vulnerabilities and dependencies on foreign actors. This is achieved by enhancing the EU's security of supply, resilience and technological sovereignty. As in the case of raw materials, microchips are pivotal for the manufacturing of current and future critical applications, including items related to work, education, entertainment, healthcare and mobility, among others. We map the supply chain of semiconductors in the EU based on the study conducted by Bonnet and Ciani (2023), who identify products spanning across different segments of the semiconductor value chain. Among these, we also include raw materials, with equal inputs for wafers, silicon wafers, foundry inputs, equipment, as well as final products.

The third sensitive area of products that we examine is the supply chain of technologies that play a central role in addressing climate change. As in previous sensitive areas, the market for these net-zero (NZ) technologies is set to triple by 2030. Recognising their significance, EU policymakers have designated them as critical technologies. On 16 March 2023, the Commission presented the Net-Zero Industry Act (NZIA) with the objective of building additional

3 Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020.
 4 Regulation (EU) 2023/1781 of the European Parliament and of the Council of 13 September 2023 establishing a framework of measures for strengthening Europe's semiconductor ecosystem and amending Regulation (EU) 2021/694 (Chips Act).

Table 1
Dependencies risk: Pillar 1 of the External Vulnerability Index across strategic supply chains

	Semiconductors	Net-zero technologies	Raw materials	All industrial products
EU	0.13	0.14	0.24	0.17
US	0.12	0.21	0.29	0.39
China	0.18	0.09	0.23	0.10

Note: EXVI scores: 0 = low vulnerability, 1 = high vulnerability.
 Source: European Commission, based on the latest BACI database (2022).

Table 2
Global position risk: Pillar 2 of the External Vulnerability Index across strategic supply chains

	Semiconductors	Net-zero technologies	Raw materials	All industrial products
EU	0.39	0.29	0.41	0.35
US	0.35	0.39	0.43	0.39
China	0.21	0.18	0.35	0.23

Note: EXVI scores: 0 = low vulnerability, 1 = high vulnerability.
 Source: European Commission, based on the latest BACI database (2022).

domestic manufacturing capacity within the EU.⁵ In particular, NZIA aims to achieve 40% of the production necessary to fulfil the EU's needs for strategic technology products by 2030. The NZ technologies covered in the paper include solar photovoltaics, wind turbines, batteries, heat pumps, electrolyzers and solar thermal technologies. In order to map CN products related to these technologies, we rely on final products and their first-tier components.

In order to calculate the pillars of the EXVI indicator, we will first identify HS6 products in each of the supply chains mentioned above. Using a simple average, which assumes that all the components are equally important, we obtain the two pillars explained above, which are summarised in Table 1 and Table 2. The final EXVI for each supply chain is obtained for the EU, US and China. The aggregated table with the EXVI for each sensitive supply chain and the aggregated industrial sector is shown in Table 3. Based on the latest BACI data, the obtained EXVIs show that the EU is more exposed to external trade vulnerabilities than China, but less so than the United States.

5 Proposal for a Regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem (Net Zero Industry Act) COM/2023/161 final.

Table 3
External Vulnerability Index across strategic supply chains

	Semiconductors	Net-zero technologies	Raw materials	All industrial products
EU	0.22	0.18	0.28	0.22
US	0.19	0.26	0.32	0.28
China	0.17	0.10	0.24	0.13

Note: EXVI scores: 0 = low vulnerability, 1 = high vulnerability.

Source: European Commission, based on the latest BACI database (2022).

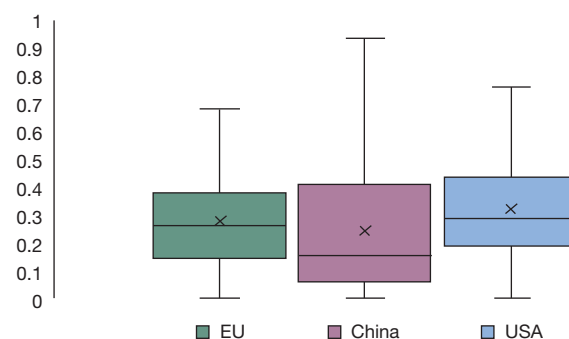
A closer examination of critical areas such as raw materials, semiconductors, and net-zero technologies reveals that the EU is most vulnerable in raw materials. Furthermore, the index shows that the EU is more vulnerable than China in all three supply chains, while it is more vulnerable than the United States only in semiconductors.

As previously highlighted, each EXVI number is composed of different product categories and for this reason, it is also necessary to look at the distribution of the product EXVIs. It is important to highlight that the vulnerability of a given supply chain is determined by its weakest spot. In other words, in the absence of a substitute, a critical component might affect the ability of an entire supply chain to produce. Figure 6 shows the distribution of the list of critical raw materials across the EU, China and the US. Among these regions, we observe that China has a lower aggregate EXVI value than the EU and the US. However, looking at individual products, we observe a low EXVI in some product categories (i.e. aluminium ores, boron, palladium, magnesium), while observing a high EXVI in some other raw materials (e.g. types of nickel, manganese, lithium carbonates, unrefined copper). Looking at the distribution, China has many more products with low EXVI compared to the EU and the US, but the 75th percentile of these products is higher than the EU. This means that although China has low vulnerability across a greater number of products, it also faces higher vulnerability in a larger range of products. In short, the distribution of the EU is more concentrated around the unweighted average than the distribution of China.

Conclusion

The increasing interconnectedness of global trade highlights the need for indicators to assess external vulnerabilities of regions in different products, sectors and supply chains. Accurately identifying and quantifying these vulnerabilities is essential for policymakers to design

Figure 6
Distribution of product External Vulnerability Indices within the raw materials list



Note: EXVI scores: 0 = low vulnerability, 1 = high vulnerability.

Source: European Commission, based on the latest BACI database (2022).

effective strategies that mitigate risks and enhance economic resilience. The EXIV provides a tool in this regard. By integrating key dimensions such as trade dependencies and global market positioning, the EXVI offers a framework to evaluate external risks across products, sectors and countries. As the global trade landscape continues to evolve, tools like the EXVI are useful for informed decision-making and long-term reduction in supply chain risks.

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Malorie Schaus

The EU Trade and Investment Policy: Navigating Challenges and Seizing Opportunities

The EU is facing increasing challenges in its trade and investment relations globally. How has the EU trade and investment policy adjusted to this new reality? Is the EU rightly seizing related opportunities for its own prosperity and competitiveness, the global economy and the rules-based multilateral trading system?

This short paper aims at shedding light on the challenging times we are confronted with, before delving into the new paradigm shift of the EU's trade and investment policy, and assessing its contribution to the EU and global trade and investment relations, as supported by the World Trade Organization (WTO).

Economic and trade challenges to the EU's prosperity and competitiveness

The EU's prosperity and competitiveness, traditionally founded to a great extent on open trade and investment, are profoundly challenged – on economic, security and geostrategic grounds – in a global economic and trade context marked by fundamental transitions.

The global economy is facing a historic level of protectionism and weaponised trade relations, which are leading to an emerging global trade and economic fragmentation, with an enhanced risk of escalation. The number of protectionist measures – covering goods, services, technologies and investments – has significantly increased recently, from 2,869 in 2017 to 6,000 in 2020 and reaching 4,493 in 2023 (Bouissou, 2024). In their geostrategic confrontation, the two largest global economies, China and the US, also have an increasing recourse towards beggar-thy-neighbour security-driven policies that render the EU and all economies globally more vulnerable. Furthermore, as explained in the World Trade Report 2023 (WTO, 2023), international trade is progressively shifting towards geopolitical lines; intra-bloc trade gradually becomes denser compared to inter-bloc trade.

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The consequences are already felt and may become dramatic for the EU, but also for the other global economic powers, and even more so for developing economies. A dislocation of the global economy would mean 7% to 12% GDP losses, reduced prosperity, soaring prices, slower growth, slower innovation, rising social risks and instability, increased risks of conflicts, and ultimately less economic security for the EU and on the global stage.

The global economic shift towards enhanced sustainability – greatly supported by the EU – is also going to entail more autonomous economic models that will rely differently and possibly less on international trade. By its essence, the circular economy, once mature, will fundamentally change our production and consumption model in creating further value based on existing, recycled products, which will entail different ways of trading. Even if driven by different factors (including circumventing tariff barriers), we may already observe a relocalisation (i.e. re- and near-shoring) of the production of batteries and wind turbines – clean tech that is key for the green transition – based on recent redirected investments, in support of the green transition.

The new paradigm shift of the EU's trade and investment policy

In this context, the EU aims at progressively adjusting and reinventing its economic and trade models. With the recent reorientation of its trade and investment policies towards open strategic autonomy, the EU is striking a very delicate balance, on the one hand seeking strategic autonomy – to the extent needed – which is aimed at enhancing resilience and competitiveness of the EU economy and related supply chains, as well as the protection of its fundamental economic interests through expanded autonomous trade measures. On the other hand, it is seeking further openness and cooperation with the broadest possible range of countries to the extent possible.

In other words, while the EU aims at minimising the vulnerabilities linked to growing economic security risks, it remains committed to preserving its traditional trade and economic openness and dynamism to the maximum extent possible. Most importantly, in a context of fundamental transitions, the EU's incrementally reoriented trade model is essentially aimed at contributing to a more resilient future – in the short and long run.

With its open strategic autonomy – progressively realised through the European economic security and de-risking strategy – the EU is not only aiming at effectively managing actual fragmenting trade relations, it is also importantly projecting itself into the longer-term future. We know that this more distant horizon will be an uprightly reformed rules-based multilateral trading system accompanying and supporting the trade and investment move towards re-globalisation, i.e. involving better and newly integrated economies globally, enhanced sustainability and growing services trade.

From this perspective, the EU should continue to leverage the core strengths of its normative model, i.e. it is open, rules-based, sustainability-driven, country-agnostic and has a limited security prism, to further assert its essential role on the global stage and thereby fundamentally contribute to a revamped, more harmonious global economy and trading system.

The EU trade and investment policy: From fragmentation to re-globalisation

Despite a more inward-looking approach, the European economic security strategy is still to a great extent embedded in rules-based openness for present and future times. It is founded on two main strategic autonomy pillars – proactive and defensive – both buttressed by a third one – on open dialogue and cooperation.

- The first pillar – the proactive perspective – is designed to promote the enhanced resilience and competitiveness of the EU's economy and its supply chains based on the EU's diversification (trade policy) and reinforced innovation and production capacities (industrial policy).
- The second pillar – the defensive approach – is aimed at protecting the EU from economic security risks based on existing, improved or new autonomous trade measures for a global level playing field, sustainability, sovereignty and security.
- The third transversal pillar – the cooperation perspective – is aimed at partnering with the broadest possible range of countries who share common economic security concerns or interests with the EU.

The EU's proactive approach: The EU's diversification strategy

On the proactive side, the magic trick for preserving to a maximum extent the EU's openness, in support of its resilience and competitiveness, relates to its diversification strategy, which extends to both the EU's external growth markets, and also, importantly, its sources of supply of key inputs for the green and digital transitions (e.g. critical raw materials, green goods). This new frontier of trade coop-

eration has translated into more diversified engagement, contributing thereby to progressive re-globalisation, as supported by rules-based multilateral trading – the very effective silent voice of continued agile international trade. It will benefit traditional trading partners, but also connecting countries such as near-shore destinations (especially, Central and Eastern Europe) or ASEAN nations, producers of raw materials worldwide, and emerging economic hubs (in manufacturing or services).

First, the EU's already wide network of free trade agreements (FTAs) is being adjusted and expanded to cover “new new” generation FTA provisions related to supply security. The latest examples include the EU-New Zealand FTA (which entered into force on 1 May 2024) and the EU-Chile FTA (soon to be ratified by Chile), which both comprise a detailed chapter on energy and raw materials, beyond the rules on trade and sustainable development. Even if the conclusion and ratification of EU FTAs has proven difficult in the recent past, the EU announced the conclusion of the EU-Mercosur FTA and the EU-Mexico FTA in previous weeks, which translates as a note of hope in protectionist times.

Secondly, complementary forms for cooperation have emerged. The EU has signed digital partnerships – covering supply chain monitoring through digital tools – with Japan, South Korea, Singapore and Canada over the 2022-2023 period. It has also concluded its very first digital trade agreement with Singapore in July 2024. Furthermore, the EU has established trade and technology councils with the US and India in 2021 and 2023, respectively. Their technical approach could be a strength for their continued operation and relevance, despite contrary winds. Partnerships on critical raw materials and industrial policy have also seen the light lately, for instance, the EU-Canada strategic partnership on raw materials, or the US-led minerals security partnership. Another interesting collaboration – the first of its kind – relates to the EU-Angola sustainable investment facilitation agreement (SIFA), signed by both parties in November 2023, which aims at attracting and expanding sustainable investments in all economic sectors of Angola, notably regarding raw materials and energy resources.

The EU's defensive approach: A paradoxically proactive EU regulatory framework

On the defensive side, the EU has expanded its legal arsenal of autonomous trade measures aimed at different essential objectives, including a global level playing field, enhanced sustainability, sovereignty and security. While it is designed to protect the EU's fundamental principles and interests, further conditioning the EU's trade relations and access to its single market, the EU's more inward-looking approach should also be assessed as a proactive

regulatory framework designed to incrementally lay the foundations of modernised multilateral trade rules and a reformed dispute settlement system as part of the WTO.

For instance, among the measures targeting a global level playing field, the EU foreign subsidy regulation, aimed at countering the distortive effects of foreign subsidies used with respect to economic activities in the EU internal market – in particular, those from China, is an essential instrument for the EU and other WTO members to pursue, at the multilateral level, competitive neutrality and the WTO fundamental principles based on the primacy of market forces and the convergence of economic systems. It may represent an interesting laboratory for developing a better knowledge base on subsidies and improved disciplines. Nevertheless, multilateral discussions are going to be harsh, given China's consistent opposition to modernised rules in this area, driven by its own emerging normative and governance model – socialism with Chinese characteristics – it aims to impose on the global stage.

Another relevant example concerns the EU's trade-related measures on sustainability, such as the carbon border adjustment mechanism (CBAM) or the EU regulation on deforestation-free products. While they may encounter opposing forces by trading partners and may need to be further aligned according to the adjustment capacity of the EU's trading partners, these autonomous measures are necessary to lead the way towards enhanced global sustainable trade, which is incrementally embraced by the rules-based multilateral trading system (e.g. the WTO agreement on fisheries subsidies – first agreement with environmental sustainability at its core; WTO discussions on environmentally sustainable plastics trade) and at the plurilateral level (e.g. The Coalition of Trade Ministers on Climate).

An interesting aspect to underline with the growing recourse of traditional rules-based trade defence measures by the three largest global economies, the EU, the US and China, is the parallel submission by the EU, but also by China, of related cases to the WTO dispute settlement system, which may serve to reinforce its core role as well as the effectiveness of its disciplines and thereby the WTO's continued legitimacy and credibility.

The EU autonomous trade measures based on sovereignty and security purposes may, however, be considered as more problematic with respect to the rules-based multilateral trading system. The EU anti-coercion regulation could be deemed WTO-inconsistent to the extent that it would entail the application of trade-related Union response measures without a prior decision from the WTO adjudicating bodies (Article 23 of the Dispute Settlement Understanding). Nevertheless, it is first conceived of as a deterrence meas-

ure – countermeasures are a last resort – and it foresees the continued possibility for engagement with the third country where relevant (Article 6 of the EU anti-coercion regulation).

The EU has also adopted a framework regulation for the screening of inbound foreign direct investment based on public order and security – one of the first new generation EU autonomous trade measures – in 2019, and it is currently assessing, together with the member states, whether an EU initiative is necessary regarding EU outbound investments in sensitive sectors, such as advanced semiconductors or artificial intelligence technologies, given potential security risks in the country of destination linked to their dual use nature.

The difficulty with measures based on national security is that they are generally adopted to last over time, and their scope may be progressively extended given their open, discretionary nature. The EU has, however, refrained from reading its trade and investment policy systematically through the prism of security. The EU autonomous trade or investment measures based on national security grounds are still very limited. Importantly, the EU economic security approach is essentially incremental, based on sound risk assessments. It involves constant coordination with the member states, as reflected by the process applied regarding a potential EU outbound investment initiative.

Conclusion

While the EU and the world are facing increasing challenges on fundamental economic, security and geostrategic grounds, the future of the EU and global economy is being built today, not only through the management of fragmenting economic and trade relations, but also in contributing to the incremental re-globalisation process and in laying the foundations for a reformed rules-based multilateral trading system in the longer term.

Based on its delicate balancing act between strategic autonomy and open dialogue and cooperation, the EU's re-oriented trade and investment policy aims at positively integrating the challenging transitioning reality in relying – to the maximum extent possible – on the fundamental strengths of its model and bringing that in line with re-globalisation and a forward-looking WTO that has proven essential to global economic growth, innovation, investments, consumers preferences and global sustainable development.

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Jochen Andritzky and Nils Hesse*

Should Non-EU Countries Be Able to Join the EU Emissions Trading System?

Climate mitigation requires global action: it does not matter where on earth a tonne of carbon emissions is being saved. Reducing carbon emissions is often cheaper in less developed countries than in EU member states. Therefore, integrating them into the EU Emissions Trading System generates efficiency gains that present a triple win for both regions and the global climate while also addressing the development dilemma of climate mitigation.

Many advanced economies have set ambitious carbon emission reduction targets. At the same time, these countries often face increasing marginal costs, as low hanging fruits have already been picked. In contrast, many emerging and less developed countries are expected to grow strongly, causing significantly higher CO₂ emissions. The International Monetary Fund (IMF) estimates that CO₂ emissions of middle- and low-income countries will increase by 35%-45% by 2030, mostly driven by GDP growth in these regions (Chateau et al., 2022). Globally, projections show an increase in CO₂ emissions by 2030 of more than 20% vis-à-vis 2019.

Capturing gains from comparative advantages

Less developed countries often face lower marginal costs of reducing carbon emissions, attributed to the fact that the more developed a country is, the less carbon inten-

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sive a unit of GDP produced is. In the calculations underlying Chateau et al. (2022), the IMF assumes lower GDP losses from carbon pricing in less developed countries than in advanced countries, although the effect varies depending on the economic structure.

The reasons for higher costs in advanced markets could be declining margins, in other words the easy gains of carbon reductions such as phasing out coal combustion have already been realised; lower efficiency of certain green technologies, e.g. fewer hours of sunlight in some advanced economies; and costs from stranded assets, as green technologies have to displace brown technologies, which is more expensive than greenfield investments.

Ricardo's theory of comparative advantage suggests that efficiency gains are larger when trading partners are more different. Today, however, carbon emissions are barely tradeable internationally. Trade therefore promises significant efficiency gains. These gains could generate a three-sided win-win, for advanced as well as for less developed countries, and for the climate overall.

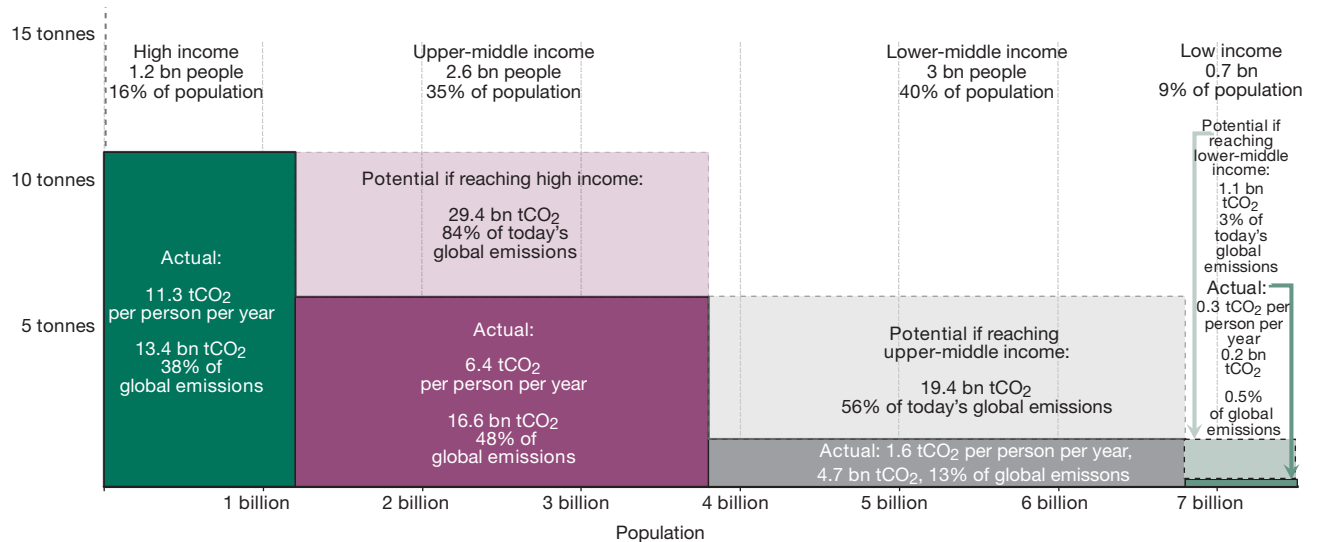
The development dilemma

From a global perspective, the differences in domestic policy priorities are mind-boggling: while EU policies try to squeeze out the last little bit of emission reductions through carbon pricing and subsidies for green technologies, growth in the less developed parts of the world frequently requires brown technologies, often because they are less capital intensive. This less climate-friendly infrastructure, which is rapidly scaling up in the high-growth environment of emerging countries, will remain in use for decades to come.

This throws effective development policy into a dilemma: the rise of less developed regions may thwart global climate mitigation efforts. For instance, China's emissions

Figure 1
CO₂ emissions, emission intensity and income level

Per capita carbon emissions (tCO₂ per person per year)



Sources: Lenaerts et al. (2021); Our World in Data and authors' own calculations.

have more than quadrupled during its amazing growth sprint over the last three decades. Would all upper-middle (lower-middle) income countries achieve the level of income of high-income (upper-middle) countries at their prevailing CO₂ intensity, global CO₂ emissions would rise by 12.8 (14.7) billion tCO₂, all else equal (Figure 1). Both these numbers are in the range of the total emissions caused by high-income countries, offsetting their efforts to reach climate neutrality.

This dilemma will not go away easily. The G20 pledge for development banks to stop financing coal power projects is an attempt to avoid a repeat. However, coal remains the most affordable source of energy production in many countries, partly because it is a less capital-intensive technology. Less than 5% of global investment in energy transition goes to developing countries, which require about US \$1.5 trillion per year in energy transition investment until 2030 (see Bhattacharya et al., 2024).

Hence, the thought of utilising emissions trading as a mechanism for development finance is a new and elegant way to better align the two conflicting policy objectives of climate mitigation and sustainable development.

How it could work

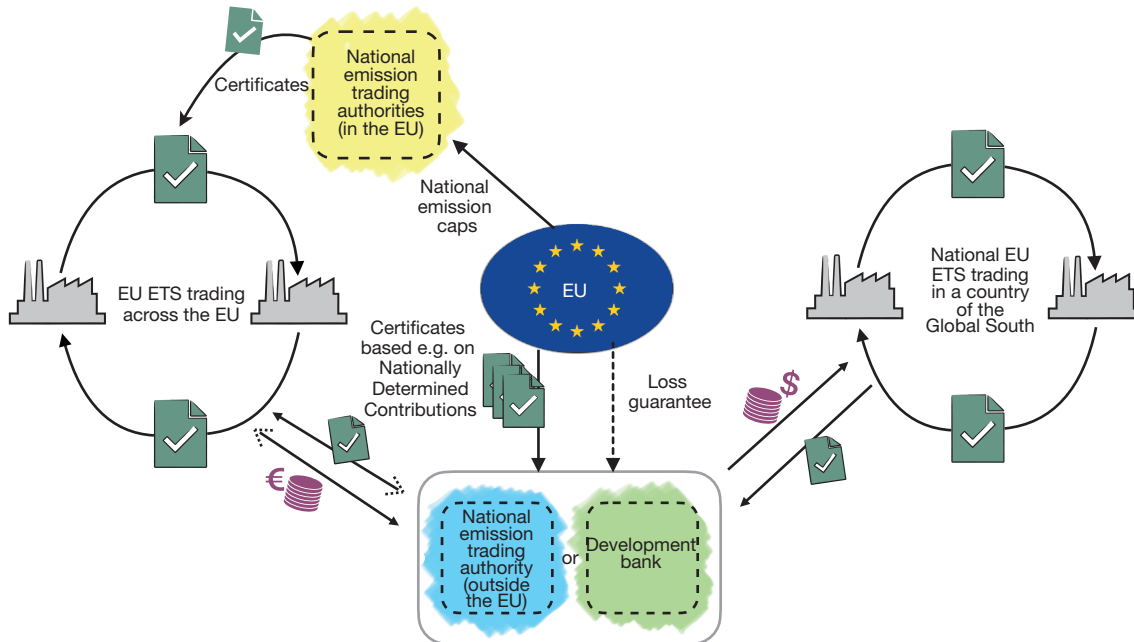
In the case of a country joining the EU Emissions Trading System (ETS) covering the energy and industrial sectors, the emitters in these sectors will have to acquire EU emis-

sion certificates for their emissions (i.e. unilateral linking; see Burtraw et al., 2013). The cap on EU ETS certificates would be adjusted in line with the expansion of the EU ETS, as has been done when countries access the EU, such as Croatia in 2013. The expansion to the cap in the EU ETS does not mean that the emission cap is being relaxed – it means that more emissions are covered by a trading system that is the most efficient and effective way to achieve lower emissions.

The certificates would be put into circulation via a central counterpart in the country that has joined the EU ETS, for instance a local development bank or an institution similar to national emission trading institutions in the EU, such as the German Emissions Trading Authority (DEHSt). This institution would allocate the certificates to the emitters and receive a trade monopoly. Figure 2 illustrates the setup.

The increase in the cap could be calibrated in different ways. A generous way would be to increase the cap along a business-as-usual (BAU) scenario under baseline economic growth, which in emerging and less developed countries is typically higher than in the EU. If the allocated amount in the respective country is based on the BAU, no scarcity exists and the certificates would have zero value in local trading. Again, all else equal, even if this BAU scenario is less ambitious than the EU's goal for reducing emissions, it does not mean that there would be more emissions globally. It just means that emission reductions

Figure 2
How would joining the EU Emissions Trading System work?



Source: Authors' own illustration.

take place where it is most efficient within an enlarged region.

Under the Nationally Determined Contributions (NDC) of the Paris Agreement, countries have set out their own ambitions to reduce carbon emissions (unconditional scenario) and a second, more ambitious goal assuming financing from advanced economies (conditional scenario). It would be reasonable to increase the cap along the unconditional scenario. This means the following two things.

First, certificates are scarce and have a positive price. Since the unconditional scenario has lower emissions than the BAU scenario, there will be fewer certificates than needed without any climate ambition, hence the certificate price in the local market will be above zero. Since the local emission trading institutions receive the certificates for free, they could sell or auction them and receive a price for them. This revenue could be redistributed, for example, to shield poor consumers from the impact of carbon pricing in the energy sector. Since electricity is typically subsidised, mechanisms for the redistribution usually exist. Given the local market is disconnected from the EU ETS, the carbon price in the non-EU country can be different from the EU ETS. Different mechanisms, such as a price cap, could be used to prevent unduly high carbon prices. A loss guarantee by the EU could insure the country against a situation in which it fails its NDC target,

e.g. if growth is unexpectedly higher, and would have to purchase additional certificates on the EU ETS market.

Second, the EU ETS price rewards any carbon savings. If the country achieves higher carbon reductions and therefore does not use the corresponding amount of EU ETS certificates, the country could sell them in the EU ETS. As the ETS price reflects the marginal price of saving a tonne of carbon emission, the carbon saving is achieved at a lower price – an efficiency gain from trade. While the proceeds from this are a financial transfer from the EU to the respective country, it still leaves the EU better off, too. The carbon trading institution could retain part of this efficiency gain, e.g. by applying a levy on any sale of certificates from local entities to the EU ETS. Just like the EU Modernisation Fund today receives a fixed share of proceeds from EU ETS allowances auctioned, the revenue from auctioning certificates or their trading with the EU ETS would accrue with a designated development finance institution.

Compared to the current situation, this would massively improve incentives to invest in capital-intensive green technologies in non-EU countries. Given high capital costs in these countries, currently green technologies in the energy sector are not deployed even if the levelised cost of energy, a measure for the cost of a kilowatt-hour produced, is lower.

A global price for CO₂ emissions?

Is a global price for CO₂ emissions fair? No, it is not. And the proposal does not mean CO₂ prices will be equalised. The IMF's proposal for an international carbon price floor for key high-emitting countries proposes different price floors of US \$25, US \$50 and US \$75 per tonne CO₂ for low-income, middle-income and high-income countries respectively (Black et al., 2021). The rationale for this differentiation is fairness, not efficiency. The debate focuses on two price theories.

Pro uniform carbon price. A uniform carbon price would be more efficient from the perspective of global growth. According to the IMF's calculations, a uniform global carbon tax achieving the same carbon reduction as under differentiated prices would yield a higher global real GDP by about 0.3% in 2030 (Chateau et al., 2022). However, growth in low- and middle-income countries would suffer vis-à-vis the differentiated prices. These countries could be compensated, while the world remains better off.

Contra uniform carbon price. Many countries fear losing out through the free trade of CO₂ certificates. The IMF writes: "Given their lower per capita income, smaller contribution to historical emissions, and generally higher emissions intensity of production, lower price floor requirements for emerging market economies (EMEs) may be appropriate and needed to encourage their participation" (Parry et al., 2021).

To ensure price differentiation, the proposed mechanism – while trading the same EU ETS certificates – maintains two segregated markets. An institution with a sustainable development mandate – such as a development finance institution – would receive a monopoly for trading emissions certificates between the non-EU country and the EU market. Parallel to the levy that the emissions trading institutions would impose on certificate sales, the purchase of additional certificates could be discounted from the EU ETS price.

Overcoming reservations

Linking emission trading systems is not new and has often failed, for a myriad of reasons, more technical than political. The key difference of joining the EU ETS is that countries can adopt a well-established institutional setup, albeit a rather complicated one. The advantage is that issues such as double counting and fraud with carbon offsets can be better avoided. This will require capacity building and monitoring services provided by the EU. But overall, the well-designed institutions of the EU ETS would be offered as a global public good, just like in the past low-inflation reserve currencies. Hence, the institu-

tional setup of a foreign monetary policy was adopted by some countries. In times of geoeconomic fragmentation, the EU ETS adoption would form partnerships between the EU and other countries – and hence also has non-economic benefits.

Certainly, not many emerging or less developed countries are instantly ready to adopt a system like the EU ETS. The current efforts to help Ukraine develop an ETS under its association agreement with the EU demonstrate the difficulties. Yet, a large number of countries are currently working on developing their own ETS scheme (World Bank, 2023). The incentive of receiving generous allowances of EU ETS certificates, which can be thought of as a type of currency, could speed up implementation. Countries joining the EU ETS would gain from its credibility compared to local schemes. If sharing the EU's ambitions for reducing emissions, joining the EU ETS would obviate the need to negotiate any exception from the EU's Carbon Border Adjustment Mechanism (CBAM).

EU member states may be opposed to the expansion of the EU ETS as they fear a dilution of certificate prices. This is unlikely at the outset, since the additional free allowances are not large enough to distort the EU ETS. Establishing a different mechanism to allocate free allowances in the non-EU country could be seen as undermining the current, more stringent approach to reducing free allowances in the EU earlier. Ultimately, the political pledge of domestic climate neutrality resonates well with parts of the electorate who may oppose anything that puts this objective into question. For them, high carbon prices and falling emissions in the EU are a sign of virtue, regardless of the effect on global emissions. These arguments are all political. Economically, they are nonsensical. At times when the economic inefficiency of climate policies starts to dominate in the public debate and voters turn against climate policies, economic arguments are more likely to convince them than the moral pledge of local carbon neutrality at any price.

An example: What if Morocco were to join the EU ETS?

Morocco is highly committed to climate mitigation, having pledged to reduce its greenhouse gas emissions by 18% by 2030 compared to a BAU scenario. Conditional on additional international support, it could reduce emissions by 45% by 2030 (European Environment Agency, 2023). In 2022, the EU and Morocco launched a Green Partnership on energy, climate and the environment (European Commission, 2022). In line with the partnership commitments, the EU has pledged €50 million for the greening of Morocco's economy and energy sector as part of the EU coop-

Table 1
Morocco's energy and industry sector emissions and Emissions Trading System certificates

	Energy sector	Industry sector	Both sectors
Emissions (in MtCO₂eq)			
2022 Actual	30	7.5	37.5
2030 Business-as-usual scenario	50	18	68
2030 Under unconditional targets	41	15	56
2030 Under conditional and unconditional targets	27	10	37
	Energy sector	Industry sector	Both sectors
Value of ETS certificates at €50/MtCO₂eq (in bn euros)			
2030 Business-as-usual scenario	2.5	0.9	3.4
2030 Under unconditional targets	2.1	0.8	2.9
2030 Under conditional and unconditional targets	1.4	0.5	1.9

Sources: Climate Action Tracker, Policy Center for the New South, Moroccan Ministry of Energy Transition and Sustainable Development, authors' own calculations.

eration programme in 2023, which has an overall volume of €624 million (European Commission, 2023). Morocco is rated Ba1 by Moody's and investors face considerable strains in funding green investment.

In 2022, Morocco emitted a total of 66.7 million tonnes of CO₂, with the energy and industry sectors contributing 45% and 11% respectively (Table 1). In a BAU scenario, the emissions in these sectors are to rise by more than 60% in the energy sector and more than double in the industry sector. These emissions compare to the current EU-wide cap set for 2021 (including the UK) of 1,571 million allowances to emit a tonne of CO₂ or equivalent which is reduced by 2.2% per year. Hence, Morocco's 2022 emissions in the energy and industrial sectors correspond to about 2% of the EU's ETS allowance. At 37.5 MtCO₂eq these two sectors in Morocco emit just slightly more than the free allowances allocated to the EU's three most polluting steel mills,¹ and slightly more than the EU's entire production of bulk chemicals.²

Assuming the emissions price of €50 per MtCO₂eq in today's prices, the value of certificates needed by Morocco's energy and industry sectors under the unconditional scenario are currently valued at €2.9 billion per year.

1 ThyssenKrupp Hüttenwerk in Duisburg, 14.8 MtCO₂eq; Tata Steel Ijmuiden, 10.2 MtCO₂eq; ArcelorMittal Atlantique et Lorraine Dunkerque, 9.6 MtCO₂eq; all as of 2022 (European Commission, 2021).

2 33.2 MtCO₂eq (European Environment Agency, 2024).

Hence, the proceeds from selling EU ETS certificates if Morocco manages to reduce emissions under the conditional scenario equals €2.9 - €1.9 = €0.9 billion per year in 2030. A 50% levy would mean that the emitters who deploy green instead of brown technology would receive proceeds of about half a billion euros per year, with the rest accruing to the emissions trading institution for development purposes. However, it is hard to say what the marginal price of carbon reductions under these targets will be. In any case, these amounts are likely much more significant than the support provided by the EU under existing agreements.

The proceeds from EU ETS certificates would be a game changer for investments in green technologies. Today, such investments are hampered by green technologies, such as solar plants, being relatively more capital intensive, while proceeds from the local sale of electricity often remain below the cost of production. The savings in CO₂ emissions from renewable energy vis-à-vis brown technologies would free ETS certificates with a value of around €0.04 per kWh at an ETS certificate price of €50 per MtCO₂eq.

Older installations, such as the 160 MW NOORo I Concentrated Solar Power Project at the Ouarzazate Solar Complex south of Marrakesh commissioned in 2016, produce clean electricity at a levelised cost of energy of €0.26 per kWh (National Renewable Energy Laboratory, 2023). The new Noor Midelt I Solar Plant, while suffering from long setbacks, is expected to reach a levelised cost of energy of €0.07 per kWh during peak hours, one of the lowest globally. The project requires an investment of about \$2.3 billion, which is financed by the World Bank, the International Bank for Reconstruction and Development, the Clean Technology Fund with loans from the African Development Bank, the European Investment Bank, the French Development Agency and KfW (NS Energy, 2019). If the project could benefit from the sale of ETS certificates for the 700,000 tonnes of CO₂ saved per year, a significant revenue stream of €35 million at an ETS certificate price of €50 per MtCO₂eq would be added to the operation.

Summary

Climate mitigation requires a global approach. Thinking backwards, in the long run we will have a system of global emissions trading just as we have a system of convertible currencies today – something that sounded like a moonshot 75 years ago before the Bretton Woods Agreement in 1944. Emissions trading is not only economically efficient, it is also effective given it caps emissions. Trading produces larger efficiency gains when comparative advantages are larger, suggesting large efficiency gains

from emissions trading between the EU and non-EU economies. To harvest these gains, access to the EU ETS would avoid the obstacles and drawbacks of linking national schemes. In the end, both partners would benefit – and the global climate, too.

The free or discounted allocation of emission certificates, if channelled through appropriate institutions, would support development and make green investments in emerging and less developed countries profitable. In addition, countries joining the EU ETS under similar ambitions would be spared from the EU CBAM. The efficiency gains would in part be reflected in the certificate prices, moderating emission costs in the EU. Most importantly though, a larger share of global emissions would be captured by emission trading systems, the most efficient and effective way towards global net zero. Just like countries adopting a foreign currency, a well-designed institution, like the EU ETS, should become a global public good.

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Michael Grömling

The Current Economic Situation in Germany in the Context of Previous Crises

This article places the current economic stagnation in Germany in the context of previous crises since 1991. In terms of depth, the current macroeconomic crisis, resulting from the pandemic and geopolitical upheavals, has already exceeded the level of all three previous crises, in some cases considerably. In order to return to the growth path experienced in the last three decades, annual economic growth of 2.5% for the next six years is necessary. There are serious doubts about whether the German economy will return to its previous path of prosperity.

Germany's economy stagnated in 2024, and its economic output has remained more or less at the level of 2019, i.e. the level before the major economic burdens associated with the COVID-19 pandemic and the Russian invasion of Ukraine. The outlook for 2025 signals continued stagnation. This means that Germany is experiencing its longest period of economic inactivity in the last seven decades. In 2023 and 2024, significant declines were recorded in the manufacturing and construction industries (Figure 1).

The construction industry is suffering from high financing and construction costs as well as weak investment activity overall. The high construction costs reflect the material and energy problems, as well as high regulatory costs. In addition, in the wake of the war-related energy price shock and associated high inflation, interest rates rose significantly.

The manufacturing crisis can be attributed to several partly mutually reinforcing causes (Grömling, 2024a):

Weak global economy. The geopolitical conflicts are having a direct negative impact on international investment activity. The high inflation rates resulting from energy price shocks caused by the war have also weakened consumption worldwide. This global slump is dampening foreign demand for German industrial goods and exports.

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In the major industrial sectors in Germany, foreign sales account for around two-thirds of business.

Weak domestic demand. In addition to weak external demand, there is a macroeconomic investment crisis in Germany. The construction recession has led to a significant drop in demand for industrial intermediate goods and construction-specific capital goods. In addition, the notable rise in financing costs is dampening general investment activity and thus an important part of the German industrial spectrum.

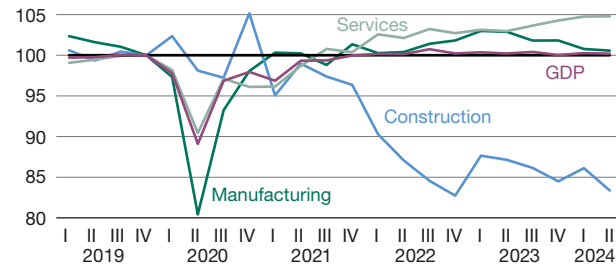
Uncertainties. The geopolitical upheavals are having a direct impact not only on global investment activity. Rather, the political uncertainties are also creating a business environment characterised by economic imponderables. In addition, uncertainties in the context of climate policy and the conditions for transformation and, above all, the unclear economic policy course in Germany are causing caution and restraint among companies and consumers. The end of the German government coalition in November 2024 and the anticipated outcome of the election in early 2025 are contributing to economic policy uncertainty.

Loss of competitiveness. Last but not least, the competitive position of internationally oriented companies has deteriorated, which in turn is curbing demand for industrial goods via the foreign trade channel and the propensity to invest domestically. As a result of the multiple cost shocks caused by the sharp rise in energy prices, higher raw material prices and higher production costs due to global logistical problems and higher labour costs, German industry has lost price competitiveness. Added to this is the appreciation of the effective exchange rate of the euro against a number of international competitors.

Figure 1 shows that the services sector has so far provided an economic counterbalance. In the first half of

Figure 1
Sectoral breakdown of economic development in Germany

Seasonally, price- and working day-adjusted gross value added; index: 4th quarter 2019 = 100



Sources: Statistisches Bundesamt; author's own calculations.

2024, the price-adjusted gross value added in this sector, which accounts for around 70% of total economic activity in Germany, was 1.6% higher than in the previous year. There was growth across the entire spectrum of the service economy – in business services and consumer-related services as well as in the public and social sectors. The positive income trend resulting from wage increases and normalising inflation rates as well as expansive government activity are currently benefiting the German service sector. Nevertheless, this trend is at best sufficient to compensate for the declines in manufacturing and the construction industry.

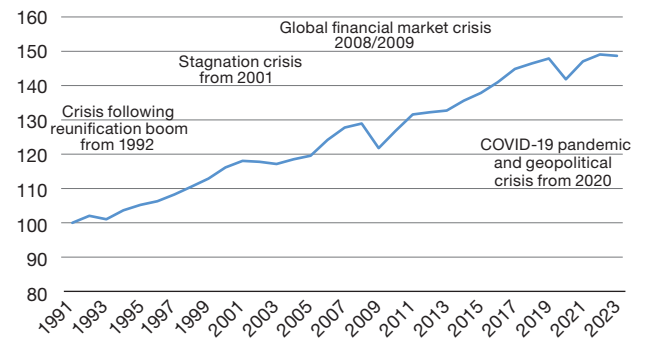
Cyclical and structural explanations

The arguments cited for the current manufacturing crisis extend beyond the poor cyclical situation, as cyclical factors partly overlap with long-term structural shocks. The pandemic and the current geopolitical upheavals show that economic shocks can also trigger changes in the sectoral structure of an economy (Grömling, 2021). Conceptually, the business cycle refers to fluctuations in the utilisation of a given production potential. The production potential describes the overall economic production possibilities of an economy with a normal utilisation of its production factors. Capacity utilisation is measured by gross domestic product (GDP), i.e. the actual volume of goods and services produced. Structural shocks (in addition to neutral technical progress and factor accumulation) have a direct influence on the level and composition of the production potential.

From a structural point of view, geopolitical changes and adjustment burdens have been causing an economic re-orientation and triggered a new discussion about the risk of deindustrialisation (Grömling et al., 2023). This dis-

Figure 2
Long-term economic development in Germany

Seasonally, price- and working day-adjusted GDP; index: 1991 = 100



Source: Federal Office of Statistics; author's own calculations.

cussion relates to the medium- to long-term significance of previously familiar sales markets, the reliability of international supply chains and logistics systems, the supply of raw materials and energy and, last but not least, the international transfer of knowledge. The restrictions experienced as a result of the pandemic (see Grömling, 2021) are being exacerbated by new tensions and uncertainties due to the changing geopolitical climate.

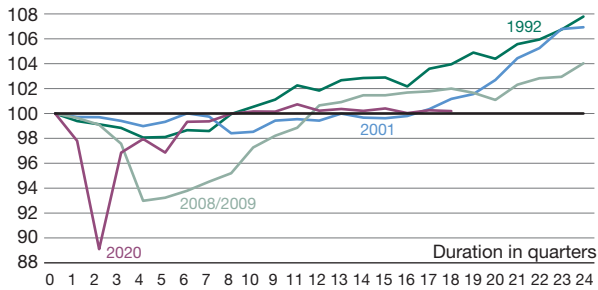
It remains to be seen what long-term adjustment burdens the new US administration will impose on the global economy and Germany. Added to this are the direct adaptation burdens for companies resulting from climate change and political transformation goals. The acute deterioration in competitiveness must also be seen in a long-term context. The quality of a business location is influenced by a variety of conditions – such as the availability of skilled workers, energy supply, the various infrastructures – and by the fundamental economic policy orientation.

Current crisis in the context of former business cycles

This article places the current economic situation in the context of previous crises in Germany since 1991 (Grömling, 2024a). Figure 2 shows the development of price-adjusted GDP on the basis of annual values with the four crises: the crisis following the reunification boom from 1992, the stagnation crisis from 2001, the global financial market crisis of 2008/2009, the COVID-19 pandemic and geopolitical crisis from 2020. The aim and subject of this article is to provide a simplified method for assessing the current economic situation against the background of the economic crises that have occurred in Germany in the last three decades. The duration and depth of these crises can be seen in Figure 3.

Figure 3
Duration and depth of economic crises in Germany

Seasonally, price- and working day-adjusted GDP; index: quarter with the last peak = 100



Notes: The development of seasonally, price- and working day-adjusted GDP is shown on the basis of quarterly figures from the national accounts. The time series are indexed to the quarter before the start of a recession. The first quarter of 2020 thus marks the start of the macroeconomic recession and, accordingly, the time series begins with the fourth quarter of 2019.

Sources: Federal Office of Statistics; author's own calculations.

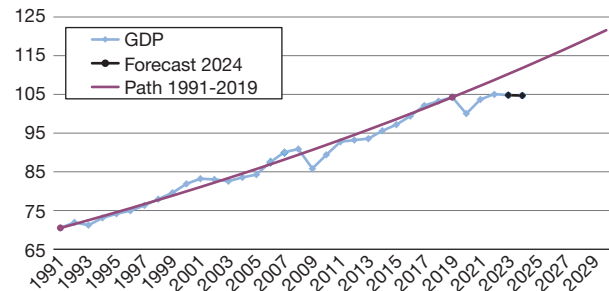
In terms of the overall economy and quarterly figures, the slump in the wake of the coronavirus pandemic was the sharpest to date, followed by the decline during the global financial market crisis in 2009. The pre-crisis level was nearly reached relatively quickly during the COVID-19 crisis in the eighth quarter. Figure 1 has already shown that there has been no economic movement since then, however. In contrast, the overall economic recovery to pre-crisis levels took a much longer time during the financial market crisis and the stagnation crisis, after which a sustained upturn set in.

Comparison with a reference path

When assessing a recession based on the production volume before the outbreak of the crisis, it is assumed that a return to pre-crisis levels is considered normal or a matter of course. On the other hand, it is not taken into account that economic life would have continued to develop without the crisis and would probably not have remained at the level of the quarter before the crisis. For this reason, a counterfactual economic development is compared with the actual economic development to estimate the value added losses associated with the coronavirus pandemic (Grömling, 2024b). For the purpose of this analysis, an economic environment was assumed in which the pandemic and the war in Ukraine, the Middle East crisis and the associated geo-economic adjustment burdens do not exist. To derive such a counterfactual course, for example, economic development can be extrapolated at a pace that is based on the economic momentum of the past. Long-term forecasts can also be used that were made before the crises occurred.

Figure 4
Growth path and actual economic development in Germany

Actual development of seasonally, price- and working day-adjusted GDP (index: annual average, 2020 = 100) and growth path



Note: The reference growth path is based on average growth of the overall economy in the period from 1991 to 2019 with extrapolation to 2030.

Sources: Federal Office of Statistics; author's own calculations.

Figure 4 shows the actual development of seasonally, price- and working day-adjusted GDP for the period 1991-2023. In addition to the data shown in Figure 2, this time series was updated with a forecast for the year 2024 (Bardt et al., 2024). Secondly, Figure 4 shows a growth path, which can be interpreted as a reference path for trouble-free development – even though past crises also influence the overall dynamics of this growth path. The reference path in Figure 4 is based on average growth for the overall economy for the period 1991-2019. The current crisis period from 2020 onwards is not taken into account here, otherwise the average growth would be reduced by 0.15 percentage points. Figure 4 shows that the actual development has always returned to this reference path after the three previous crises in Germany.

A trend line could also be used as an alternative to this linear path analysis. With a linear trend, the economic reference is measured on the basis of equal annual changes in absolute terms, with correspondingly lower rates of change in the trend path over time. The approach chosen here, on the other hand, is based on a development path with constant percentage changes, which comes close to an exponential trend. A trend with a Hodrick-Prescott filter (Hodrick & Prescott, 1997; van Ruth, 2010), in which a very high smoothing parameter is used, also comes closer to this approach. The smoothing parameter “penalises” the extent to which the trend deviates from the original time series. The smaller the smoothing parameter is selected for the HP filter, the closer the trend approximates the original series and the more the trend takes crisis effects and cyclicalities into account. This should explicitly not be

the case with the approach chosen here; instead, an overall undisturbed counterfactual development is chosen as a reference – from which, in turn, a deliberately chosen steady progress in prosperity can be derived.

Underwater periods in Germany

By comparing the actual development and the reference growth path, the economic “underwater” periods can be seen and measured for the economy as a whole. The comparison makes clear how long and how deeply economic development has dipped below the growth path defined here. This also reveals an output gap with the corresponding implications for macroeconomic income generation. This approach allows conclusions to be drawn about the intensity of economic crises.

Table 1 documents the length of time (in years) it took to return to the growth path. The speed of recovery after reaching the pre-crisis level is also relevant. The extent of the crises is the sum of the annual percentage deviations of the actual values from the growth path and shown as a percentage (rounded values to full percentages). When assessing the current crisis, it is important to bear in mind that this crisis is not yet over and that it is therefore not yet possible to determine the final outcome. The data for the path analysis includes the complete year 2024 based on a forecast (Bardt et al., 2024). In general, it should be noted that the assumed linear development as a counterfactual reference always poses a greater challenge compared to other forward-looking trend methods.

In terms of the depth and the associated deviation of the economy as a whole from the growth path that has been in place since 1991, the current situation has already exceeded the level of all three previous crises, in some cases considerably. As far as the duration and final impact on the economy as a whole is concerned, it remains to be seen how long the current crisis will last and thus how far the gap to the linear trend will widen. The financial market crisis follows at a distance. In terms of both duration and depth, the reunification crisis and the stagnation crisis were much less of a burden on the German economy.

Pace of recovery

In order to classify the economic crises, this path analysis can also be used to determine the pace of recovery required to return to the usual growth path from the current crisis and to overcome the underwater period (Grömling, 2024a). The path based on the growth average from 1991 to 2019 was extrapolated to 2030 in

Table 1
Economic crises in Germany: Duration, depth and recovery

	Crisis after reunification boom from 1992	Stagnation crisis from 2001	Global financial market crisis 2008/2009	Pandemic and geopolitical crisis from 2020
Duration in years ¹	5	3	8	5
Depth of the crisis ²	-4	-4	-16	-23
Pace of recovery ³	1.8	1.7	2.1	2.5

Note: Comparison with the level of the growth path. Growth path based on the actual annual average change in the overall economy in the period from 1991 to 2019. ¹ Duration in years until the growth path is reached again. ² Sum of the annual percentage deviations of the actual values from the growth path. ³ Average annual growth in real GDP (in percent) required to return to the growth path after the respective crisis.

Source: Author's own calculations.

Figure 4. It should be noted that the recovery phases in the past were occasionally interrupted, prompting the beginning of a new recovery. At a macroeconomic level, an average growth rate of 1.7% to 2.1% per year was required in the previous crises in order to close the gap to the path (Table 1). An above-average pace was necessary, particularly to resolve the financial market crisis.

In terms of the economy as a whole, a permanent annual economic growth rate of 2.5% for the next six years is necessary to return to the growth path. This appears to be a target that is almost impossible to achieve. The growth potential of the German economy is likely to be severely curbed by demographic trends and a lack of qualified employees in the coming years. Added to this are the adjustment burdens resulting from the geopolitically necessary restructurings and decarbonisation. There are therefore serious doubts that the German economy will return to the path of prosperity experienced between 1991 and 2019 in the near future.

Decisive changes are needed if the German economy is to turn around and embark on a path of recovery and growth at all. A real deescalation of geopolitical tensions including the wars in Ukraine and the Middle East and latent conflicts, i.e. growing nationalism in the European Union, territorial conflicts in the Indo-Pacific, the impact of the new US administration on the world economy, is an essential geoeconomic game changer. The reliability of well-established markets would be strengthened; the international division of labour would be stabilised through trustworthy supply chains and effective raw

material and energy supplies; and the risk of paralysing production and cost shocks would be reduced. Current uncertainties in the business environment would also be diminished. This chain of effects would increase the chances of a self-sustaining global investment and transformation cycle – which is good for the global community both economically and ecologically. In addition, reliable economic policy in Germany must seriously address and promote the quality of the business location. Internationally oriented taxes, regulations and innovation conditions as well as effective government investment is necessary to strengthen competitiveness. Uncertainties for companies due to climate change itself, but above all due to unclear conditions for the transformation, are a brake that must be removed.

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Ákos Kengyel

Experiences Influencing the Preparation of the Post-2027 EU Budget Framework

The article analyses the factors affecting the preparation of the post-2027 EU budget framework by examining the characteristics of the European Union's budget and the changes that took place between 2021 and 2027. The article draws lessons from the Multiannual Financial Framework and the NextGenerationEU programme and maps the factors influencing the planning of the post-2027 budget. The analysis pays special attention to the consequences arising from the new approaches applied in connection with the NGEU.

In 2025, the European Commission will publish its package of proposals for the seven-year EU budget period between 2028 and 2034, the content of which is yet unknown. Since, according to experience, a period of two to two and a half years is still necessary for member state discussions and the approval of the European Parliament after the publication of the package of proposals, it can already be said with certainty that an agreement on the future long-term budget will be reached at the last moment.

Several considerations have already justified the thorough reconsideration of EU-level budget expenditures. The effects of various crises that have hit the EU in the past decade and a half proved that it would be necessary to strengthen and make the EU-level budget framework more flexible, and to rethink the functions performed by the budget. It was only the pandemic that was able to bring about a strategic turn in the field of budget management at the EU level, as the member states were able to agree on the creation of a framework financed in a new way in addition to the Multiannual Financial Framework (MFF; European Commission, 2020).

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The financing, targets and operation of the NextGenerationEU (NGEU) programme, launched in 2021, brought new approaches that may have a significant impact on the future operation of the EU budget. Although these resources, even when combined with the NGEU, amount to only about 1.8% of gross national income (GNI), the EU-level budget can play a significant role in supporting the strategic goals in economic stabilisation and in promoting structural reforms. It is already apparent that the experience gained during the operation of the NGEU, which was originally launched as a temporary, one-time solution, can play a significant role in the preparation for the period after 2027.

The tasks for the post-2027 budget are being defined by the new geopolitical and geoeconomic challenges facing the EU (Montoya, 2023), which bring the complex issues of strengthening strategic autonomy and improving competitiveness even more to the fore (Draghi, 2024). In addition, the achievement of the long-term goals of the twin (digital and green) transition must continue to be supported. At the same time, the strengthening of economic, social and territorial cohesion between member states must also be kept in mind, i.e. programmes that promote convergence and prevent divergence are needed.

The article does not aim to define specific expenditure headings and priorities but to examine the conditions and directions of change that may significantly influence the formation of the future EU-level budget.

Determinants of EU-level expenditure planning

It is worth pointing out some general characteristics that decisively influence and limit future changes. In order to

assess the validity of the expectations, the following considerations should be taken into account.

Path dependence and crises

The operation of the EU institutional system has created a technocratic, bureaucratic, rule-based decision-making that can react slowly to changes. For this reason, the feasible budget reforms are characterised by a significant degree of path dependence; that is, future changes are largely determined by the established structure. The shift between individual expenditure headings can only take place slowly and gradually. At the same time, the creation of the NGEU is a good example of how a crisis situation can trigger integration forces and create innovation, which introduces new conditions for raising budget resources as well as in terms of the implementation of programmes. In addition, a significant proportional shift can occur among individual budget expenditures.

There is still no indication that the European Commission would propose financing based on joint borrowing similar to the NGEU in the post-2027 period. When the NGEU was created, it was considered a one-time solution. However, if this scheme proves to be effective, and if the support for the set goals can only be sufficiently financed in this way, i.e. if the member states are still unwilling to provide the necessary extra funds through own contributions, then there can be no doubt that joint borrowing will remain part of the EU budget system in the future.

Supporting European added value and European public goods

During discussions about the EU budget framework, member states underestimate the importance of the resources spent at the EU level. Based on their attitude towards changes on the revenue and expenditure side, it seems as if they regard the operation of the EU-level budget as a zero-sum game. However, EU-level spending has a European added value (Gros & Micossi, 2005; Monti et al., 2017; Rubio, 2011). This can best be interpreted as mutual benefits for all member states from the given expenditure. EU expenditure is more effective than national budgets individually supporting given policy goals, and some objectives can only be realised through EU-wide funding efforts.

It should be emphasised that thanks to the added value at the European level, mutual benefits are derived from the EU budget expenditures. Cross-border effects, indirect demand and supply effects can be interpreted as such general benefits. Synergies and economies of scale from joint action, together with the catalytic role and multiplier

effect of EU grants and financial instruments, significantly enhance the impact.

The meaning of European added value is closely linked to the provision of European public goods. While there are many overlaps and connections between the two, there is no unified interpretive framework for the clear definition of the content of European public goods. Individual authors approach policy areas that can be classified as public goods differently (Begg, 2023; Buti et al., 2023). It would be necessary to develop a clear framework for interpretation and to analyse the financing needs and methods of related policies. Therefore, the determination of properly substantiated expenditures with European added value and supporting European public goods should be a decisive aspect in the formation of the future budget.

Combined financing of strategic goals

The main question for the period after 2027 is how to finance the achievement of the strategic goals: from the EU-level budget, from joint borrowing (through various financial instruments), or from the national budgets. Based on the current situation, the take away is that it is worth supporting the achievement of strategic goals in a combined way: this includes, in addition to non-reimbursable grants, various financial instruments, national budget expenditures and the co-financing expected with the involvement of private sources, as well as EU-level frameworks.

In this area, the NGEU programme represents a significant institutional innovation, as the EU has never before borrowed such a large amount in order to finance the expenses of the member states. In the course of the negotiations on the NGEU, different positions emerged about the extent to which this new financial instrument could become a permanent source of funding. The NGEU can be presented as a forerunner of deeper economic integration; however, its exceptional and temporary nature can also be highlighted (Miró, 2022). The question remains as to what kind of role solutions similar to the NGEU can play in the financing of EU-level goals in the long term.

In any case, coherence must be created between the individual programmes and financing methods – that is, meaningless overlaps, which still characterise the system in the case of the targets of many instruments, must be avoided. It is enough to refer only to the scope of the cohesion policy subsidies related to structural change and the resources provided within the framework of the NGEU (Rubio et al., 2024). It is essential that the management of funds from different sources be integrated within a unified institutional framework to ensure coordinated implementation and avoid fragmentation.

Predictability or flexibility

An essential feature of the MFF is stability, but at the same time, a certain degree of flexibility is also necessary to deal with unforeseen crises. Stability is particularly important due to the provision of a predictable budget background for multiannual programmes (Kengyel, 2017). The EU budget framework is traditionally characterised by an investment-oriented approach that serves stability. It is essentially an investment budget: in the period 2021-2027, taking into account MFF and NGEU expenditures, 63% of the total budget supports investments, compared to the share of around 40% in previous decades (European Commission, 2024a).

Flexibility is essential in order to ensure the ability to respond quickly to unforeseen situations. For this reason, the mid-term review, the regrouping within the expenditure headings and the setting of the appropriate reserves also play a significant role. An important lesson is that in the current budget period, a total of 2.4% of the funds available within the MFF were reallocated due to unexpected crisis situations, based on the existing regulatory framework (European Commission, 2024a, p. 16). This reflects a rather high degree of inflexibility.

Subsidies provided through various financial instruments, as well as loans with preferential repayment terms, can serve to provide a more flexible response. In the future, increased flexibility could be introduced through the simplification of the regulations for the implementation of individual programmes, or, for example, by granting member states greater autonomy in designing measures to support specific priorities (Rubio et al., 2024). A decisive strategic question is whether the EU budget should be more investment-oriented or crisis management-oriented in the future. By definition, the former enables a more inflexible framework, since the rules of the related programmes and policies designate well-defined goals in advance. Strengthening the ability to handle unexpected crisis situations, on the other hand, requires the establishment of tools and programmes with a more flexible regulatory background.

Consequences arising from the characteristics of the EU budget

Among the characteristics of the EU budget that have developed today, four main areas are worth examining: the limited amount of expenses, budgetary functions different from the budgets of the member states, the problem of own resources, as well as the consequences of the slow but gradual transformation of the spending structure.

The size of the budget

The size of the budget has remained fairly modest in recent decades. Even today, the expenses make up only 1.07% of EU GNI; even if the resources of the NGEU programme were added, it would only be a share of 1.8%. The member states apparently do not wish to support a major shift in the size of the budget. As a result, it can also be assumed for the future that the resources available for the traditional EU budget framework cannot be realistically expected to increase.

However, if we assume that the member states have strategic goals based on common interests, then they should adopt an EU budget of adequate size to support them. They should clarify what kind of union they want, what their priorities are, and what kind of EU-level spending would be necessary. Over the past decades, the most important goals of the EU budget have not been clearly defined: we cannot speak of a delineated federal division of labour between the member states and the EU. Due to the size of the budget, beyond fulfilling the redistribution and allocation functions, spending at the EU level is currently not suitable for playing a decisive role in economic stabilisation.

Functions performed by the budget

The EU budget functions differently from a national budget, therefore it does not finance many areas (Begg, 2009; Figueira, 2009). Since a major part of the EU budget expenditures are those related to agricultural policy and cohesion policy, it primarily performs allocation and distribution tasks. At the same time, most areas of the redistribution policy remained intact: among others, the EU budget does not deal with welfare transfers, health insurance, or, for example, public goods such as the field of defence. In the case of cohesion policy, the development function is also strong. Additionally, the development function is important in relation to R&D policy, education and training programmes, and support for trans-European networks (although despite their gradual strengthening, the share of these policies is still relatively low in total expenditure).

With the exception of monetary policy, the role of economic stabilisation is almost exclusively the responsibility of national governments, but in some respects (mainly thanks to cohesion policy transfers and the NGEU) the EU budget also has an economic stabilisation role. Of course, due to its size alone, the EU budget is unable to fulfil a broad macroeconomic stabilisation function. It was recognised in the creation of the NGEU that it is necessary to increase the effectiveness of the stabilisation function and to strengthen the EU's fiscal capacity. Because of

Table 1
Distribution of budget expenditures in the multiannual financial frameworks, 1988-2027

in %

Main expenditure headings	1988-1992	1993-1999	2000-2006	2007-2013	2014-2020	2021-2027	2021-2027 MFF+NGEU
Agriculture	58	48	46	42	38	31	20
Cohesion policy	22	33	33	36	34	31	58
Internal policies	4	6	6	10	16	22	13
External actions	5	7	9	6	6	9	5
Administration	9	5	5	6	6	7	4
Reserves	2	1	1	-	-	-	-
Payment appropriation, % of GNI	1.15	1.22	1.09	1.12	1.03	1.07	1.8

Note: The table shows the expenses of each period broken down according to the expenditure structure before 2007 and compared to the GNI of the EU member states of the given period.

Source: Author's calculation based on the interinstitutional agreements of each period and the Council of the European Union (2020b).

the long-term management of the consequences of the economic crisis of 2008-2009, several experts warned about this in the period before the crisis caused by the COVID-19 pandemic (Hübner et al., 2017).

With the NGEU programme, EU-level subsidies have gained macroeconomic relevance, as the new sources contribute significantly to crisis management and economic stabilisation, and promote the implementation of structural reforms. A fundamental question is to what extent the additional resources provided by the NGEU and the new methods introduced during the operation of the programme serve as an example for the approaches to be used in the budget period after 2027.

Financing the budget

As a result of the gradual decline of revenues from traditional own resources and the proportional shift that took place during the past budget periods, the revenues of the EU budget are increasingly tied to GNI-based contributions of the member states. The current situation shows that a system of own resources that is truly independent of the member states' budgets – apart from customs revenues – has not been established. However, genuine own resources would be of fundamental importance for the proper functioning of the EU budget (Cipriani, 2014; Fuest et al., 2015). In the case of their absence or insufficient size, the EU budget is almost entirely dependent on the national budgets.

Several proposals have already been made regarding the possible own resources, of which one has been introduced for the first time in 2021: a national contribution calculated on the basis of the amount of non-recycled plas-

tic packaging waste. Thus, in addition to customs duties, value-added tax-based contributions and GNI-based payments, the range of own resources has been expanded with this new source of income (Council of the European Union, 2020a). So far, no unanimous decision has been reached among the member states on additional own resources. Although the outlined schedule, according to which new resources would have been introduced from 2023, was not fulfilled, the Commission has already twice proposed to change the Council decision on the EU's own resources (European Commission, 2023).

In any case, the member states must jointly guarantee the repayment of loans taken out jointly in connection with the NGEU, which required an increase in the ceiling for own resources even in the current period (Council of the European Union, 2020a, p. 3.). The upper limit of own resources was raised (until full repayment) by 0.6 percentage points, which means an increase of more than 40%.

Looking to the future, a big question is how joint borrowing can play an important role in the financing of EU expenditures (Steinbach, 2023). Since own resources are not defined in the Treaty, it raises the question of whether joint borrowing could be considered a new own resource in the financing system of the EU budget. This is also a strategic issue because it would be reasonable to create a unified system for the implementation of programmes financed from own resources and joint borrowing.

Shifts on the expenditure side of the budget

On the expenditure side of the EU budget, a gradual shift among the expenditure headings can be observed (Kengyel, 2016). Within the limited budget framework, the

Table 2
Expenditure headings in the period 2021-2027

MFF and NGEU, commitments, in billion euros, 2018 prices

	MFF	NGEU	Total
Single Market, innovation and digital	132.781	10.600	143.381
Cohesion, resilience and values	377.768	721.900	1,099.668
Natural resources and environment	356.374	17.500	373.874
Migration and border management	22.671	-	22.671
Security and defence	13.185	-	13.185
Neighbourhood and the world	98.419	-	98.419
European public administration	73.102	-	73.102
Total	1,074.300	750.000	1,824.300

Source: Council of the European Union, 2024.

changes could only be realised by cutting the expenses devoted to the two main “traditional” policies (agricultural and cohesion policy). The policies for competitiveness and digital transformation (internal market, R&D, education, trans-European networks) gradually strengthened and new resources were provided for new priorities (migration, security). The novelty of the 2021-2027 period is that the funds provided under the NGEU have increased the available funds outside the MFF by 70% (see Table 1).

The total €1,824.3 billion framework for the period 2021-2027 consists of the €1,074.3 billion MFF and the €750 billion NGEU package at the level of commitment appropriations calculated at 2018 prices. With the appearance of the funds provided by the NGEU, a significant reorganisation of the ratios between expenditure items took place. The NGEU programme complements certain expenditure headings of the MFF. The programme only contributes to three headings, providing the largest amount of funds in the framework of the “Cohesion, resilience and values” heading (Table 2).

It is also a fact that nowadays 80% of EU budget expenditures are tied to predetermined goals, so it is very difficult to adequately respond to the new challenges that have arisen. Despite the promised simplification and streamlining, the budget framework remained extremely complicated: seven budget headings support 15 policy areas, which provide resources in the framework of more than 50 different programmes (European Commission, 2024a). In addition, there are significant overlaps: it is enough to refer to the parallelism between the support provided by the Cohesion Fund, the Connecting Europe Facility (CEF) and the NGEU (Recovery and Resilience Facility; RRF) in the field of infrastructure investments, or the Erasmus+,

European Social Fund Plus, Creative Europe and Digital Europe programmes in the field of human resources development. Therefore, it would be necessary to clearly delimit the target system of the various programmes, to eliminate duplications, and to ensure the possibility of implementation within a unified framework.

An important lesson is that in the case of most centrally managed programmes, the spending of the planned frameworks is progressing well. Among others, the expenditures supporting digital transformation in the budgets of Horizon Europe, Digital Europe and the CEF had already been 99% committed by the end of 2023, but the Erasmus+ programme and the CEF transport infrastructure framework are also performing very well. At the same time, only 4% of the cohesion policy subsidies were paid out in the 3rd year of the current programming period, i.e. in 2023, compared to 14% in the previous seven-year period. There may be several reasons for this: in addition to the late implementation, the significant additional tasks arising in connection with the resources of the NGEU (RRF) can serve as an explanation (European Commission, 2024a, pp. 13-14).

In the future, it can serve as a valuable lesson in identifying policy areas with high demand for the available resources and those in which it is not possible to use the funds at an appropriate pace for the planned purposes. Of course, it is also necessary to evaluate the efficiency and effectiveness of the use of resources.

Experiences from the implementation of the NGEU

The new characteristic features of the NGEU deserve special attention because this programme was created not only for short-term crisis management but will also support the EU in achieving its long-term goals regarding the transformation towards a digital, green and resilient economy. The poorer states and those most affected by the pandemic benefit from the resources to the greatest extent.

Novel approaches to the Recovery and Resilience Facility

From the €723.8 billion RRF, which is the largest item of the NGEU, member states can use €338 billion as non-reimbursable grants and €385.8 billion as loans (European Commission, 2024b). The recovery and resilience plans (RRPs) prepared in connection with the use of RRF funds contain the reform and investment programme of the given country. According to the RRPs, 42% of the RRF resources will be used for climate policy goals, and 26% will be spent on the digital transition. The main beneficiaries of the grants are Spain, Italy and France, while the largest total allocations, including loans, are received by Italy,

Table 3
Recovery and Resilience Facility funds allocation per country

Country	Grant (billion euro)	Loan (billion euro)	Total (billion euro)	Allocation as share of GDP (%)
Italy	71.78	122.60	194.38	9.32
Spain	79.85	83.16	163.01	11.15
Poland	25.28	34.54	59.82	7.97
France	40.27	0	40.27	1.44
Greece	18.22	17.73	35.95	16.32
Germany	30.32	0	30.32	0.74
Romania	13.57	14.94	28.51	8.78
Portugal	16.33	5.89	22.22	8.37
Hungary	6.51	3.92	10.43	5.31
Croatia	5.79	4.25	10.04	13.13
Czechia	8.41	0.818	9.228	3.02
Slovakia	6.41	0	6.41	5.22
Bulgaria	5.69	0	5.69	6.06
Netherlands	5.44	0	5.44	0.53
Belgium	5.03	0.264	5.294	0.91
Austria	3.96	0	3.96	0.83
Lithuania	2.29	1.55	3.84	5.34
Sweden	3.45	0	3.45	0.63
Slovenia	1.61	1.071	2.68	4.26
Latvia	1.97	0	1.97	4.88
Finland	1.95	0	1.95	0.70
Denmark	1.63	0	1.63	0.44
Cyprus	1.02	0.200	1.22	4.09
Ireland	1.15	0	1.15	0.23
Estonia	0.95	0	0.95	2.53
Malta	0.328	0	0.328	1.69
Luxemburg	0.241	0	0.241	0.30

Note: GDP information is based on 2023 data.

Source: Author's own compilation based on European Commission (2024).

Spain and Poland. In GDP proportion, the main beneficiaries are Greece, Croatia, Spain and Italy (Table 3).

In the RRP, it was necessary to substantiate with thorough justification how the planned measures represent a comprehensive response to the economic and social situation of the member state, how they contribute to the growth potential and job creation, the green and digital transition. Furthermore, it was necessary to present the planned cost and schedule of the measures, the solutions for monitoring and controlling the plan, including the proposed targets and milestones.

The individual RRP differ significantly in their structure and also in the priorities for which the available funds are allocated (Darvas et al., 2023). It can be observed that individual countries place greater emphasis on those areas that were already struggling with problems before the pandemic, as well as those that were more affected by the pandemic (measures). The fact that RRP reflect the structural characteristics of the economy of a given country is also true because the Council's country specific recommendations had to be taken into account.

The spillover effects of the NGEU

The embeddedness of the RRF can be clearly seen in the important changes it has induced either in the operation of the European semester, in connection with the country-specific recommendations or in the role of the Commission, which has already stepped out of the mere "accountant" control role to discuss growth strategies as an "investor" (Bokhorst & Corti, 2024). Performance-based budgeting, i.e. tying payments to the achievement of milestones and targets, is one of the most important innovations in relation to the RRF. No other EU instrument applies performance-based conditionality to such an extent as the RRF (Corti & Vesan, 2023).

The NGEU programme can also have a significant impact on strengthening the international role of the euro. The joint bond issue represents an important step in the implementation of the capital market union. The EU is becoming a major player in the green bond market: the EU plans to raise up to €250 billion in the capital markets in the form of green bonds to finance the NGEU in the period 2021-2026. If NGEU borrowing is combined with the existing EU programmes (European Financial Stabilisation Mechanism, Macro-financial assistance, Balance of payments and Support to mitigate Unemployment Risks in an Emergency), the total stock of EU bonds could reach €1 trillion by 2026. This increases the liquidity of Eurobond markets by providing a significant amount of EU-wide safe assets (European Commission, 2021).

Concluding remarks

There is an ever-growing gap between the expectations from the EU-level budget and the realities. It is therefore of great importance how member states address the implementation and support of the jointly formulated strategic goals. The directions of change so far show that the strengthening of fiscal capacity at the EU level was achieved by the creation of instruments outside the EU budget, that is, the member states tried to generate the missing resources by creating different financial instruments.

The creation of the NGEU represented a truly novel approach, as member states empowered the Commission to borrow on the capital markets on behalf of the Union. However, the more radical reform of the traditional EU budget still did not take place. This is reflected in the consistently small size of the budget, the insufficiency of creating genuine own resources, which are essential for financing, and the slow transformation of the expenditure side. The experiences gained during the operation of the NGEU can certainly provide important lessons for the development of the budget framework for the next period. It should be a crucial aspect that the management of different types of resources is implemented in a unified framework, avoiding parallels and overlaps between the goals of individual programmes.

Due to the limited size of the own resources available at the EU level, joint borrowing may continue to play an important role in the future. Moreover, in supporting the realisation of common goals, it is essential to involve more national public funds and promote the participation of the private sector. In addition to traditional non-reimbursable grants, the role of loan-type financing (various financial instruments) may become increasingly important. This may partly mean an approach based on the experience of the NGEU, but it may also result in the strengthening of various constructions managed, among others, by the European Investment Bank.

The new approaches introduced during the implementation of the NGEU programme can contribute to the reform of the methodological and implementation frameworks affecting the EU budget as a whole. The widespread use of the performance-based budgeting method is particularly noteworthy. The experience gained during the implementation of the NGEU may give way to permanent central fiscal capacity, but this depends on many factors. The most important of these is whether the NGEU will be able to achieve its set policy goals. If convincing results are not achieved in boosting growth potential, it will be much more difficult to adopt new approaches related to the future deepening of fiscal integration.

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What a First Week

That was quite a first week. In his first week in office, President Donald Trump withdrew the United States from the Paris Climate Accord and World Health Organization, threatened Canada, Mexico and Colombia with tariffs, initiated what were characterized as mass deportations of undocumented immigrants, criticized the Federal Reserve for its high interest rates, revoked a host of economic regulations promulgated by the Biden Administration and announced a \$500 billion artificial intelligence (AI) infrastructure plan. It was, to put it mildly, a lot for an economist, or for that matter anyone, to absorb.

Start with the tariffs, which are top of mind. The question is whether Trump sees tariffs as a combined negotiating tool and threat to extract concessions from other countries, or as a protectionist and revenue-raising measure to be imposed unilaterally. The Colombian episode, when Trump threatened Colombia with tariffs in response to President Gustavo Petro's refusal to accept U.S. military aircraft bearing deportees but then declined to follow through when Colombia backed down, is suggestive of the first interpretation. However, the fact that Trump has surrounded himself with true believers in tariffs points instead to the second. It may be that we will see a combination of the two strategies. Canada and Mexico may manage to get Trump to roll back the tariffs imposed on February 1 by taking steps on border security, while China, which is a strategic rival running a large trade surplus vis-à-vis the U.S., may be hit with significantly higher levies that stay in place for the duration. From this standpoint, it is interesting to contemplate the mixed prospects of the European Union, which is a geostrategic ally on the one hand, but runs a large bilateral surplus with the U.S. on the other.

Over Trump's first week in office, there was an almost perfect day-to-day correlation between the intensity of the president's pro-tariff rhetoric and the strength of the dollar. Investors evidently understand that the current account of the balance of payments is the difference between national saving and investment. Since tariffs, which have a first-order impact on neither saving nor investment, will switch U.S. spending away from now more expensive imported products, they will have to be offset by a stronger dollar, which pushes U.S. spending back in the other direction. This sets up an imminent conflict between Trump and the Fed, which the president will blame for the over-strong dollar. Trump's statement to the Davos World Economic Forum that he would "demand" lower interest rates is evidence that this conflict is looming. Financial markets will undoubtedly react badly to efforts to infringe on the independence of the Fed. The good news is that this may ultimately restrain the president. The bad news is that we are in for a period of financial turbulence.

Trump's deportations of undocumented immigrants, while still limited in number, are having their intended chilling effect. Farmers in California's central valley are already complaining of a shortage of field workers. Some economists predict a significant impact on food price inflation and, conceivably, Federal Reserve interest rate hikes in response. We are about to see an interesting, if socially regrettable, real-time test of the Mariel Boatlift hypothesis, in which Nobel Laureate David Card demonstrated that the mass immigration of Cubans to Miami in 1980 had a very limited impact on wages, inflation and the local labor market. If Card's conclusions carry over, then the economic impact of Trump's deportations may be less than their societal implications. We shall see.

Trump's suspension of funding provided under President Biden's Inflation Reduction Act and Infrastructure Investment and Jobs Act, designed to encourage investments in renew-

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able energy, and his elimination of the electric vehicle mandate, together with his executive order lifting restrictions on oil and gas exploration in Alaska, may be among his most consequential. By eliminating restrictions on the use of fossil fuels by American industry, they will widen still further the country's energy cost advantage over Europe. At the same time, they will make it even harder for a future U.S. administration to meet the Paris Climate goals, and for other governments, forced to pursue expensive measures shunned by the U.S., to proceed on their own. It has been suggested that Trump will also withdraw the U.S. from the umbrella agreement, the 1992 United Nations Framework Convention on Climate Change, making it more difficult for a future U.S. administration to reenter the Paris Accord.

The Inflation Reduction Act and Infrastructure Investment and Jobs Act were part of a broader Biden Administration industrial policy push designed to promote manufacturing. The Trump Administration and Republicans in Congress oppose these measures for the simple reason that they were Biden Administration initiatives, but also because their priority is cutting taxes. Having inherited a budget deficit north of 6% of GDP, they will have to find matching spending reductions, and it is increasingly unlikely that Elon Musk will find them elsewhere. However, they also understand that these pro-manufacturing policies benefit so-called Rust Belt states populated by Trump's constituents.

In theory, the Trump Administration could seek to substitute private funding for public funding, removing or relaxing restrictive regulations imposed on environmental, national security and other grounds. Thus, on his second day in office, Trump, appearing with Oracle's Larry Ellison, SoftBank's Masayoshi Son and OpenAI's Sam Altman, announced plans for a \$500 billion private joint venture, known as Stargate, to construct data centers and fund research and development on new AI applications. The irony, of course, was that no sooner was this joint venture announced than the Chinese company DeepSeek released an AI model that could match the capabilities of cutting-edge AI tools while using only a fraction of the specialized computer chips produced by Nvidia and its competitors, and requiring only a fraction of the training. It may be that the vision informing Stargate is already past its use-by date, and that those massive data centers are not needed after all.

Retaining one's sanity for the next four years will require keeping a sense of humor. I therefore close this Letter from America with Trump's cryptocurrency initiatives. On January 25, the president signed an executive order establishing a working group to provide regulatory clarity on crypto-related issues and to contemplate the "potential creation and maintenance of a national asset stockpile" or reserve. Confusion over whether this so-called strategic reserve would be comprised of Bitcoin or a broader portfolio of cryptocurrencies and whether it would consist solely of digital assets acquired by the federal government as a result of earlier legal and regulatory action or would include additional cryptocurrencies acquired by managers of the stockpile, set off frenzied speculation, grounded in exactly zero information. Even more amusing was when, coincident with the inauguration, Trump used his social media accounts to launch a meme-coin called \$TRUMP. Its issuance prompted an outraged reaction in cryptocurrency circles, where entrepreneurs and investors worried that Trump's value-free coin would discredit other "more respectable" digital assets, especially if it crashed.

But probably Trump's most significant action was his appointment of crypto-enthusiasts to head his Commerce Department and chair his Securities and Exchange Commission (SEC). One of the new SEC's first acts was to roll back accounting guidance limiting banks' involvement with crypto. Given the capacity of large, leveraged cryptocurrency positions to destabilize financial institutions and markets, maybe these initiatives are not so amusing after all.

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