PRODUCTIVITY AND COMPETITIVENESS IN EUROPE

ASHOK KAUL

Europe's productivity stagnates due to weak innovation, slow technological adoption, energy shocks, overly cautious regulation, and an ageing workforce. This results in declining competitiveness, sluggish income growth, and increasing inequality. New threats, like AI disruption, global talent competition, and rising capital costs, further risk cementing Europe's long-term divergence from global peers like the US and China. To reverse course, this paper proposes the R.A.I.S.E. framework: Reskill the workforce, Allocate capital efficiently, Innovate through science and commercialisation, Scale digitalisation and market access, and Execute coordinated industrial strategies across member states.

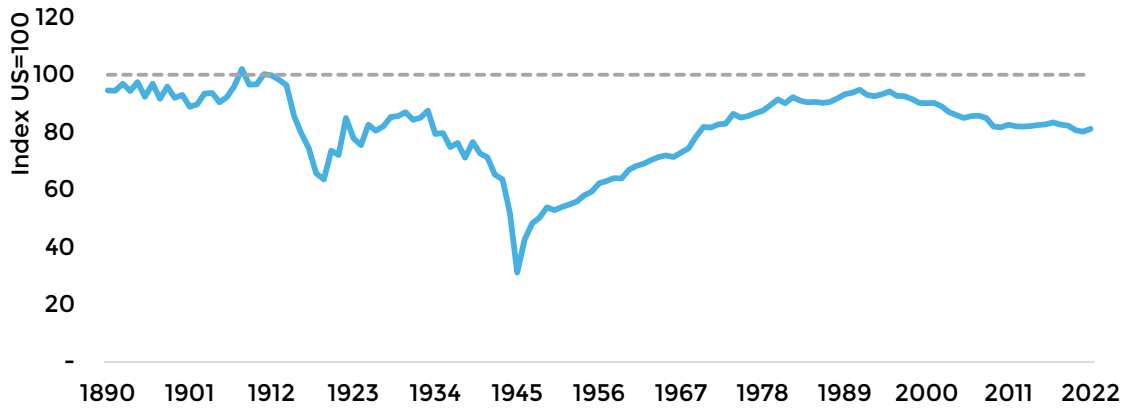
Productivity is the ability to achieve more output with given resources. In many ways, it reflects the final goal of economics, that is, to improve the standard of living. There are two ways to increase output. One is by increasing the quantity of resources, for example, through population growth. However, in this case, living standards (measured as income per person) remain unchanged, because adding more people to the workforce does not inherently improve income per person. This leaves only one way to raise living standards, which is by increasing the output produced by each person, or in other words, improving productivity (Zymek, 2024). Therefore, productivity growth is essential for improving standard of living.

THE EU IS LOSING COMPETITIVENESS

In recent years, the European Union has been falling behind China and the United States in productivity growth. At the end of World War II, the EU's total factor productivity (TFP), which accounts for the efficiency of all inputs used in production, was three times lower than that of the US (Figure 1). By the 1990s, EU total factor productivity had risen to almost 95% of the US level. Since then, however, the EU could not sustain productivity growth and lost ground. For instance, between 2019 (Q4) and 2024 (Q2), labour productivity in the euro area rose by only 0.9%, compared to a 6.7% increase in the US (Dias da Silva et al., 2024). As a result of slow productivity growth over the last decades, the EU's relative productivity has steadily declined, falling to around 80% of US levels. Slow productivity growth results in lower economic growth. As a result, people experience stagnant or declining real incomes. Governments find it difficult to invest in essential public services such as healthcare and education, thereby limiting improvements in citizens' well-being.

In addition, slow productivity growth undermines global competitiveness. A key measure of relative competitiveness is the

FIGURE 1
EU TOTAL FACTOR PRODUCTIVITY RELATIVE TO THE US, 1890-2022, INDEX US=100



Source: Bergeaud, A. et al., 2016

IMD World Competitiveness Ranking, published by the International Institute for Management Development. It assesses how competitive countries are relative to each other (Institute for Management Development, 2024). Between 2020 and 2024, the rankings of 15 out of 26 EU member states declined. In contrast, emerging economies have gained ground. Indonesia, for example, improved its position from 40th to 27th and now ranks ahead of two-thirds of EU member states in terms of competitiveness. These developments signal a relative decline in Europe's competitiveness and highlight the pressing need for structural reforms.

Enhancing overall economic productivity, particularly TFP, depends on strengthening its two fundamental drivers: labour and capital. Labour productivity refers to the output generated per hour worked. Improving it depends on the quality of education, access to effective tools and technology, and how work is organised. Capital productivity refers to the output generated per unit of capital, such as machinery. Improving it depends on the quality and technological efficiency of capital. These productivity drivers are influenced by both internal structural conditions and external global pressures. The following sections examine the structural forces behind productivity performance and outline a policy ponse to reverse the trend.

CAUSE: BOTH INTERNAL AND EXTERNAL FACTORS DRIVE THE DECLINE

This section describes the factors that challenge the EU in improving productivity. This section is structured around internal factors, which include the structural challenges the EU faces in improving productivity, and external factors, which explain why countries such as China and the US are outperforming.

Internal factors

Weak research and innovation

Innovation is central to productivity. It improves technologies, processes, and organisational methods, that enable productivity growth. This, in turn, reinforces competitiveness (European Commission, 2023a; OECD, 2023; Doğan, 2016). However, the EU is falling behind other advanced economies in terms of innovation capacity. According to the Summary Innovation Index, the EU lags behind the US by nearly seven percentage points. China has reduced its innovation gap with the EU from 50 to 5 points and is on course to surpass it in the coming years (Draghi, 2024). This trend highlights a broad and persistent weakness in Europe's

innovation capacity which risks undermining its productivity.

Insufficient financing for research and development (R&D) is a key factor behind the EU's weakening innovation capacity relative to peers. In 2022, the EU invested just 2.2% of its GDP in R&D and did not meet its 3% target (GLOBSEC, 2024). This represented a funding gap of approximately €123 billion. By contrast, the US invested 3.5% of GDP, Japan 3.3%, and China 2.4%. In absolute terms, the shortfall is even more striking: US R&D spending reached €877 billion, more than double the EU's €355 billion (Draghi, 2024). This R&D gap restricts funding for research, infrastructure, and talent needed to develop new technologies and products. These innovations are key to boosting productivity through efficiency and high-value output. Without sufficient investment, the EU is losing competitiveness relative to global peers.

Moreover, R&D investment is unevenly distributed across the EU. Advanced member states such as Sweden (3.6% of GDP), Belgium (3.3%), Austria (3.3%), and Germany (3.1%) consistently invest more than 3% of their GDP in R&D. In contrast, less economically developed regions, including Romania (0.5%), Cyprus (0.7%), and Bulgaria (0.8%), invest up to seven times less (Eurostat, 2024). This regional disparity in investment translates into uneven innovation capacity. Uneven innovation capacity, in turn, creates regional disparities in competitiveness across EU regions.

Technology adoption

The slow adoption of new technologies is one of the barriers to productivity growth in the EU. Traditional industries account for a large share of the EU economy. They tend to adopt innovations slowly, hampering technological adoption across supply chains and the economy. In 2020, only 63% of EU firms had adopted at least one advanced digital technology, compared to 73% of firms in the US (European Investment Bank, 2021). Moreover, EU firms also face challenges to use new technologies effectively. Only 30% of euro-area firms succeed in translating them into productivity gains (Anderton et al., 2023).

Low adoption and limited gain from new technologies reflect the EU's face challenges to turn innovation into scalable products. As a result, Europe is underrepresented among the world's top technology firms and start-ups. None of the top 20 global technology firms or top 20 start-ups are based in the EU (European Commission, 2024a). The seven largest US technological firms – Alphabet, Amazon, Apple, Meta, Microsoft, Nvidia, and Tesla – are twenty times the size of the seven largest firms in the EU and produce over ten times more revenue (The Conversation, 2024). These firms not only demonstrate high productivity levels but also stimulate productivity growth along their supply chains, contributing to total productivity growth in the US.

As a result, technology firms in the US contribute to national productivity growth more than their European counterparts. Since 2005, US technology firms have recorded cumulative productivity growth of approximately 40%. Over the same period, productivity among European technology firms has remained flat (Cerdeiro et al., 2024).

Regulatory barriers and precautionary principle

Europe's regulatory approach, while focused on public protection, is often overcautious. Overlapping rules and rigid standards create barriers for firms to innovate and grow.

One such major barrier is the EU's strict use of the precautionary principle. This principle states that no action should be taken if a certain decision is not fully backed by science and there is the possibility that implementing that very same decision could end up causing harm (EUR-Lex). In other words, the EU system is based on inaction when a lack of certainty arises. While this can protect against some risks, this extreme caution discourages the experimentation needed for innovation.

First, it dictates business practices ex-ante to avert potential risks ex-post, which constrains firms' ability to experiment with new products and processes.

Second, it introduces limits based on predefined risk levels. For example, the Artificial Intelligence Act (AI Act) categorises AI systems based on their risk levels and imposes restrictions based on the assessment (European Commission, 2024b). This limits innovation based on a potential risk assumption, imposes a high administrative burden on firms and raises barriers to entry for start-ups through high compliance costs. For instance, the implementation of the EU Green Deal, the EU's flagship environmental and climate strategy, has introduced extensive reporting requirements that create costs for firms (Rzepecka et al., 2024; Hancock, 2024). Overregulation in innovative services has constrained the expansion of Europe's technology sector and limited productivity gains. For example, Compliance with the General Data Protection Regulation (GDPR) has reduced profits for small technological firms by up to 12% (Presidente et al., 2022).

Third, the proliferation of regulatory agencies and the gold-plating of EU directives, i.e., when national governments add extra rules on top of the EU legislation, further increase administrative burdens on firms and lead to fragmentation (My Country Europe, 2018).

Finally, this framework focuses on risks and fails to balance them with potential benefits and opportunity costs. In other words, it considers only the risks of action, whilst ignoring the risks of inaction.

As a result, some global firms avoid the European market when launching new technologies. Due to overregulation, major innovations like Apple's AI tools are often not introduced the EU (Grech Deguara, 2024). Even strategic sectors face friction. Qatar Energy, for example, cited difficulties in supplying critical inputs to Europe due to regulatory barriers (Reuters, 2024). These barriers limit Europe's technological adoption and global competitiveness.

Start-ups are also affected by regulatory barriers in the EU. Strict and fragmented regulations, coupled with high compliance costs, often prevent start-ups from scaling across borders (European Commission, 2025b). In contrast, start-ups in the US benefit from simpler and more flexible regulatory frameworks, while those in China receive support through state subsidies. This matters because start-ups are frequently the origin of new products, services, or business models with the potential to generate significant productivity gains. Europe's fragmented regulatory environment therefore undermines the capacity of start-ups to innovate. As a result, many start-ups are unable to evolve into high-growth firms capable of driving productivity improvements across the EU.

Access to private equity

In the EU, both established firms and start-ups have less access to private equity than their peers in other major economies. In 2022, EU start-ups attracted only 5% of global venture capital funding, compared to 52% in the US (European Commission, 2025b). Ecosystems like Silicon Valley in the US continue to dominate the global venture capital landscape as they give easier access to funding. Limited access to funding may incentivise high-potential EU start-ups to relocate to more favourable investment environments.

Private equity funding in established firms remains relatively limited in the EU. According to the IMF, over the past two decades, US-listed companies issued about twice as much equity relative to their size as EU firms (Cerdeiro et al., 2024). This greater access to capital enables US firms to invest more in expansion and innovation. Limited equity financing in the EU limits firms' ability to scale and modernise, contributing to weaker productivity performance.

One reason for the limited capital is relatively lower returns on investment (ROI) relative to peers. EU firms earned 14% ROI from 2015–2022, below the 18% average in the US (McKinsey, 2024). Higher capital costs and lower returns discourage invest-

ment and risk making Europe's industrial base outdated.

Recent US political uncertainty and financial volatility might shift investor sentiment toward European markets. Since the US election on November 5, 2024, the S&P 500 index, which tracks the stock performance of 500 of the largest publicly traded firms in the US, has declined by 1.4% (as of May 5, 2025). In contrast, the STOXX Europe 600 index, a similar index for Europe, has risen by 3.5%. This divergence may suggest that some investors reallocating capital toward European assets. However, historical data shows that capital flows between the two markets tend to move in the same direction rather than acting as substitutes. Our own analysis of daily price over the past ten years shows that the S&P 500 and STOXX 600 are positively correlated (0.56)[1]. During periods of elevated uncertainty, investors typically reduce exposure to both and shift capital into safe-haven assets such as gold or government bonds (Lucey et al., 2013).

Fragmented and limited size of markets

Despite decades of economic integration, the EU's internal market remains fragmented. While the EU and the US are similar in economic size[2], European firms face higher barriers when operating (Adilbish et al., 2025). A recent IMF estimate from late 2024 indicates that intra-EU non-tariff barriers, like licensing rules or inconsistent regulations that create additional barrier to cross-border trade, are equivalent to a 44% tariff on goods and a 110% tariff on services. The impact of these barriers on growth is much greater than that of external tariffs imposed by most trade partners (Kammer, 2024).

Without broader market access, firms face limited opportunities to benefit from economies of scale (Grassi, 2024). Limited scale, in turn, constrains productivity gains (Neri et al., 2023). As a result, this fragmented internal market, reinforced by intra-EU non-tariff barriers, prevents European firms from fully leveraging the size of the EU economy and achieving higher productivity.

Ageing population

The share of elderly people in Europe is rising. As of January 2024, people aged 65 and over accounted for 21.6% of the EU population, up from 18.7% a decade earlier (Eurostat, 2025c). Over the coming decades, these trends are expected to accelerate. By 2100, the share of people aged 65 and over is projected to reach 32.5%, while the working-age population will continue to decline. The old-age dependency ratio, i.e., the number of people aged 65 and over compared to those aged 15 to 64, is expected to nearly double from 33.9% in 2024 to 59.7% by 2100 (Eurostat, 2025d). An ageing population results from rising life expectancy and persistently low fertility rates (Tzouganatou, 2022) (Szűcs, 2024). Older people tend to adopt new technologies slower than younger people. This can explain the slowing pace of technology adoption in the EU that impacts productivity growth.

Moreover, an ageing population increases the demand for healthcare services and pension payments. Age-related spending places pressure on public finances and diverts funds from growth areas like education, infrastructure, and technology.

Compared to younger economies such as India, where the median age is almost twice lower (29 versus 45), the EU faces challenges in maintaining competitiveness (Worldometer, 2025; Eurostat, 2025c).

External factors

Intensifying global competition

Global competition is intensifying as developing countries expand their capacity. Between 2005 and 2024, China's share of global exports rose from 7.4% to 15.0% (International Trade Centre, 2025). As emerging economies like China grow, European

1 Author's calculation using data from Investing.com
2 Each accounting for roughly 15% of global GDP (PPP-adjusted)

firms face stronger competition at home and abroad.

A notable example is the electric vehicle (EV) sector, where Chinese manufacturers have significantly increased their global market share, reaching approximately 76% (Hawkins, 2024). This expansion has been driven by low-cost models with advanced digital features, underpinned by aggressive industrial policy and extensive state subsidies that distort global markets (Li et al., 2024). In many cases, Chinese firms benefit from preferential access to capital, land, and raw materials, and are supported by coordinated state-backed export strategies. These advantages strengthen their profit margins, enabling greater reinvestment in innovation and productivity-enhancing upgrades, accelerating productivity growth over time. As Chinese productivity rises, even if Europe's absolute productivity remains stable, its productivity relative to China declines, leaving the European economy less competitive in global markets.

In response, the EU has introduced countervailing tariffs of up to 45% on Chinese EV imports, citing market distortion through state subsidies. Despite these measures, Chinese firms such as BYD and Zeekr continue to increase their investment footprint in Europe and elsewhere (Li et al., 2024).

Subsidies are not only unfair from a trade perspective but also contribute to illicit or hidden practices. These include transshipment, where goods are routed through third countries to hide their true origin and avoid trade rules, underreporting production costs, and exploiting weak regulations in partner countries. Imports of counterfeit and pirated goods now make up 5.8% of all products entering the EU (OECD/EUIPO, 2021). All these practices create market distortions that favour foreign producers and harm European companies making them less competitive.

Geopolitical challenges

Geopolitical shocks have highlighted vulnerabilities in the EU's competitiveness. The EU is highly dependent on imported energy. For decades, affordable and abundant energy imports, particularly from Russia, underpinned European industrial competitiveness. The EU's energy import dependency rate stands at over 60%, higher than China's 25%, while the US is a net energy exporter (Eurostat, 2025e; McKinsey, 2024). Before the war, Russia supplied over 40% of EU gas. The US, by contrast, is energy self-sufficient, benefitting from abundant domestic production of shale oil and gas. China has long pursued a strategy of diversified supply contracts and state-controlled energy pricing (Council of the European Union, 2025).

The war in Ukraine marked a turning point for Europe's energy security, leading to increases in the prices of key resources. Following the onset of the conflict, natural gas prices in the EU rose by approximately 180%, while coal and oil prices increased by 130% and 40%, respectively (Adolfsen, et al., 2022). By January 2025, electricity bills in the EU capitals were 36% higher than four years earlier (Yanatma, et al., 2025). These cost increases have reduced energy-intensive sectors' margins, weakening the competitiveness of EU exports.

Combined, these internal structural weaknesses and external global pressures are holding back the EU's productivity growth. The next section explores how slow productivity growth translates into slower income growth and rising disparities across the EU.

CONSEQUENCES: THE RESULT IS THE EROSION OF EUROPE'S ECONOMIC STRENGTH

This section describes how the EU's weakening productivity performance is translating into economic and social consequences.

Slow income growth

Improvements in living standards must come from growth in productivity because living standards are measured as income per person. In other words, a country cannot improve living standards simply by in-

creasing its population. When productivity stagnates, firms are unable to increase labour productivity. This limits their ability to raise wages and reduces profit margins for investors and owners. A key indicator of weak productivity is slow growth in GDP per capita, a key measure of average income levels. Since the 2008 global financial crisis, GDP per capita in the EU has grown by only 11%, compared to a 70% increase in the US over the same period (see Figure 2). In 2010, the average US citizen enjoyed a GDP per capita (PPP-adjusted) roughly 32% higher than their EU counterparts. By 2023, this gap had widened to 38% (World Bank, 2025b).

Poverty and regional disparity

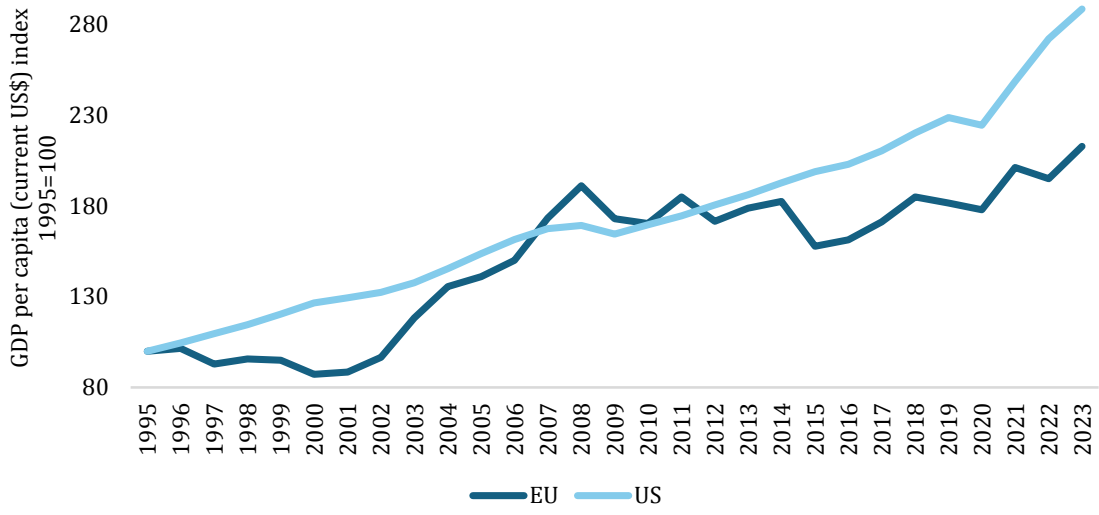
Everything else being equal, declining competitiveness reduces the share of income accruing to workers and widens the gap between high- and low-income groups (Furman et al., 2018). Meanwhile, constrained fiscal space limits governments' ability to support vulnerable groups.

IMF research shows that stagnation periods lasting four years or more can raise income inequality by nearly 20%, a larger effect than many recessions. Prolonged low growth weakens labour markets, slowing job creation, depressing wages, and increasing structural unemployment (Georgieva, 2024). This trend is visible in the EU. The share of social protection in government expenditure declined from 41.4% to 39.3% (Eurostat, 2025f). According to the 2024 Eurobarometer survey, 56% of lower-income households reported difficulty covering basic expenses, up from 40% in 2023 (Ahrendt et al., 2025). These data reflect a deterioration in economic well-being among vulnerable groups.

Regional disparities are prevalent as well. In 2024, over 40% of people in Greece (55%), Croatia (45%), Latvia (41%), Estonia (41%), Hungary (40%), and Cyprus (40%) reported difficulty making ends meet, well above the EU average of 30% (Ahrendt et al., 2025).

Poverty indicators further confirm this stagnation in social progress. The EU's 2020 strategy aimed to lift over 20 million people out of poverty or social exclusion, yet only half that goal was achieved (Eurostat, 2025g; European Parliament, 2024). Since then, progress has stalled. In 2024, the share of the population at risk of poverty stood at 21%, unchanged from 2019 (Eurostat,

FIGURE 2
GDP PER CAPITA (CURRENT US$) IN THE EU AND US, 1995-2023, INDEX 1995=100



Data: World Bank, 2025a

2025h). This persistence signals a broader failure to improve resilience among vulnerable groups.

The next section discusses emerging pressures that threaten to deepen EU competitiveness challenges.

COMPLICATION: NEW PRESSURES THREATENING FUTURE COMPETITIVENESS

This section describes the emerging challenges that could further widen the EU's productivity gap with other major economies in the foreseeable future.

Accelerating technological disruption

Europe's weak position in emerging technologies may cement its subordinate position in global standard-setting.

Technologies such as Artificial Intelligence (AI), quantum computing, and cloud infrastructure are becoming general-purpose tools for innovation across multiple sectors (Raskovich, 2025; Fleming, 2021). Among these general-purpose technologies, AI is the most transformative. According to McKinsey, generative AI, a type of AI that creates text, images, or code, could add $575.1 billion to the European economy by 2030. The largest gains are expected in consumer goods and retail ($101.9 billion) and healthcare ($55.7 billion) (Sukharevsky et al., 2024).

Reflecting this potential of AI, in 2025, the EU announced plans to mobilise €200 billion in AI-related investments mostly from private funds. That includes a €20-billion fund to develop five AI facilities with capacities four times greater than the world's most advanced facilities (Orru, 2025).

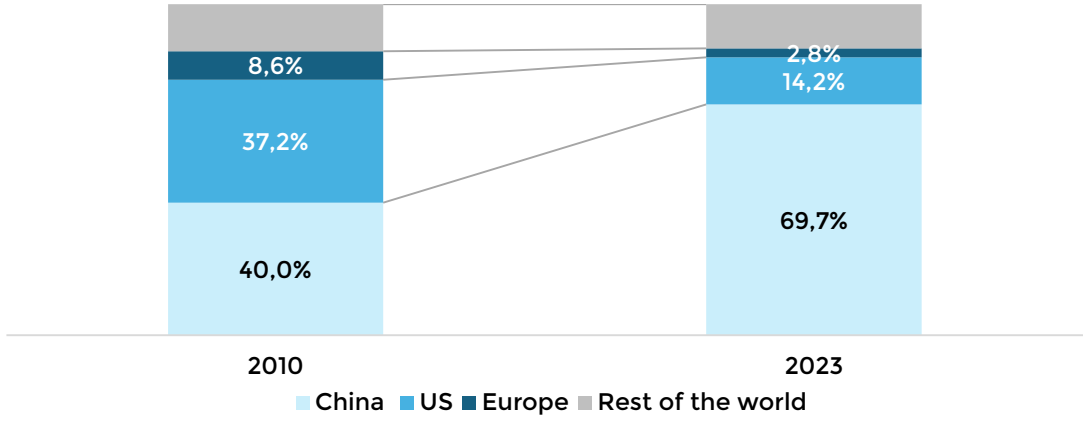
However, despite these ambitions, Europe has not succeeded in establishing a leading role in AI. Since 2017, 70% of foundational AI models have been developed in the US. Three US hyperscalers control over 65% of both the global and European cloud market, while the largest European provider holds just 2% (Draghi, 2024). Also, AI adoption remains low, with only 11% of the EU firms reporting usage (Orru, 2025). These gaps suggest Europe may fail to embed AI into its industrial ecosystem in the foreseeable future, limiting its ability to scale innovation and increase productivity.

Research base in AI is also weak compared to peers. The EU's share of global granted AI patents fell from 8.6% in 2010 to just 2.8% in 2023. Meanwhile, China's share surged from 13.4% to 69.7% (see Figure 3). The growing research gap with China could limit the EU's ability to harness AI's economic potential and realize its productivity gains.

The EU is also falling behind in other general-purpose technologies such as quantum computing, which is advancing quickly. It has major implications for sectors like materials science and pharmaceuticals (Singh, 2025; Patel et al., 2024). Among the world's ten largest investors in quantum technologies, five are US-based and four are Chinese. None of the top ten quantum investors are European (Draghi, 2024). Similarly, cloud technologies – digital platforms that provide on-demand access to computing power, storage, and software over the internet – are consolidating globally. This trend favours firms with deep capital reserves and vertically integrated services, where European providers lack the scale to compete effectively (Draghi, 2024).

AI, quantum computing, cloud technologies and other general-purpose technologies are driving faster productivity gains than past innovation cycles. Countries that lead in these areas are now setting the direction and defining how technologies are used and how markets develop. Leading countries will use this position to establish international standards and shape persistent market norms. These secure a lasting competitive advantage. Europe's weak presence in new technologies will constrain its ability to compete. Europe will have to follow technological directions and norms defined by other countries. This position will entrench Europe's disadvantage and make it less competitive.

FIGURE 3
GRANTED AI PATENTS AS SHARE OF WORLD TOTAL BY REGION, 2010-2023



Source: Human-Centered AI Institute at Stanford, 2025

Intensifying competition for highly skilled workers

As Europe ages and global competition for talent intensifies, the EU is on track to face a rapidly widening workforce gap.

Against a backdrop of a record-high employment rate of 75.3% in 2023 and historically low unemployment at 6.1%, skilled labour shortages remain a major challenge in the EU (European Commission, 2025b). Nearly four in five of SMEs report difficulties finding workers with the right skills (European Commission, 2023b). The shortfall is most acute in critical sectors like science, technology, engineering, and mathematics, where the EU produces 20% fewer graduates per capita than the US and 45% fewer than South Korea (McKinsey, 2024).

However, as the importance of high-skilled workers grows, their global competition is set to intensify. Peer economies are already implementing new measures to attract or keep highly skilled workers. Through its Global Skills Strategy (GSS), Canada offers expedited work permit processing, often within two weeks, for highly skilled professionals and their families (Government of Canada, 2025). Australia introduced the National Innovation Visa, which allows highly skilled workers to benefit from faster visa processing (Australian Government, 2025). Emerging economies like China are improving local opportunities, making it more appealing for skilled workers to stay or return (Haipeng et al., 2024; Fedasiuk et al., 2020).

Accelerating technological disruptions and intensifying competition for highly skilled workers are likely to amplify the impact of existing structural weaknesses on EU productivity. The next section presents a policy framework to help the EU rebuild its productivity by addressing both long-standing pressures and emerging challenges.

SOLUTION: R.A.I.S.E. CAN INCREASE THE EU'S LONG-TERM PRODUCTIVITY AND COMPETITIVENESS

To address the structural weaknesses holding back the EU's productivity, this section proposes a five-part framework, **R.A.I.S.E.**, focused on **R**eskilling, **A**llocating resources effectively, **I**nnovating, **S**caling digital, and **E**xecuting strategies across member states. This framework provides a set of instruments for member states to implement effective reforms that reinforce competitiveness.

Reskill the workforce and reform labour markets

Update education systems and equip workers with future-ready skills

Europe's education systems must adapt to prepare workers for a rapidly evolving economy. Education systems need to train people to not only work with new technologies but also stay flexible as technologies evolve. Digital skills, such as coding, data literacy, and AI awareness, should be integrated into primary, vocational, and higher education. Embedding these skills early on ensures that graduates are ready to meet the demands of technological changes. Such a future-ready workforce will mitigate the risk of structural unemployment by equipping the workforce with the skills required for tomorrow's jobs or the agility to learn new skills.

Reform labour market policies to lengthen working age

Older workers bring an expertise that can improve efficiency, reduce errors, and support knowledge transfer. Early retirement results in the underutilisation of this potential. Labour market reforms should prioritise retaining experienced workers and supporting their adaptability to leverage this experience. This requires two main levers. First, incentivise work at older ages, through flexible pension rules, upskilling opportunities, and age-friendly workplace design. Second, discourage early retirement by phasing out incentives that encourage premature exits from the workforce, particularly among healthy and capable individuals. These measures will increase the effective labour supply, reduce pension burdens, and support economic resilience in the face of demographic challenges.

Allocate resources more efficiently toward dynamic, high-growth sectors

Redirect industrial policies from low-growth legacy sectors toward innovative sectors

Governments use public interventions such as subsidies, export support, and investment incentives, commonly referred to as industrial policies, to strengthen domestic industries and enhance competitiveness. IMF research shows that industrial policies improve firm performance only when applied to sectors that are already innovative and competitive. When directed at industries with low productivity, these tools often prove ineffective and can delay economic transformation (Baquie et al., 2025). Accordingly, the EU should prioritise industrial policy based on innovation potential rather than politically motivated allocations.

We analysed EU patent data from 2015 to 2024 to identify areas with such potential. These are sectors where EU firms hold a high share of globally granted patents[3]. The results show that EU firms hold a strong patent position in renewable energy, gas and liquid storage, plastic processing, heat exchangers, and aviation and space and many other areas (see Figure 4). Prioritising these sectors for industrial policy support would amplify the impact of private-sector innovation, generating productivity spillovers across supply chains.

Innovate through science, commercialisation, and regulatory reform

Strengthen commercialisation pipelines to turn research into products

To improve the process of converting research into market-ready products, the EU should expand support for technology transfer offices (TTOs), which help universities and research institutions patent, license, and spin-off innovations. Networks like the TTO Circle already support over 35,000 patents and 4,000 start-ups, but many national ecosystems remain underresourced (European Commission, 2024c).

The EU should also promote intrapreneurship, where employees innovate from within firms. Governments should provide tax incentives for innovation activities within firms and support collaboration between firms and research institutions to embed entrepreneurial thinking into organisational cultures. This can help firms

3 Sectors contributing less than 0.3% of total EU's granted patents were excluded from the analysis to ensure relevance.

invest in research and convert innovations into products.

Modernise regulation to enable responsible experimentation

The EU must reform its regulatory environment to support innovation. While the precautionary principle plays an important role in risk management, rigid and overcautious applications can hamper innovation. Instead, the EU should move toward a risk-proportionate regulation. Regulatory sandboxes, i.e., controlled environments where new technologies can be tested under close supervision, are one proven tool. The EU should expand their scope, standardise best practices, and integrate them into broader regulatory strategy. This would allow innovation and regulation to co-evolve, supporting experimentation while ensuring public safety.

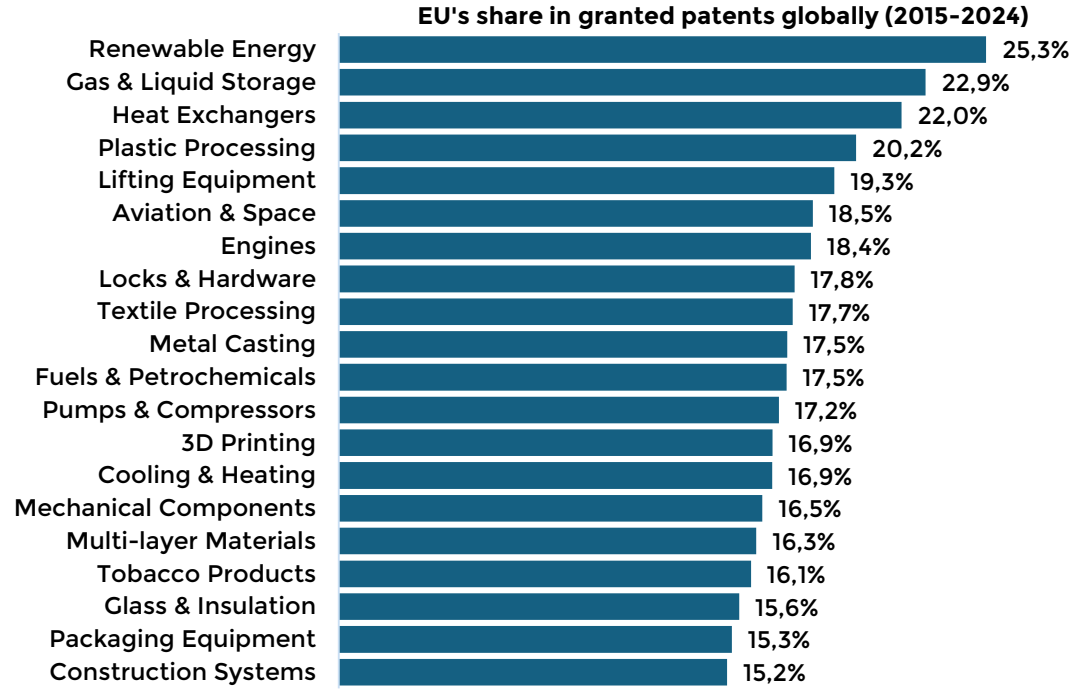
Traditional industries such as consumer goods, construction, and healthcare, which employ millions and account for a large share of household consumption, must also undergo technological transformation to remain competitive.

Execute coordinated industrial strategies across member states

Build joint industrial initiatives around key strategic sectors

Fragmented national strategies prevent European firms from scaling innovation or competing globally. Joint industrial initiatives to support innovation in scale-dependent industries like quantum computing and cloud technologies are essential to unlock efficiencies and accelerate innovation. The focus should also extend to traditional industries that already operate at scale and shape everyday life, including agriculture and consumer goods manufacturing. These industries are central to economic resilience and social wellbeing. Driving innovation in these industries will not

FIGURE 4
TOP 20 AREAS WHERE THE EU HOLDS HIGHER SHARE IN WORLD TOTAL GRANTED PATENTS (2015-2024), EXCLUDING AREAS THAT REPRESENT LESS THAN 0.3% OF TOTAL EU'S GRANTED PATENTS



Fuente: OEPM

only strengthen Europe's competitiveness but also deliver visible benefits for citizens.

Pool expertise at the EU level to compete with global players

Unlike the US and China, which rely on integrated national capabilities, Europe's fragmented knowledge base undermines its capacity to anticipate economic trends and respond effectively. The EU should create a permanent Industrial Expert Network bringing together national experts, EU officials, and independent researchers into a single coordinated body to compete.

This network would monitor technological trends, market signals, and supply chain risks. It would play a dual role: first, identifying emerging vulnerabilities that require early policy action; second, spotting high-potential opportunities where Europe can lead. Its core value lies in enabling foresight and coordinated response and gaining early access to new markets or technologies. It functions as an early-warning and early-readiness system that shifts industrial strategy from reactive to forward-looking.

The EU should integrate the Industrial Expert Network directly into its policymaking process. Its insights must inform key decisions, such as funding allocations, program design, and regulatory frameworks.

CONCLUSION

Europe's productivity and competitiveness are declining, threatening incomes, social cohesion, and prosperity. Lagging innovation, regulatory barriers, market fragmentation, and limited access to private equity are some of the main reasons. In the global race for AI, the potential consequences for Europe's economic position are considerable. Lagging in a highly concentrated global competition for technological leadership with the US and China threatens Europe's long-term prosperity. An ageing workforce and intensifying competition for skilled workers exacerbate Europe's vulnerabilities.

Unless the EU changes its overly cautious approach to innovation and burdensome regulation, it will remain dependent on the US and China. This dependency is already growing and risks becoming permanent. A shift to a risk-proportionate regulation would allow innovation and regulation to co-evolve, enabling experimentation and helping restore Europe's capacity to lead.

To reverse course, we suggest implementing the R.A.I.S.E. framework. It includes the following pillars: Reskilling the workforce to equip people with future-ready skills to enhance labour productivity; Allocating capital to sectors where Europe already holds a competitive edge to raise total factor productivity; Innovating through risk-based regulation and improved commercialisation pipelines to accelerate the translation of science into products and services; Scaling digital infrastructure and harmonising digital rules to increase firm-level efficiency, reduce costs; Executing joint industrial initiatives across borders to pool expertise.

REFERENCES

Adilbish, Oyun Erdene, Diego Cerdeiro, Romain Duval, Gee Hee Hong, Luca Mazzone, Lorenzo Rotunno, Hasan Toprak, and Maryam Vaziri (2025), "Europe's Productivity Weakness: Firm-Level Roots and Remedies", *IMF Working Paper*.

Adolfsen, Jakob Feveile, Kuik Friderike, Lis Magdalena, Schuler Tobias (2022), "The impact of the war in Ukraine on euro area energy markets", *European Central Bank Economic Bulletin*.

Ahrendt, Daphne, Sándor, Eszter, Chédorge-Farnier, Daphné, and Schulte-Brochterbeck Larissa (2025), "Quality of life in the EU in 2024: Results from the Living and Working in the EU e-survey", *European Foundation for the Improvement of Living and Working Conditions*.

Anderton, Robert, Vasco Botelho, and Paul Reimers (2023), "Digitalisation and Productivity: Game-changer or Sideshow?", *ECB Working Paper*.

Australian Government – Department of Home Affairs (2025), "National Innovation visa".

Baquie, Sandra, Yueling Huang, Florence Jaumotte, Jaden Kim, Rafael Machado Parente, and Samuel Pienknagura (2025), Industrial Policies: Handle with Care, *IMF Staff Discussion Note*.

Bergeaud, Antonin, Gilbert Cette, and Rémy Lecat (2016), "Productivity Trends in Advanced Countries between 1890 and 2012", *Review of Income and Wealth*.

Cerdeiro, Diego, Gee Hee Hong, and Alfred Kammer (2024), "How to Awaken Europe's Private Sector and Boost Economic Growth", *IMF Blog*.

Council of the European Union (2025), "Where does the European Union's gas come from?".

Dias da Silva, António, Paola Di Casola, Ramon Gomez-Salvador, and Matthias Mohr (2024), "Labour productivity growth in the euro area and the United States: short and long-term developments", *European Central Bank*.

Doğan, Ebru (2016), "The Effect of Innovation on Competitiveness", *Ekonometri ve İstatistik Sayı*.

Draghi, Mario (2024), "The future of European competitiveness".

EUR-Lex. "Precautionary Principle", *Accessed on 20.04.2025*.

European Commission (2023a), "Enterprise and Innovation for Competitiveness".

European Commission (2023b), "European Year of Skills – Skills Shortages, Recruitment and Retention Strategies in Small and Medium-Sized Enterprises", *Eurobarometer FL529*.

European Commission (2024a), "Why Europe is losing the race for innovation".

European Commission (2024b), "AI Act".

European Commission (2024c), "Competence Centre on Technology Transfer".

European Commission (2025a), "Single market and standards".

European Commission (2025b), "Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: A Competitiveness Compass for the EU".

European Investment Bank (2021), "Digitalisation in Europe 2020-2021: Evidence from the EIB Investment Survey".

European Parliament (2024), "The fight against poverty, social exclusion and discrimination".

European Economic Community (1957), "Treaty of Rome".

Eurostat (2024), "R&D expenditure".

Eurostat (2025a), "Labour productivity and unit labour costs by industry (NACE Rev.2)".

Eurostat (2025b), "Cloud computing services".

Eurostat (2025c), "Population structure and ageing".

Eurostat (2025d), "Population on 1st January by age, sex and type of projection".

Eurostat (2025e), "Energy statistics".

Eurostat (2025f), "General government expenditure by function".

Eurostat (2025g), "Persons at risk of poverty or social exclusion by age and sex - EU 2020 strategy".

Eurostat (2025h), "Persons at risk of poverty or social exclusion by age and sex".

Fedasiuk, Ryan and Feldgoise Jacob (2020), "The Youth Thousand Talents Plan and China's Military", *Center for Security and Emerging Technology*.

Fleming, Sean (2021), "Top 10 technology trends that will shape the coming decade, according to McKinsey", WEF.

Foroohar, Rana (2025), "Europe's perfect storm", *Financial Times*.

Furman, Jason, and Peter Orszag. "Slower Productivity and Higher Inequality: Are They Related?" *Harvard Kennedy School*.

Government of Canada (2025), "Global Skills Strategy: Find out if you're eligible for faster processing. *Immigration, Refugees and Citizenship Canada*.

Georgieva, Kristalina (2024), "A low-growth world is an unequal, unstable world", *IMF Blog*.

GLOBSEC (2024), "Shaping the Next EU Commission's Priorities: Forging a more competitive EU".

Google Patents (2025). "Google Patents Public Data" (via BigQuery), patents with kind codes B1/B2 and priority dates from 2015 to 2024. Data retrieved and analysed using SQL.

Grassi, Basile (2024), "The EU Miracle: When 75 Million Reach High Income", *IGIER Working Paper*.

Grech Deguara, Susanna (2024), "The Absence of Apple Intelligence in the EU", *Chetcuti Cauchi Advocates*.

Haipeng, Zhang and Yu Wang (2024), "Migrant workers returning to villages provide momentum for nation's rural revitalization", *Global Times*.

Hancock, Alice (2024), "Is Red Tape Strangling Europe's Growth?" *Financial Times*.

Hawkins, Amy (2024), "China's share of global electric car market rises to 76%", *The Guardian*.

Human-Centered AI Institute at Stanford (2025), "Artificial Intelligence Index Report 2025".

International Trade Centre (2025), "Trademap".

Institute for Management Development (2024), "IMD World Competitiveness Booklet 2024".

Investing.com, "S&P 500 Historical Data and STOXX Europe 600 Historical Data", Accessed on 02.05.2025.

Kammer, Alfred (2024), "Europe's Choice: Policies for Growth and Resilience", *IMF working paper*.

Li, Gloria, Inagaki, Kana, and Hale, Thomas (2024), "Chinese carmakers reset European ambitions as EU tariffs bite", *Financial Times*.

Lucey, Brian, Li Sile (2013), "What Precious Metals Act as Safe Havens, and When? Some US Evidence", *Applied Economics Letters*.

Mačiulytė-Šniukienė, Alma, Dargenytė-Kacilevičienė, Laura Matuzevičiūtė, Kristina (2023), "Convergence in transport and ICT infrastructure: Evidence of EU member states", *Journal of International Studies*.

McKinsey Global Institute (2024), "Accelerating Europe: Competitiveness for a New Era".

Mura, Petru Ovidiu, Donath Liliana Eva (2023), "Digitalisation and Economic Growth in the European Union", *Electronics*.

My Country Europe (2018), "Gold-plating: how EU States over-regulate themselves and then blame Brussels".

Neri, Matteo, Gianluca Orefice Laine, and Michele Ruta (2023), "Deep Trade Agreements and Heterogeneous Firm Exports".

OECD/EUIPO (2021), "Global Trade in Fakes: A Worrying Threat", *OECD Publishing*.

OECD (2023), "Competition and Innovation: A Theoretical Perspective", *OECD Competition Policy Roundtable Background Note*.

Orru, Mauro (2025), "European Union Bets on Gigafactories to Catch Up With United States, China in Artificial Intelligence Race", *The Wall Street Journal*.

Patel, Hiral, Sejal Mishra, Rahul Jain, and Nirali Kansara (2024), "The Future of Quantum Computing and its Potential Applications", *Journal for Basic Sciences*.

Presidente, Giorgio and Frey, Carl Benedikt (2022), "The GDPR effect: How data privacy regulation shaped firm performance globally", *VoxEU*.

Raskovich, Kelly, (2025), "In Tech Trends 2025", *Deloitte*.

Reuters (2024), "Qatar threatens to stop EU gas sales if fined under due diligence law".

Rzepecka, Julia, Aleksander Fuksiewicz, Francesca Squillante, Lukas Alijošius, Ilsa Godlovitch, Peter Stamm, Julia Wielgosch, and Martin Lundborg (2024), "The Impact of EU Legislation in the Area of Digital and Green Transition, Particularly on SMEs", *Policy Department for Economic, Scientific and Quality of Life Policies, Directorate-General for Internal Policies, European Parliament*.

Singh, Ajit (2025), "Prospect of Future Computing Era Using Quantum Computing", *Patna University*.

Sukharevsky, Alexander, Eric Hazan, Sven Smit, Marc-Antoine de la Chevasnerie, Marc de Jong, Solveigh Hieronimus, Jan Mischke, and Guillaume Dagorret (2024), "Time to Place Our Bets: Europe's AI Opportunity", *McKinsey & Company*.

Szűcs, Péter (2024), "Demographic shifts and economic challenges in the European Union", *Európai Tükör*.

The Conversation (2024), "Europe's tech industry is lagging behind the US – but it gives the continent a chance to write the rules of the game".

Tzouganatou, Simoni Gerasimina (2022), "The Ageing Population of the European Union: Challenges and Prospects", *HAPSc Policy Briefs Series*.

World Bank (2025a), GDP per capita (current US$)".

World Bank (2025b), "GDP per capita, PPP (constant 2021 international $)".

Worldometer (2025), "India Population (1950-2025)".

Yanatma, Servet, (2025), "Three years on: How Russia's invasion reshaped energy prices across Europe", *Euronews Business*.

Zymek, Robert (2024), "Total Factor Productivity: How Can Economies Do More with Less?", Finance & Development, *International Monetary Fund*.

ABOUT THE AUTHOR

Ashok Kaul is a German economist specialising in quantitative methods in strategy consulting, including statistics, machine learning, and computational economics. He currently serves as a Senior Partner at Roland Berger N3XT, where he focuses on enhancing the firm's impact through data science, big data, regulatory impact assessments, and microsimulation models. He began his academic journey in Germany, earning a master's degree in economics from the University of Constance and a Ph.D. in economics from the University of Bonn. Ashok Kaul has held faculty positions at several prestigious European institutions, including Universitat Pompeu Fabra in Spain, Gutenberg University Mainz in Germany, the University of Oslo in Norway, and the University of Zurich in Switzerland. Since 2009, he has been a Full Professor of Economics at Saarland University in Germany. Dr. Kaul's research interests encompass public policy, labour economics, health economics, and applied econometrics. His work often involves the application of synthetic control methods and the analysis of smoking behaviour in Germany. He has published extensively in these areas, contributing to both academic and policy-oriented discussions.