Europe in the Digital Era: Global Competition, Policy Responses, and the Portuguese Case Study

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Executive summary

At a time when technological leadership is a key engine of economic growth, productivity, and geopolitical influence, the European Union is rapidly falling behind the United States and China in digital competitiveness. This growing gap is making Europe increasingly reliant on external powers for the development and deployment of cutting-edge technologies. Such dependence threatens the long-term sustainability of its economic model, social welfare systems, and the foundations of its democratic rule-of-law framework.

The Draghi Report emerges as a strategic response to Europe's declining competitiveness. The report provides a comprehensive diagnosis of the structural weaknesses of the European innovation ecosystem. It portrays a fragmented and investment-constrained Union that has increasingly specialised in mature technologies while global competitors have shifted towards frontier innovation. According to Draghi, Europe's regulatory complexity and fragmented capital markets have constrained the capacity of European firms to scale and compete globally, reinforcing a cycle of low innovation and weak productivity. The report calls for deep structural reforms to mobilise capital, simplify regulation, strengthen technological infrastructure, and enable Europe to regain strategic autonomy in key technologies.

Since the publication of the Draghi Report, the European Union has begun to respond through a series of policy initiatives aimed at strengthening competitiveness and innovation capacity. Measures adopted under the Competitiveness Compass, such as the proposed EU Inc. framework, signal a clear political commitment to closing the innovation gap. Nevertheless, important challenges remain regarding the scale, coordination, and speed of implementation, raising concerns that Europe may continue to fall behind global technological leaders if reforms are not delivered more decisively.

The Portuguese case provides a concrete illustration of both the opportunities and structural constraints identified at the European level. Portugal is increasingly viewed as an attractive innovation environment, supported by strong digital infrastructure, competitive energy costs, and a growing technology ecosystem. However, the country also faces key challenges highlighted by Draghi, including limited access to private capital, difficulties in scaling up internationally, and persistent challenges in retaining highly qualified talent. Despite strong public support for innovation and growing entrepreneurial activity, structural barriers continue to constrain productivity growth, export performance, and the internationalisation of Portuguese firms.

This paper argues that strengthening Europe's digital competitiveness requires not only ambitious policy initiatives but also faster implementation, and stronger mechanisms to scale innovation across the Union. The Portuguese case demonstrates how European structural constraints materialise at the national level. It highlights the urgency of coordinated action to ensure Europe's long-term competitiveness in the global digital economy.

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I. Introduction

Technological innovation and digital transformation have become central drivers of economic growth, productivity, and geopolitical power in the twenty-first century[1]. Digital technologies increasingly shape the global economy, while also influencing national security and strategic autonomy. In this context, the capacity to develop, deploy, and scale frontier technologies has become a defining feature of global economic leadership.

The European Union faces a growing competitiveness challenge in the global technological landscape. Compared with the United States and China, Europe shows persistent structural weaknesses in private investment, firm scaling capacity, and technological deployment, particularly in frontier digital technologies. These gaps risk increasing Europe's technological dependence on external powers and weakening its ability to sustain economic growth and productivity. Beyond economic considerations, this challenge raises broader questions regarding Europe's capacity to preserve its social model and democratic governance structures. Sustained productivity growth is essential to finance welfare systems, maintain fiscal sustainability, and preserve social protection mechanisms in ageing European societies. A continued loss of technological leadership, therefore, poses risks not only to competitiveness but also to the long-term sustainability of Europe's economic and social model.

A rapidly evolving geopolitical environment further amplifies the urgency of strengthening European competitiveness. Russia's invasion of Ukraine has fundamentally reshaped Europe's security landscape, while growing global fragmentation and uncertainty in transatlantic relations have reinforced concerns regarding Europe's strategic autonomy. In a recent meeting of the European Council, leaders have emphasised that economic resilience, industrial capacity, and technological sovereignty are increasingly intertwined with defence capabilities and geopolitical stability[2]. In this context, technological capability is no longer solely an economic concern but a central component of economic security, political autonomy, and strategic influence.

It is within this broader economic and geopolitical context that the European Commission tasked Mario Draghi with drafting a report on European competitiveness. The Draghi Report provides a comprehensive diagnosis of the structural barriers limiting Europe's innovation capacity. It warns that Europe risks entering a self-reinforcing cycle of low productivity, weak investment, and technological

[1] The OECD identifies digital technologies as a key driver of productivity growth and structural transformation in advanced economies Organisation for Economic Co-operation and Development, *Digital Economy Outlook 2024, Volume 1: Embracing the Technology Frontier* (Paris: OECD Publishing, 2024).
[2] European Parliamentary Research Service, *Outcome of the European Council Meeting on European Defence and Competitiveness* (Brussels: European Parliament, 2026).

dependence unless it takes decisive action to prevent it. Draghi outlines a strategic agenda centred on closing the innovation gap, strengthening the Single Market, mobilising investment, and enhancing Europe's technological infrastructure.

Following this diagnosis, the European Union has initiated a series of policy responses to strengthen its innovation ecosystem and improve its global competitiveness. Measures introduced under the Competitiveness Compass and related initiatives seek to mobilise investment, support technological development, reduce regulatory fragmentation, and deepen market integration across Member States. These initiatives reflect a growing recognition that competitiveness, innovation, and economic security must be addressed through coordinated structural reforms at both European and national levels.

Within this framework, the role of individual Member States becomes critical to the success of the European competitiveness strategy. National innovation ecosystems and policy implementation capacities will largely determine the effectiveness of the Union's broader agenda.

Portugal has increasingly positioned itself as an emerging innovation hub in Europe, supported by strong digital infrastructure, growing start-up activity, and policy initiatives that foster technological development and experimentation. At the same time, the country faces structural constraints that reflect many of the broader weaknesses identified at the European level. The Portuguese case, therefore, provides a concrete and policy-relevant perspective on how European competitiveness challenges materialise in practice.

Accordingly, this paper analyses the European Union's position in global technological competition, examines the policy response following the Draghi Report, and evaluates its implications with a particular focus on Portugal. The primary objective is to contribute to the national policy debate on how Portugal can strengthen its innovation ecosystem, improve access to capital, scale technological development, and position itself more strategically within the European digital economy. By situating Portugal within the broader European competitiveness framework, the paper seeks to identify both structural constraints and strategic opportunities for the country in an increasingly competitive global technological landscape.

This study was prepared to support the discussions of the III Encontro Sustentável, organised by Plataforma para o Crescimento Sustentável, which brings together national policymakers, experts, and stakeholders to discuss Portugal's role in Europe's technological and economic future. The research was conducted with the support of Google Portugal and aims to provide an analytical basis for informed policy discussion on Portugal's innovation strategy, its integration within European competitiveness initiatives, and its potential contribution to the Union's long-term technological development.

II. The EU's position on The Global Technological Competition

The European Union ("**EU**") faces mounting challenges as it strives to keep pace with global technological leaders. The EU is behind the US and China in the most relevant frontier technologies, and the gap is widening. In sectors such as artificial intelligence ("AI"), semiconductors, and quantum technologies, the US and China outpace the EU by far in innovation, investment, and scale. Given the critical nature of these technologies, the block's security and competitiveness are at stake. Europe imports a striking 80% of all digital technologies, showing the astonishing degree of dependence on the US and China[3]. The EU is already feeling the consequences of such dependency, namely in the car industry, which has been largely affected by chip supply shortages following a skirmish between China and the Netherlands over security concerns[4]. While Europe remains a major consumer of technologies developed in the US and China, it still lags significantly behind both powers in the competitive production and global commercialization of these advanced technologies.

Europe is both dependent on infrastructure and digital technologies such as storage and computing power. Cloud services in the EU are largely controlled by US hyperscalers, which are projected to account for 65% of data centre demand in the EU market. In comparison, the largest EU cloud operator accounts for 2% of the market[5]. The EU consequently faces a significant challenge to its technological and digital sovereignty, as its main competitors can leverage their dominance in digital infrastructure and services to exert commercial and political influence within the Union.

The EU is considered a regulatory superpower, setting standards for other jurisdictions while protecting its consumer base and ensuring the responsible, regulated use of technology. Legislative initiatives such as the General Data Protection Regulation ("GDPR") have shaped the regulation of technological activities worldwide, particularly those related to data use. More recently, the Digital Services Act ("DSA") and the Digital Markets Act ("DMA") have had a similar impact.

Despite its pioneering legal instruments protecting its consumer base, excessive regulation is considered to hinder the EU's ability to compete with its peers by slowing innovation and making it

[3] European Commission, *EU Competitiveness: Looking Ahead* [Draghi Report], 57 (Brussels: European Commission, 2024).
[4] Jasper Jolly, "EU Carmakers 'Days Away' from Halting Work as Chip War with China Escalates," *The Guardian*, 2025. EU carmakers 'days away' from halting work as chip war with China escalates | Automotive industry | The Guardian
[5] Report European Commission, *Report on the Digital Decade 2025* (Brussels: European Commission, 2025).

less attractive for investors. The same goes for EU competition regulations, which are too rigid and ultimately have the effect of restraining the building of large companies[6].

Moreover, European capital markets and governance frameworks are fragmented, with different rules across member states, preventing the bloc from scaling up innovation across the whole market and taking advantage of the large consumer base. Innovation and capital markets should be more dynamic to allow capital to flow faster within the internal market and for companies to access consumer markets across all Member States.

In this section, we will provide an overview of how the EU compares with China and the US in terms of technological development. We will look at three critical emerging technologies and provide a comparative picture of where the EU stands in their development.

For that purpose, we shall explore the conclusions of Harvard's Belfer Center "Critical and Emerging Technologies Index" and other relevant sources to explore success factors, comparative indicators, and other relevant data. The Belfer Centre report examines various factors to determine the comparative positions of global powers in this field, concluding that economic and human resources, data, and computing power are the most relevant factors in determining dominance.

2.1. Artificial Intelligence

The US has clear leadership in AI. The country is ahead in computing power, economic resources invested, and algorithms. In 2024, US-based institutions produced 40 notable AI models, compared to China's 15 and Europe's combined total of three[7]. US companies also have the most advanced AI models with OpenAI, Google, and Aduril dominating the development of state-of-the-art applications. According to the Belfer Centre, US dominance is explained by strong data pipelines, a large user base, and high adoption by both private and public entities.

China's Deep Seek has excelled in cost efficiency by reducing development costs and creating more efficient training pipelines. The launch of the R1 model and Alibaba's Qween3 family of models show that China is becoming increasingly competitive. According to Stanford's AI Index 2025, the performance gaps between US and Chinese models on major technical benchmarks have narrowed

[6] European Commission, *EU Competitiveness: Looking Ahead* [Draghi Report], 18.
[7] Stanford University Human-Centered Artificial Intelligence, *Artificial Intelligence Index Report 2025*, 12 (Stanford: Stanford University, 2025).

substantially. While there were previously notable differences, by the end of 2024, models from both countries were achieving nearly equal results, indicating near parity on key measures[8].

France's Mistral and Germany's Helsing are the leading EU-developed large language model (LLM) companies, with estimated valuations in 2025 of USD 12-15 billion. These valuations are significantly lower than OpenAI's projected USD 500 billion valuation for the same year.

Private investment is fundamental to ensuring the sustained growth of tech companies. According to Stanford University's AI Index 2025[9], US private AI investment reached USD 109.1 billion in 2024, nearly 12 times China's USD 9.3 billion and 24 times the UK's USD 4.5 billion. Europe attracted USD 19.4 billion in total AI private investment in 2024, remaining far behind the US. The gap is even more pronounced in generative AI, where US investment exceeded the combined total of China, the EU, and the UK by USD 25.4 billion in 2024, expanding on the USD 21.8 billion gap in 2023[10]. When aggregating private AI investments from 2013 to 2024, the US leads with USD 470.9 billion invested, followed by China with USD 119.3 billion. Since 2023, US private AI investment has grown by 50.7%, while in Europe it has grown by 60%, and in China it has declined by 1.9%. According to the Belfer[11] Center report, public investment in AI is opaque in China, with venture capital ("**VC**") funding often originating from government funds. However, China's total capital investment in AI still lags far behind the US[12], although it is increasing steadily.

Metric	**United States**	**China**	**Europe**
Private AI Investment (2024)	USD 109.1 billion	USD 9.3 billion	USD 19.4 billion
Cumulative Private AI Investment (2013–24)	USD 470.9 billion	USD 119.3 billion	~USD 55 billion (est.)
Generative AI Investment (2024)	USD 29.0 billion	USD 2.1 billion	USD 1.5 billion

[8] Stanford University Ibid.
[9] Stanford University Ibid.
[10]Stanford University Ibid.
[11] Belfer Center for Science and International Affairs, *The Great Tech Rivalry: The State of Play in AI, Quantum, and Biotech* (Cambridge: Harvard Kennedy School, 2025).
[12] Reuters, "China's Slim AI Budgets Are Self-Reinforcing," *Reuters Breakingviews*, October 8, 2025, https://www.reuters.com/commentary/breakingviews/chinas-slim-ai-budgets-are-self-reinforcing-2025-10-08/.

Metric	United States	China	Europe
Notable AI Models Produced (2024)	40	15	3
Share of Granted AI Patents (2023)	14.2%	69.7%	2.8%

Computing power is also a strong indicator of countries' capabilities in AI. The EU places third in computing power, with the US having 17 times more capacity. The US currently hosts 75% of AI supercomputers, China 15% and the EU around 5%[13]. In response to this the EU is investing 20 billion in the gigafactory project, from January 2026[14]. The gigafactory project aims to substantially increase the EU's cloud computing capabilities, which are considered as fundamental for the block's digital sovereignty.

Europe is also lagging in AI adoption with 66%[15] of large European organizations not yet investing at a transformative scale. Globally, AI adoption reached unprecedented levels in 2024, with 78% of organizations reporting AI use (up from 55% in 2023), and 71% using generative AI in at least one business function (up from 33% in 2023). Europe experienced a 23 percentage point increase in organizational AI use, though North America (82%) maintains leadership by a small margin.

An index by Tortoise[16] measures countries' performances based on AI implementation, innovation, and investment. The index looks at countries individually and to the EU as a block. Scoring countries from 0 to 100, it shows complete dominance by the US with China in a distant second place. The US scores 100 while China 53. On the top ten countries, there are only two EU member states (France and Germany) all scoring below 30, with only 13 Member States in the top 50.

Patent activity is also revealing of the EU's position. According to Stanford's AI Index 2025, between 2010 and 2023, the number of AI patents grew from 3,833 to 122,511. As of 2023, China accounts for 69.7% of all granted AI patents worldwide, while the US accounts for 14.2% and Europe for 2.8%. On a per capita basis, South Korea (17.3 patents per 100,000 inhabitants) and Luxembourg (15.3) lead,

[13] Epoch AI, "Trends in AI Supercomputers," arXiv, 2025, https://arxiv.org/pdf/2504.16026.
[14] European Commission, "Memorandum of Understanding on AI Gigafactories," Shaping Europe's Digital Future, 2025, https://digital-strategy.ec.europa.eu/en/library/memorandum-understanding-ai-gigafactories.
[15] European Commission, *EU Competitiveness: Looking Ahead* [Draghi Report].
[16] Tortoise Media, "The Global AI Index," 2025, https://www.tortoisemedia.com/data/global-ai.

followed by China (6.1). Bruegel reports[17], the US and China dominate raw patent counts, with large firms such as Baidu and US large firms leading filings. However, when looking at breakthrough innovation, i.e. innovations that are most likely to shape future technological frontiers, the picture is different. The US leads in AI radical innovations by far, while the EU and China are tied in second place. The EU only dominates in some very specific fields, as innovation fragmentation is pointed out as a major factor of slowing down innovation. Although the EU currently spends more than China on research and development (USD 47.5 billion in 2024, compared to China's 34.7 billion in 2025), growth[18] in expenditure is double in China than that happening in the EU. This is another indicator of the widening gap between the EU and its peers.

[17] Bruegel, "Radical Novelties in Critical Technologies and Spillovers: How Do China, the US and the EU Fare?" Working Paper, 2025, https://www.bruegel.org/working-paper/radical-novelties-critical-technologies-and-spillovers-how-do-china-us-and-eu-fare.

[18] Bruegel, "What Can Europe Learn from China's Critical-Tech Innovation Push?" Policy Brief, 2025, https://www.bruegel.org/policy-brief/what-can-europe-learn-chinas-critical-tech-innovation-push.

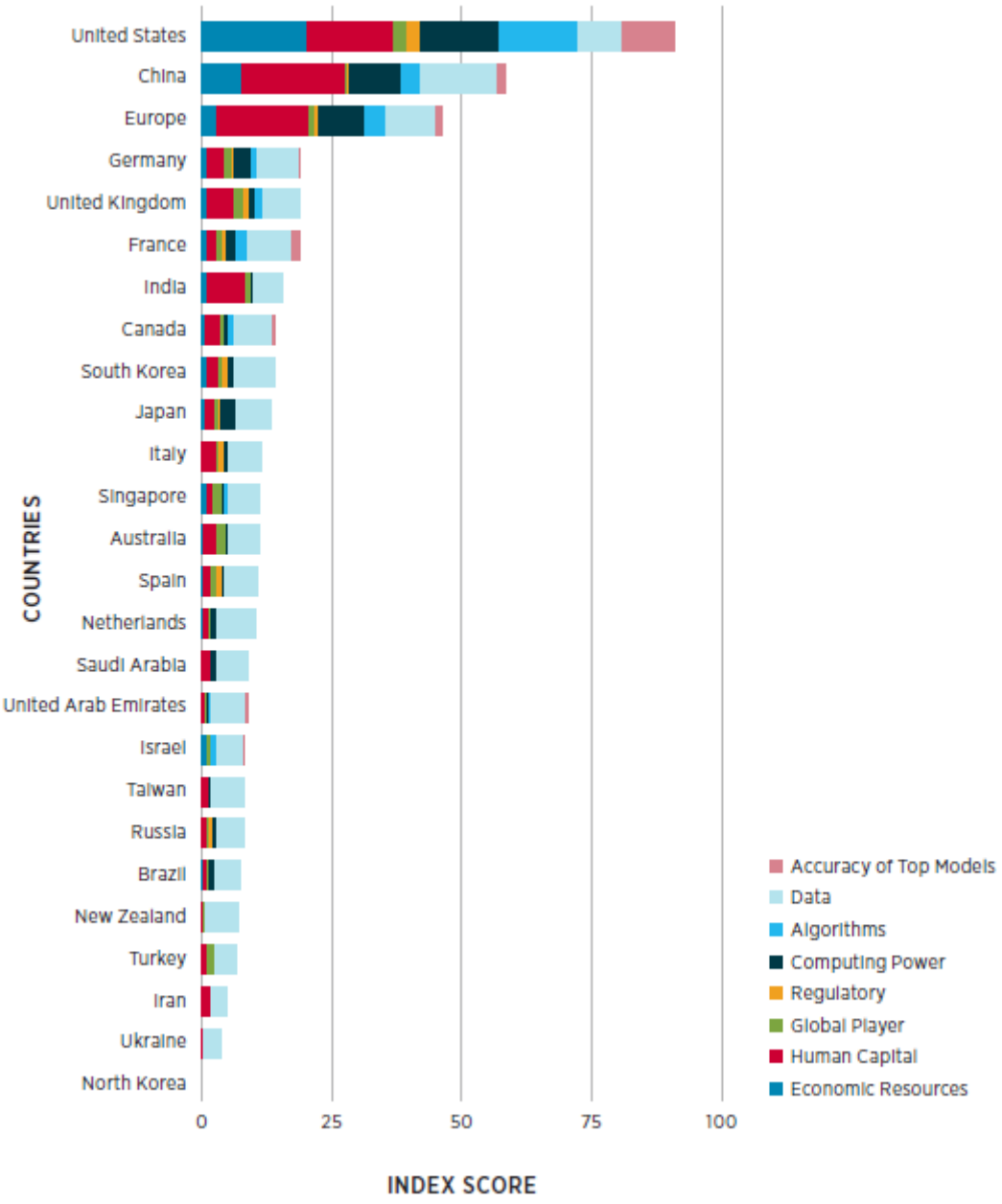

Figure 1 - Belfer Center for Science and International Affairs, "AI Index Score," figure, in The Great Tech Rivalry: The State of Play in AI, Quantum, and Biotech (Cambridge: Harvard Kennedy School, 2025), 14.

In another report, Bruegel[19], highlights that, when it comes to AI, the speed of knowledge spillover replication (i.e., how rapidly groundbreaking innovations are replicated across regions) is fast between the US and China but much slower in Europe. China typically replicates novel AI patents from the US or the EU within just six months, and the US also adapts Chinese novelties in roughly the same period. In stark contrast, EU countries take 18 to 24 months to replicate AI patents from both

[19] Bruegel, "Radical Novelties in Critical Technologies and Spillovers."

the US and China. A striking figure shows that intra-EU novelty replication (i.e., the time it takes for an EU Member State to replicate another EU Member State's novelty) is slow, sometimes even slower than US and Chinese replication. Although Bruegel believes that further research should be conducted on the subject, it points out that low private investment levels may lead to low-speed replication, the lack of companies with the financial ability to pursue bold innovation, complex digital regulations, and the fragmentation of the internal market.

As we will see in the next chapters, although the EU is indeed lagging behind the US in AI development and is soon to be behind China, it has competitive advantages that may put it in a better position than it currently is. The EU positions itself as a pioneer in AI regulation[20], and wants to be a shaper of responsible AI use. Furthermore, the block shows strong indicators in terms of human resources and has vast amounts of raw data. The EU's biggest challenges are the lack of private investment, computing power, and algorithms. Similar to the Draghi report, the Belfer Center's report points out that market fragmentation and a heavy regulatory framework are slowing down Europe's ability to innovate. As things currently stand, Europe is shaping the use of AI marginally by pioneering regulatory initiatives and generating ideas through talented researchers. Still, it is unable to turn those ideas into scalable commercial products.

Meanwhile, AI development costs are falling rapidly: the inference cost for an AI model performing at the GPT-3.5 level dropped from USD 20.00 per million tokens in November 2022 to USD 0.07 per million tokens by October 2024, representing a more than 280-fold reduction. Hardware price performance has improved with costs dropping 30% per year, while energy efficiency has increased by 40% annually. These efficiency gains, exemplified by DeepSeek's cost-efficient R1 model, are lowering barriers to entry and may help level the playing field for European innovators.

2.2. Quantum Technologies

Quantum technologies explore the behaviour of particles at the atomic and subatomic levels and can revolutionise information processing at speeds never reached before in human history. Quantum technologies may therefore bring many benefits and new commercial applications, but they also pose extensive risks. Although quantum technologies[21] are still at an early stage of development, progress

[20] European Parliament and Council of the European Union, Regulation (EU) 2024/1689 [AI Act], *Official Journal of the European Union*, 2024, https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng.

[21] For further technical explanation on quantum technologies and their implications we refer to this paper by the OECD Organisation for Economic Co-operation and Development, "Mapping the Global Quantum Ecosystem" (Paris: OECD Publishing, 2025);

is gaining momentum. Quantum technologies include a range of applications, including quantum computing, sensing, and communications. According to the Belfert Center Report, investment currently focuses on early-stage concepts, which explains why concepts are mainly developed in universities and then taken up by startups, and why investment levels are relatively low. The OECD and European Patent Office point out that R&D funding between 2015 and 2023 has also sharply increased, rising from 0.4% of total R&D spending in 2015 to 1.1% in 2023[22].

However, this is quickly changing, with investment in Quantum growing substantially between 2021 and 2024, and the number of funded firms rising from below 50 to around 300 in the same period.

Patent filings by Quantum firms have also substantially increased between 2010 and 2024, with a high concentration in the largest patent holders.

The US also leads the quantum race, with China and the EU standing closer in second and third place. US dominance is clear when looking at funding. In a selected sample of OECD countries, US quantum startups accounted for only 30% of global quantum startups but received around 60% of all funding. Europe attracts only 5% of the total private investment in Quantum.[23]

China is in the lead when it comes to public funding, with an investment of USD 15 billion. The EU is in second place, with over the last five years, with 9 billion from Member State domestic public funding, Germany leading the way, and an additional 2 billion from EU funding. The US is third with roughly 5 billion of public funding for Quantum.[24] However, when it comes to private funding, the US has an undisputed leadership accounting for 44% of the global USD 15 billion private investment in quantum computing in 2024, with US-based investors representing 52% if the global investment in quantum companies between 2016 and 2024. China currently shows very low comparative levels of private quantum investment.[25]

Europe remains a research powerhouse for quantum technologies. According to the EU's Joint Research Centre, the EU is home to 32% of the world's quantum companies, while the US hosts only

[22] Organisation for Economic Co-operation and Development, "Mapping the Global Quantum Ecosystem."
[23] Center for European Policy Analysis, "Europe's Quantum Leap Challenges US Dominance," CEPA, 2025.
[24] McKinsey & Company, "Benchmarking Quantum Technology Performance: Governments, Industry, Academia and Their Role in Shaping Our Technological Future," 2025.
[25] The Belfer Centre report uses different methodology to determine funding amounts and concludes that the US, China and Europe are tied at 9 billion funding each from both the private sector. This is due to the use of different research methods and periods considered.

25% and China 5%. Half of these companies were created after 2018, and the EU has seen eight out of nineteen quantum ventures deployed on the continent during 2024.[26]

When it comes to patenting in the quantum field, China leads in the raw number of patent filings, with most of such filings being Chinese national filings. Focusing on International Patent Filings ("**IPF**"), the US leads, followed by the EU, Japan, and China. The US domain of international patent filing is clear, with US companies such as IBM, Google, Microsoft, and Intel accounting for the largest number of IPFs. Nevertheless, China is approaching.

Although the EU has the fewest published quantum computing patents among the three competitors, it boasts strong publicly funded research centers. However, the low number of private sector patent filings may indicate limited capacity to develop future marketable products.

2.3. Semiconductors

Semiconductors are the main component of modern computing systems. They are substances that act as conductors or insulators of electricity under different circumstances. They are fundamental to AI, computer chips, and other devices that require large amounts of energy to be transported over short distances.

The production of semiconductors is highly technical and capital-intensive, requiring substantial public and private investment, as well as critical raw materials such as silicon. This makes the production and control of global semiconductor supply chains a matter of economic competition, and geopolitical security. The complex nature of semiconductor and microchip production makes it difficult for any single country to control the entire supply chain. Various stages of manufacturing and sourcing of raw materials occur across multiple jurisdictions, making it challenging for any one country, or even an entire region, to achieve complete autonomy in semiconductor production.

Semiconductors differ depending on their uses, which means industries must be highly specialized in producing specific types of semiconductors (e.g., AI semiconductors).

The US has tried to control China's rise in the semiconductor industry, with tariffs and export restrictions coordinated with trade partners such as the Netherlands[27] and Japan, which blocked companies from those countries, such as ASML, from selling their products to Chinese companies.

[26] European Commission Joint Research Centre, "Quantum Technology: 32% of the Companies, but Only 6% of Patents Are from the EU," EU Science Hub, 2025.
[27] ASML, "ASML Expects Impact of Updated Export Restrictions to Fall within Outlook for 2025," Press Release, 2025.

China responded to US sanctions by blocking exports of critical raw materials to the US and European countries, which are essential components of the medical, defence, energy, and automotive industries. China controls the extraction, refining, and export of most critical raw materials. It is responsible for 60% of the EU's supply of critical raw materials and 98% of rare elements, exposing the block to potential security issues, as China may choose to cut supply, as it already did[28]. It has also reportedly blocked the export of equipment used to extract these materials, to ensure its competitors remain dependent on Chinese imports.

US companies dominate semiconductor design, while South Korea, China, and Japan dominate front-end manufacturing, controlling 75% of the market.

The EU's market share in global chip production has dropped from 20% in the 1990s to 10% now. The EU has relevant players, such as ASML, which currently has an almost-monopoly in the lithographic machines market, holding an 87% market share. EU companies have strengths in equipment for chip manufacturing, but are lagging on manufacturing capability, especially in leading-edge chips, and heavily rely on imports[29]

The EU recognizes the strategic importance of these chips and is responding with additional funding and policy instruments. The European Chips Act includes measures to mobilize more than €100 billion in private and public investments by 2030, to strengthen supply chain resilience and reduce dependence on foreign powers.

2.4. Implications for European Competitiveness

The evidence presented above confirms that the European Union lags behind the United States and China across key frontier technologies, including artificial intelligence, quantum technologies, and semiconductors. This gap reflects not only differences in technological capabilities, but also structural constraints related to investment scale, industrial capacity, and market integration. As these technologies increasingly shape economic performance, security, and geopolitical influence, Europe faces the urgent challenge of defining its position within the evolving global technological order.

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[28] GIS Reports, "China's Critical Raw Materials Dominance," 2025. *Much like Russia, China is prone to leveraging its natural resources at times of geopolitical tension. In 2010, China unexpectedly imposed an export ban on REEs to Japan during an episode of heightened friction.*

[29]European Commission, *Staff Working Document: Digital Decade in 2025* (Brussels: European Commission, 2025): *80% of EU companies' suppliers are headquartered outside the EU, with 35% located in the US, 12.4% in Taiwan, 11.7% in China or Hong Kong, 10% in South Korea, and nearly 9% in Japan; in addition, European companies have a significant share of their customers in semiconductors (63%) headquartered outside the EU17 . p.8*

Strengthening Europe's capacity for technological production is therefore essential to safeguard the security of its citizens and preserve its economic model, social framework, and core values. To do so, the EU needs to adopt a strategic approach that combines greater competitiveness with targeted international cooperation.

While the European Union must enhance its ability to compete with global technological leaders, collaboration, particularly with large international firms, may play a critical role in accelerating innovation, fostering the emergence of globally competitive European companies, and attracting foreign investment. As the following sections will show, these challenges have prompted a growing policy response at the EU level, most notably reflected in the Draghi Report.

III. Draghi Report Objectives and Proposals

In an age when Europe faces major challenges, from rising energy costs to dependence on foreign powers, the European Commission has asked Mario Draghi, former Italian prime minister and European Central Bank President, to prepare a report outlining a vision for the future of European competitiveness. The result was an extensive work, which outlines the EU's main fragilities in an increasingly competitive world.

The report focuses on key areas such as energy, technological development, security, and financial markets. All of these are investigated both autonomously and from an interconnected perspective.

The report argues that Europe must break a vicious cycle of low innovation and low investment by catalyzing a self-reinforcing loop in which higher investment accelerates innovation, enabling firms to scale and invest further.

In the next subchapters, we will focus on Mario Draghi's perspective regarding Europe's position in the technological landscape. Building on the comparative data presented in previous sections, we will incorporate key insights from the Draghi report.

Draghi identifies three areas for action to reignite growth: closing the innovation gap, a joint plan for decarbonization and competitiveness, and increasing security while reducing dependencies.

While the primary emphasis of this work is on innovation, the report's various pillars are closely interconnected. Therefore, references to other pillars were included whenever they are pertinent to Europe's digitalization and technological advancement. For instance, topics such as reducing energy

prices—which are crucial for data centers and other infrastructure—or securing critical raw materials for semiconductors will be discussed, as they are essential for sustained technological development.

3.1. The European Union at a Crossroads: Balancing Strengths with Global Challenges

The European Union is a market of 440 million consumers, accounting for around 17% of global GDP in 2025. It enjoys lower inequality than the US and China, higher life expectancy, and a robust rule of law. The EU is home to one of the world's most educated populations and has among the lowest poverty rates globally. Furthermore, it has the world's largest Exclusive Economic Zone and is a global leader in sustainability, setting some of the most ambitious climate objectives.

This positive portrait contrasts with slow growth, low productivity, and limited innovation. The GDP gap between the EU and the US has widened from 17% in 2002 to 30% in 2022, while in PPP terms it has evolved from a 4% plus to a 12% minus compared to the US. The GDP difference is largely explained by low productivity, which led to lower demand, and income growth: per capita real disposable income has grown twice as much in the US as in the EU since 2000.

Draghi points out three external conditions that put Europe at a crossroads on the global stage:

I. Europe is highly dependent on international trade, which accounted for around 22% of the bloc's GDP in 2023, according to the Draghi Report. International trade growth dropped from 4.9% between 2000 and 2019 to 3.3% in 2026. This is most likely due to the growing fragmentation of global markets and the more protectionist posture adopted worldwide, especially after the COVID-19 pandemic. Other factors, such as China's growth which has led to weaker demand for European products, and recent US sanctions, have further weakened the EU's position.

II. Another factor in Europe's slowdown is its dependency on Russia for Natural Gas, which accounted for 45% of the EU's total natural gas imports in 2019. Since then, Europe has substantially diversified its energy imports and reduced the share of Russian gas imports to about 11% in 2024[30]. However, this diversification came at a cost: investment in new energy infrastructure and alternative sources had to accelerate, requiring substantial investments, which put pressure on the EU's budgets.

III. Finally, the EU has to increase its defence spending substantially. The Draghi Report notes that the US's global dominance previously enabled the EU to prioritize economic development over

[30] Council of the European Union, "Where Does the EU's Gas Come From?" Consilium, 2025.

security concerns. However, the Russian invasion of Ukraine marks a major shift in the geopolitical landscape, forcing Europe to place greater emphasis on its own security. After the report was published, Donald Trump's recent stance on defence, including threats to take over Greenland, has substantially increased Europe's concern over its own defence. This situation also raises concerns about dependence: the EU's high level of openness to international markets makes it particularly vulnerable to global shifts toward protectionism. As discussed in previous sections, the EU is highly reliant on critical raw materials that are essential for driving technological innovation in key sectors.

According to Draghi, Europe needs to take steps if it wants to ensure the prevalence of its economic model based on strong social support systems, rule of law and consistent growth, in a world where global and internal tensions are rising steadily. Continued slow growth would lead to a failure in delivering climate, social, digital and security ambitions. To reach its objectives, Europe needs to improve productivity levels across the block and create a consistent internal market strategy.

Draghi states that productivity gap with the US is mostly about tech[31]. Innovation is key to improving the block's competitiveness, the EU is held back by barriers that impact innovation, investment, and firm scale. Draghi notes that Member States are acting, but effectiveness is undermined by uncoordinated national policies (including asymmetric state aid), fragmented financing instruments, and weak cross-policy coordination between fiscal, trade, and foreign economic tools.

3.2. Europe's innovation barriers

Over the past decade, the EU's share of global tech revenues fell from 22% to 18%, while the US's share has increasead from 30% to 38%. These figures underline Europe's weakening position in the very technologies that could drive future growth and income, which are essential to finance the EU social model. This gap reflects a structural problem. Europe still specializes in mature industries with limited breakthrough potential. At the same time, the US shifted Research and Innovation ("R&I") leadership from the automobile and pharma sectors in the 2000s to software and hardware in the 2010s, and to digital platforms in the 2020s. As a result of much higher investments in the US tech sector, EU companies spent roughly €270 billion less on R&I than US peers in 2021. Draghi highlights that if Europe

[31] European Commission, *EU Competitiveness: Looking Ahead* [Draghi Report], 24: "*The main reason EU productivity diverged from the US in the mid-1990s was Europe's failure to capitalise on the first digital revolution led by the internet – both in terms of generating new tech companies and diffusing digital tech into the economy. In fact, if we exclude the tech sector, EU productivity growth over the past twenty years would be broadly at par with the US.*"

continues on this path, it risks a self-reinforcing cycle of low innovation, investment, and productivity, known as the "middle technology trap." Multiple factors are creating barriers to the innovation pipeline: regulatory barriers, low-ranked universities, limited private-sector financing, and fragmented financing and policy.

3.2.1. Universities and research

Europe has too few top-tier institutions and struggles to turn discoveries into products at scale. Only three EU institutions appear in the global top fifty for top science journals. The EU university system is good on average, but compared to the US, the UK, and China, only 4 EU universities rank in the top 50 of the QS World University Rankings[32].

Lower-ranked universities may signal lower innovation potential, as cutting-edge technology often originates in strong academic institutions. European Universities also fail to retain top talent compared to US universities. Lower investment in these institutions means lower salaries and fewer career opportunities, thereby reducing incentives for top researchers to remain in the EU. Another distinctive feature often attributed to European universities is the high levels of bureaucracy and lower career mobility within universities.

Furthermore, only about one-third of university patents are commercially exploited. Draghi relates this to underdeveloped European innovation "clusters" when comparing with the US and China. This lack of robust ecosystems limits connections among universities, startups, large firms, and VCs that help new tech reach the market. A recent report from the European Research Council ("ERC") showed that ERC grantees have commercialized 44% of their patent applications. The report also concludes that a stronger innovation ecosystem is necessary to transform research into marketable products[33].

According to the World Intellectual Property Office's ("WIPO") Innovation Cluster Ranking 2025 ranking[34], which analyzes world locations with the highest concentration of patent filings, scientific article publication, and VC, only 7 European cities are listed in the top 50 worldwide. China leads with 24, the most clusters in the top 100, the US with 22, and the EU with 17. According to WIPO, European clusters tend to focus more on strong research. In contrast, North American ones excel in commercialization and investment, which means lower technology transfer from universities to the private sector and, therefore, fewer marketable products. Innovation clusters in Europe are mostly

[32] QS Quacquarelli Symonds, "QS World University Rankings 2026: Top Global Universities," TopUniversities, 2026, https://www.topuniversities.com/.
[33] European Research Council, "New Report Reveals How ERC Grantees Commercialise Their Patented Inventions," ERC, 2025.
[34] World Intellectual Property Organization, "Innovation Cluster Ranking 2025," WIPO, 2025.

focused on traditional industries such as automotive, whereas the major clusters in the US and China are more focused on digital technologies.

3.2.2. Public funding

Draghi highlights that public support for innovation is significant but fragmented and insufficiently focused on disruptive innovation. Although public average R&D spending in the EU is comparatively high relative to its GDP, only about one-tenth of public R&D is conducted at the EU level, with substantial differences in budget sizes across Member States. While the US centralizes most R&D funding in the federal government, EU Member States account for the largest share of public R&D budgets. Fragmentation across Member States creates further barriers to innovation: fewer opportunities for EU-wide projects, fewer common priorities, less scale for viable players, leading to funds distributed to players with less potential, and duplication[5].

Horizon Europe is the largest R&D funding program in the EU, with approximately €100 billion allocated for 2021 to 2027. While it plays a crucial role in supporting R&D, Horizon Europe faces challenges that limit its effectiveness. One key issue is its overly broad scope, which covers too many fields and priorities, diluting its impact. In addition, beneficiaries often find the application process burdensome, citing this complexity as a significant barrier to accessing funds. The processes for budget allocation and project selection are also complex and frequently do not align with the specific priorities of individual Member States.

Furthermore, Horizon Europe has an insufficient emphasis on fostering groundbreaking innovations. The European Innovation Council ("EIC") Pathfinder budget (€256 million)[35], which exists under Horizon Europe, and is designed to support research of breakthrough and cutting-edge technologies, is a fraction of the US' Advanced Research Project Agency ("ARPA") budget, which totals USD 6.1 billion for the same type of investments.

3.2.3. Private funding

European companies struggle to access private investment, which is their main source of growth, with bank funding accounting for 87% of total EU funding, compared to 52% in the US. Capital supply and demand gaps reinforce each other, with data from the European Investment Bank showing that equity supply for scale-ups still lags behind actual demand.[36]

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[35] European Innovation Council, "EIC Pathfinder," European Commission, 2025.
[36] European Commission, *Study of Barriers to, and Drivers of, the Scaling-Up of Funds Investing in Innovative and Growth Companies*, 34 (Luxembourg: Publications Office of the EU, 2025).

Although VC fundraising has increased throughout the decade between 2010 and 2020[37], the EU capital markets and VC intensity are still much behind the US[38]. mostly because Europe offers fewer growth prospects for new companies than the US does. The fragmented, incomplete single market creates barriers to startups scaling in Europe. In contrast, in the US, a larger capital market, more VCs, and faster scaling opportunities create attractive conditions for EU-founded companies that want to scale.

According to a PWC report [39], 55% of all unicorns are in the US, while only 10% are in Europe. The report bases its assessment on Dealroom data and identifies 3,000 unicorns – i.e., companies that have grown from startups to valuations of at least USD 1 billion. The total valuation of these companies reaches USD 27 billion, with US unicorns valued at USD 20.1 trillion, accounting for 75% of the global valuation of unicorns.

The EU accounted for only 5% of global VC funding, compared to 52% in the US and 40% in China (supported by public VCs), and spent 0.04% of its GDP on VC in 2023, compared to 0.21% in the US. Although the US outpaces Europe in investment across all stages of company development, the gap is most striking in later-stage development, with an 82% difference between the two economies. Focusing on AI, the difference between the US and the EU is also clear: the US accounts for 61% of all private investment in AI startups globally, while EU Member States investors represent only 6%.

According to the Draghi report, between 2008 and 2021, close to 30% of European-founded unicorns moved their headquarters abroad, mostly to the US. A European Parliament study shows that the EU unicorns have moved 20 times more to the US than US unicorns have moved to the EU, a 120 times larger rate of movement in the EU compared to the US[40]

3.2.4. Lack of single market

[37]Different Funds, "Venture Capital Fundraising Data," 2025. *"Between 2010 and 2020, venture capital fundraising* grew 6 fold to nearly $24B*. Although still far short of the record* $73.6B *the US ecosystem raised in 2020, it represents an impressive leap and is about 1.5 times the rate of growth that US fundraising experienced over the same period. "*

[38] European Commission, Study of Barriers to, and Drivers of, the Scaling-Up of Funds Investing in Innovative and Growth Companies, 34 (Luxembourg: Publications Office of the EU, 2025), https://op.europa.eu/en/publication-detail/-/publication/6531d67f-a978-11f0-89c6-01aa75ed71a1/language-en. The report also shows that the total value of deals involving VC managers hit €95.6 billion in the EU versus USD 380.6 billion in the US in the period from 2022 to 2024.

[39] PwC, *Unicorns Report* (2025).

[40] Ricardo Reis, *Letting Large European Firms Grow*, In-Depth Analysis PE 760.228 (Brussels: European Parliament, Economic Governance and EMU Scrutiny Unit, June 2024).

The Draghi report highlights that the lack of a true Single Market is preventing companies across Europe from achieving the scale needed to adopt advanced technologies more quickly. The report points to several barriers, including varying national regulations and the high costs associated with complying with different tax and regulatory requirements. These obstacles have resulted in a fragmented Single Market, making it especially difficult for micro and small companies to implement new technologies. As a result, their productivity and ability to scale up within the EU are limited, thereby reducing overall financing demand. This fragmentation reflects the substantial gap between scale-up financing available in the EU and that in the US, as noted earlier.

3.2.5. Regulatory barriers

Throughout the report, Draghi mentions regulatory barriers as a primary issue in the EU's innovation ecosystem. Draghi points out that there are substantial differences in regulations, with the EU having close to 100 laws targeting technology and more than 270 regulators across the Union. Regulatory barriers are reinforced by Member States' "gold-plating" of EU legislation, creating different standards across Member States that hinder company expansion due to high compliance costs. Tight regulatory constraints on data storage and management may also be putting EU companies at a competitive disadvantage compared with US and Chinese companies, which have access to larger data sets to train their AI models. Overall, the diagnosis is clear: EU regulation needs to change, as more than 60% of EU companies see the regulatory burden as an obstacle to further investment.[41].

3.2.6. Skills gap

Europe faces a shortage of both low- and high-skilled workers. A persistent shortage of science, technology, engineering, and maths ("STEM") skills is undermining Europe's ability to innovate and embrace new technologies. While EU universities and research centers continue to educate capable scientists and engineers, the number of graduates remains insufficient, especially compared to other international competitors like the US. On top of this, Europe consistently loses talent to countries offering more attractive professional opportunities. These trends are already felt across the economy: most European firms cite the shortage of skilled workers as a major obstacle to investment and innovation[42]. Companies are increasingly struggling to hire digital and tech specialists, and almost half of EU citizens are missing basic digital literacy. As the block's workforce shrinks due to retirements and

[41] European Commission, *EU Competitiveness: Looking Ahead* [Draghi Report], 18.
[42] Ibid., 36.

changing labour-market demands, the mismatch between labour-market needs and available skills is set to widen if left unaddressed.

This widening skills gap is closely linked to gaps within Europe's own education and training systems. Students' performance in crucial areas like mathematics and science is slipping according to PISA reports, with standardized international assessments highlighting both overall declines and a shrinking share of top performers.

Barrier	Evidence from data	Structural consequence
Fragmented capital markets	5% global VC vs 52% US	Scale-up gap
Regulatory burden	100 tech laws, 270 regulators	Compliance cost, slow replication
Skills gap	STEM shortage, PISA decline	Weak AI adoption
University commercialization	1/3 patents exploited	Weak innovation pipeline

3.3. Draghi's strategy for innovation

3.3.1. Completing the Single Market and Fostering Competitiveness

The Draghi report calls for bold, systemic change in how Europe approaches competitiveness and innovation. At its core, the report urges the EU to realize the Single Market's full potential by removing national barriers that fragment the economic space and burden companies with duplicative compliance. Completing the Single Market would create opportunities for innovative firms to expand across Europe, potentially unlocking around 10% of untapped EU GDP.

To foster a thriving innovation ecosystem, Draghi recommends that Europe align industrial, competition, and trade policies with a strategy centered on competitiveness. This approach means treating all sectors fairly, modernizing merger rules to account for the unique dynamics of innovation, broadening support for large, collaborative innovation projects (IPCEIs), and using trade defenses only where necessary to counter foreign distortions.

3.3.2. Financing, Governance, and Scaling Innovation

Financing is another cornerstone of Draghi's vision. Europe needs an investment surge, about five percentage points of EU GDP annually, to accelerate digitalization, decarbonization, and defence. The report advocates mobilizing private capital through deeper integration of capital markets and complementing it with targeted public support for breakthrough innovation and critical infrastructure. As productivity grows, it can help offset the fiscal effort required. Where national budgets alone fall short, common EU funding will be essential for projects that benefit all Member States.

To make these ambitions achievable, Draghi stresses the importance of streamlined governance. European decision-making must become faster and less complex, especially for innovative young firms. He suggests targeted reforms short of Treaty change, with greater delegation to the EU level where unified action is needed, stricter subsidiarity elsewhere, and real simplification of regulations, particularly for SMEs.

On the innovation front, the report proposes doubling research and innovation funding to €200 billion over seven years, with a focus on supporting disruptive ideas. According to Draghi, the European Innovation Council should evolve into a dynamic, outcome-driven agency led by experienced managers. European research institutions should work together more strategically, while the European Research Council should receive increased support to fund world-class science. New talent-attracting initiatives, such as an "EU Chair" regime and competitive funding for leading institutions, would secure Europe's place at the forefront of global research.

To bridge the gap from invention to investment, Draghi outlines measures to make scaling up easier: a fair royalty-sharing model to manage university IP, full EU-wide adoption of the Unitary Patent for streamlined protection, and an EU-wide legal status for startups—the "Innovative European Company"—that simplifies cross-border expansion and harmonizes key aspects of corporate and labour law. Draghi calls for more local capital, expanded incentives for early-stage and institutional investment, and a larger role for the European Investment Bank Group in co-investing alongside private investors.

3.3.3. Infrastructure, Technology, and Inclusive Growth

When it comes to infrastructure and technology, Draghi highlights the need for an ambitious expansion of computing power for startups and SMEs through initiatives such as EuroHPC, as well as joint investments in AI and digital infrastructure to reduce costs and accelerate deployment. He recommends coordinated experiments in strategic sectors, updated cloud data security policies, and standards that level the playing field for European companies while maintaining openness and efficiency in telecoms and network connectivity.

Finally, Draghi connects competitiveness with inclusion and social progress. Europe should not only match US innovation performance but also surpass it in creating opportunities for education and lifelong learning.[43]. By investing in skills intelligence, curriculum updates, and common certification, the EU can close its gaps in STEM and management expertise. At the same time, the report urges proactive reskilling to mitigate the impact of AI and digital transformation on the workforce and to sustain Europe's unique social model.

In summary, Draghi's recommendations address the root causes of Europe's digital and innovation challenges, offering a unified, scalable strategy: complete the Single Market, professionalize innovation funding, build shared digital infrastructure, unlock private investment, and streamline governance.

In summary, Draghi's recommendations address the root causes of Europe's digital and innovation challenges, offering a unified, scalable strategy: complete the Single Market, professionalize innovation funding, build shared digital infrastructure, unlock private investment, and streamline governance

This shall empower innovative companies to grow in Europe, not abroad.

Draghi's comprehensive plan to enhance innovation is summarized in the table below.

DRAGHI'S PROPOSED POLICY SOLUTIONS	
Building Block	**Proposed Solutions**
Accelerating **INNOVATION**	**RESEARCH AND INNOVATION UNION**: Strengthen policy coordination via a Research and Innovation Union and an "European Research & Innovation Action Plan". This plan should reaffirm commitment to 3% R&D expenditure target. **EUROPEAN 'ARPA-TYPE' AGENCY**: Develop a European-Scale agency, leveraging EU scientific fundamental knowledge into breakthrough applied innovation. **ACADEMIC EXCELLENCE AND WORD-LEADING RESEARCH**: Create ERC-I (ERC for Institutions), modeled on France's LabEx, double ERC support for fundamental research and increase joint investment in world-class research & technology infrastructures (e.g. CERN).

[43] Ibid., 25.

DRAGHI'S PROPOSED POLICY SOLUTIONS	
Building Block	**Proposed Solutions**
	INNOVATIVE EUROPEAN COMPANY: Introduce a new EU-wide legal statute for innovative start-ups. **START-UP AND SCALE-UP FUNDING**: Significantly increase equity and debt funding for start-ups and scale-ups.
Closing **SKILLS GAP**	**SKILLS INTELLIGENCE**: Use granular 'skills intelligence' data to inform skill policies. **CURRICULA REVISION**: Revise curricula for changing skill needs, with a focus on STEM, digital, and green transition skills. **TALENT ATTRACTION**: With the creation of an EU-level visa programme for students, graduates and researchers in relevant subjects and a new Tech Skills Acquisition Programme. **MANAGEMENT SKILLS**: Promote managerial skills in SMEs, inspired by UK's "Help to Grow: Management" **FREEDOM OF MOVEMENT**: Improve and harmonize skills certification for maximizing the impact of EU skills policies and deepen the Internal Market. **EU SKILLS POLICIES**: Rethinking the design, funding and implementation and evaluation EU skills policies through a reform of the European Social Fund (ESF+). This shall retarget skills policies in accordance with EU-level strategic priorities.
Sustaining **INVESTMENT**	**COMMON REGULATOR**: Establish a European Security Exchange Commission as the single EU market regulator, transitioning ESMA from coordination tool the exclusive supervision. **DEBT ISSUANCE**: issuance of a common safe asset to finance joint investment projects

DRAGHI'S PROPOSED POLICY SOLUTIONS	
Building Block	**Proposed Solutions**
	BANKING UNION AND SECURITIES: Enable the European securitization market and complete the banking union for "country blind" cross-EU banking supervision and crisis management.
Revamping **COMPETITION**	**STRATEGIC EXEMPTIONS**: Provide guidance for novel R&D/sustainability-related agreements between competitors. **IPCEIs**: Reform and expand IPCEIs to support a broader range of innovation initiative. **EFFICIENT REGULATION** : Reinforce ex-post versus ex-ante regulation. **NEW COMPETITION TOOL (NCT)**: Introduce a new tool to investigate and remedy structural market competition problems.
Strengthening **GOVERNANCE**	**COMPETITIVENESS COORDINATION FRAMEWORK**: Separate the competitiveness decision-making from the subordination to fiscal surveillance (European Semester) **SECTORAL PLANNING**: Organize "EU Competitiveness Action Plans" by industrial policy areas **ALTERNATIVE DECISION-MAKING**: Use enhanced or intergovernmental cooperation if EU procedures are blocked. **SIMPLIFICATION VP**: Streamline the EU acquis via a new Vice-President for Simplification (addressing regulatory burdens such as sustainability reporting, due diligence, GDPR, and waste legislation).

The Draghi Report presented an extensive agenda to address Europe's structural innovation challenges, ranging from regulatory harmonisation to deeper capital markets integration. While the report provides a comprehensive roadmap, the critical question concerns implementation. The following section examines the European Union's response since the publication of the Draghi Report, assessing the extent to which policy initiatives have addressed the identified challenges and identifying remaining gaps.

IV. EU Policy response Since Draghi

Although some action has taken place since the presentation of the Draghi Report, the EU institutional framework—and its regulatory weight—has largely lived up to its critiques. Initial action materialised primarily through a proliferation of institutional documents, whose execution has subsequently been slowed down by the multiple parts and gears of the EU machine. While European authorities have signalled willingness to act, delivery has fallen short of expectations, even prompting, as further detailed below, Draghi himself to publicly criticise the insufficient EU response to the challenges underlying his report[44].

Notwithstanding this assessment, it would be inaccurate to claim that no action took place. In January 2025, only a few months after the release of the Draghi Report, the European Commission presented *"A Competitiveness Compass for the EU"* (the "Compass"), ambitiously aiming to "guide the work in the coming five years and list priority actions to reignite economic dynamism in Europe".

By providing a timeline and a non-exhaustive list of planned initiatives, the Compass sets out an action plan intended to implement the recommendations of the Draghi Report. It does so by identifying clear and concrete policy actions across both the "three transformational imperatives to boost competitiveness" and the five horizontal enablers. In essence, the Compass asserts two broader objectives: (i) to identify the policy changes needed to boost Europe's competitiveness and productivity; and (ii) to develop new ways of coordinating decision-making at EU level in order to increase both the speed and quality of outcomes.

The following chapter identifies the key actions proposed under these dimensions and assesses their status of implementation. Given that this Report focuses on the digital dimension of the European strategy, the analysis will preferentially highlight policy initiatives with a relevant impact in that context.

4.1. The Innovation ecosystem and finance tools

As exposed above[45], the EU innovation ecosystem faces multiple funding constraints. To address fragmented policies and public R&D spending across member states, the Compass determined that the Commission should present a "**European Research Area Act"** (2026) to strengthen R&D investment and bring it up to the 3% of GDP target. The Compass established that the Commission should draft and present this proposal in 2026.

[44] European Commission, *Communication on Competitiveness*, *High Level Conference – One year after the Draghi report: what has been achieved, what has changed*, 2025.
[45] Please see "Europe's innovation barriers**",** section 3.2.

Recognising that these financial constraints are not only a problem for the public sector, the Compass also proposes a joint approach to private-sector innovation funding through two distinct policy instruments.

First, a dedicated **EU Start-up and Scaleup Strategy** (Q2 2025) will address the obstacles that prevent new companies from emerging and scaling up. The main goals are the promotion of relations between business and universities, the enhancement of patent prospects, and the removal of barriers to access to risk capital. The strategy also identifies the need to strengthen Single Market rules for the free flow of skilled workers and their talent.

The Commission adopted the strategy was adopted on 28 May 2025 proving concrete actions from which we highlight: (i) the institution of a "**Scaleup Europe Fund**", which was agreed with top-tier private investors on 28 October 2025 and is scheduled to make its first investments in Spring 2026[46]; (ii) or the "**Blue Carpet initiative**" for the attraction and retention of high skilled workers, aiming to amplify the impact of the **EU Blue Card Directive** within entrepreneurial education, tax-related aspects of employee stock options and cross-border employment. The package also includes the creation of the "**European Business Wallets**", a digital initiative to establish a harmonised identity across all member states, enabling easy communication between businesses across borders. This measure is estimated to save up to €5 billion in administrative costs between the end of 2025 and 2029[47]. Member states will have two years to implement the use of the Business Wallets.

Second, a "**European Innovation Act"** (Q4 2025 – Q1 2026) to promote the access of innovative companies to European research and technology infrastructures, intellectual assets generated by publicly funded R&I, in view of increasing patenting, and regulatory sandboxes allowing innovators to develop and test new ideas. Furthermore, the Compass asserts that the Commission will propose harmonising legislation through a "28th legal regime". The Commission held a public consultation on the European Innovation Act from 8 July to October 2025. In January 2026, at the World Economic Forum, President Von der Leyen announced the implementation of the 28th regime through a single corporate structure called the "EU-Inc."

In line with Draghi's suggestions and following a petition and a concrete proposal from a large group of EU entrepreneurs[48], the EU-Inc. will have a single set of rules applicable across all Member States—

[46] European Commission, "Commission Partners with Private Investors to Set Up Multi-Billion Scaleup Europe Fund," Press Release, 2025.
[47] European Commission, "European Business Wallets," Shaping Europe's Digital Future, 2025.
[48] EU–INC Initiative, "One Europe. One Standard. — Pan-European Legal Entity," 2025.

the EU-Inc. The framework includes a harmonized capital regime within the Union, with the EU projecting the first EU-Inc—companies to start registering between 2027 and 2028.

4.2. Excelling in technologies for tomorrow's economy or (Groundbreaking Technologies)

The Compass also reasserts European ambitions to be a frontrunner in discovering and developing groundbreaking technologies such as AI, semiconductors, and quantum technologies. For that purpose, the Commission is to present proposals on an "**AI factories initiative**" (Q1 2025) and, in parallel, an "**EU Cloud and AI Development Act**" ("**CADA**") (Q4 2025-Q1 2026) mobilising public and private initiative to establish new AI Gigafactories and a "Data Union Strategy" to improve the access to high-quality data.

The AI Factories are dynamic ecosystems that foster innovation, collaboration, and AI development. They do so by leveraging the EuroHPC Joint Undertaking's supercomputing capacity to develop generative AI models. According to the "**AI Continent Action Plan**" throughout 2025-2026, at least 15 AI factories are expected to be operational. In addition, Europe shall create a new €20 billion fund, the "**AI Invest Facility**", to create up to 5 AI Gigafactories[49].

Regarding CADA, a formal proposal is expected to be adopted over the first quarter of 2026. A public consultation for this initiative ran from April to July 2025. The CADA initiative encompasses three distinct pillars anchored in Europe's Digital 2030 objectives: (i) advancing research and innovation, encompassing the optimisation of resources for data processing through resource-efficient data processing infrastructure; (ii) conditions for investment and deployment, namely through enhancing energy flexibility through strategic grid user integration and the creation of fast-track processes for highly impactful projects; (iii) ensuring highly secure EU-based cloud and AI computing capacity.

On quantum technologies, a "**Quantum Strategy**" (Q2 2025) and a "**Quantum Act**" (Q4 2025) are to be proposed. The policies aim to address regulatory fragmentation, align EU and national programmes, and support investment in pan-European quantum computing, communication, and sensing infrastructure.

The "Quantum Europe Strategy: Quantum Europe in a Changing World" was effectively adopted by the Commission on 2 February 2025. The strategy is subdivided into 5 key areas: (i) Research and Innovation; (ii) Quantum Infrastructures; (iii) Strengthening the EU Quantum Ecosystem; (iv) Space and Dual-Use Potential Quantum Technologies (Security and Defence); (v) Quantum Skills. This strategy is

[49] AI Gigafactories being *"large-scale facilities dedicated to the development and training of next-generation AI models containing trillions of parameters".*

to be further developed and implemented by the Quantum Act, which was under a call for evidence until 15 December 2025[50]. This diploma aims for the boost of R&I, scale up of industrial capacity and reinforcing the supply chain and governance.

4.3. Diffusion of innovation across the whole economy

Since the Recovery and Resilience Plan (RRP), digitalisation has been a cornerstone of the EU's development strategy and a key hope for boosting its productivity. Recognising the gap between R&D of AI technologies and their actual integration into the economy, the Commission announced a proposal for an "**Apply AI Strategy**" (Q3 2025). This strategy shall account for both new industrial uses of AI and its integration into public services, where integration is key to enhancing competitiveness.

The **Apply AI Strategy** was effectively adopted on 8 October 2025, comprising three sections: first, targeted measures to boost AI adoption across 10 key industry sectors, ranging from healthcare and pharmaceuticals to electronic communications and cultural, creative, and media. Second, actions to increase the EU's technological sovereignty by tackling cross-cutting challenges to AI development and adoption. This section highlights the Commission's role in enabling an AI-ready workforce. The strategy's objectives shall be achieved through the provision of practical AI literacy training and by encouraging industry involvement in upskilling and reskilling. Third, the creation of a new governance system through the implementation of the "**Apply AI Alliance**", a main coordination forum that brings together industry leaders, academia, and relevant public sector entities.

The strategy also acknowledges that, although AI has the potential to improve energy consumption and efficiency across multiple sectors, "advanced AI models and systems also consume significant energy, notably in data centres". Energy consumption shall be addressed by the upcoming "**Strategic Roadmap on Digitalisation and AI for the Energy Sector**" together with CADA.

Furthermore, the increasing digitalisation of the economy and the widespread use of these technologies must be anchored in a capable, robust infrastructure. To that end, the Commission was to adopt a proposal for a "**Digital Networks Act**" (DNA) (Q4 2025), realigning incentives to build networks and hammering down excessive burdens and compliance costs.

The proposal for the DNA was adopted on 21 January 2026, merging four legal acts into one directly applicable Regulation [51]. The Act delivers four key measures: (i) strengthening a Single Market for

[50] European Commission, "Commission Invites Contributions to Shape Future EU Quantum Act," Shaping Europe's Digital Future, 2025.

[51] The European Electronic Communications Code (EECC), the BEREC Regulation, the Radio Spectrum Policy Programme and the core parts of the Open Internet Regulation.

connectivity, introducing a "Single Passport" authorisation for operations and service provision across the EU; (ii) achieving simplification; (iii) boosting innovation in the broader digital ecosystem, by introducing a mechanism to clarify Open Internet rules for innovative services and a voluntary ecosystem cooperation on IP interconnection or traffic efficiency; (iv) strengthening resilience and preparedness, with an EU-level Preparedness Plan to tackle the rising risks of natural disasters and foreign interference in networks. At the infrastructure level, the DNA defines a framework to support and accelerate the transition from copper networks to a full-fibre environment, introducing mandatory national transition plans for the phase-out of copper networks.

Finally, it should be noted that both the Draghi Report and the Compass made references to a potential "CERN for AI", a high-scale research institution leveraging high-level coordination for AI Research. The result of this was the "**Resource for AI Science in Europe**" ("**RAISE**"). A virtual institute that pools excellent talent, computing, data, and research funding for AI, as laid out in the European Strategy for AI in Science[52]. The Commission launched a pilot for RAISE at the AI in Science Summit in Copenhagen in November 2025.

4.4. Horizontal enablers

Besides identifying key policy areas and initiatives for targeted development of the Economy, the Commission acknowledges the need for structural adaptations within the EU institutional and regulatory framework to boost competitiveness. On one hand, there is a real effort to deliver a "simpler, lighter, faster" EU regulation, fit for competitiveness. On the other hand, the intention is to bridge European investment gaps through new directing instruments and increased coordination.

The Compass announced the launch of the first of a series of Simplification Omnibus packages in February 2025, delivering an unprecedented simplification effort of EU regulations. In fact, the first Omnibus on sustainability (Omnibus I) was presented in February 2025 and aimed to simplify corporate due diligence obligations and sustainability reporting. But this was only the beginning: from February to December 2025, the Commission presented a total of 10 Omnibus simplification packages, from food and safety to digital[53].

The Commission proposed the Digital Omnibus package (Omnibus VII) on 19 November 2025, including two regulations (Digital Omnibus and Digital Omnibus for AI) to simplify the digital legislative

[52] European Commission, *Communication from the Commission to the European Parliament and the Council: A European Strategy for Artificial Intelligence in Science—Paving the Way for the Resource for AI Science in Europe (RAISE)*, COM(2025) 724 final (Brussels: European Commission, 2025), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52025DC0724.

[53] Council of the European Union, "Simplification of EU Rules," Consilium, 2025.

framework. This package clarifies the concepts of personal data and pseudonymisation, reducing data processing burdens for businesses. It also allows the use of personal data to create or run an AI model or system, subject to the safeguards of the "legitimate interests" option.

The changes aim to reduce the GDPR burden on companies and to align the framework with the urgent need to develop AI models. The proposal will now go through the ordinary legislative procedure, and its approval is expected before August 2026. In parallel, the Commission is to promote a "stress-test" through the so-called "**Digital Fitness Check**", which aims to study the interplay between the different rules and their cumulative impact on business. The Digital Fitness Check is under public consultation until 11 March 2026.

A decisive step in the mobilisation of joint investment proposed in the Compass is the "**Strategy on a Savings and Investment Union**". The Commission indeed adopted this strategy on 19 March 2025 and has its central component in the "**Market integration package**"[54], adopted on 4 December 2025. This package aims to address the fragmentation and underdevelopment of the EU capital market by increasing stock exchange capitalisation, expanding the scale of investment funds, and strengthening market infrastructure. A key measure is the creation of a "Pan-European Market Operator (PEMO)" status for groups operating across multiple countries under a single licence. The package shall introduce a "Master Regulation", a "Master Directive", and a Settlement Finality Regulation, to be implemented over the next two years.

Finally, from the public financing standpoint, the Compass also announced the Commission's intention to introduce two new coordination instruments under the Multiannual Financial Framework ("**MFF**"): the "**Competitiveness Coordination Tool**," supported by a new "**Competitiveness Fund**" ("**ECF**")[55]. The introduction of these new tools was predicted to be adopted by 2025, and the proposal was, in fact, adopted by the Commission in July 2025 for the MFF 2028-2034. This proposal groups 14 existing funds, totalling €400 billion, or 22% of the future MFF, to provide significant financing for strategic technologies and support important projects of common European interest ("**IPCEI**"). The proposal is currently undergoing the ordinary legislative procedure.

4.5. From planning to execution: reality vs expectations

While comparing the proposed measures and priorities in the Draghi Report and their corresponding policy, as translated into the Compass, it is impossible not to acknowledge the level of normative

[54] European Commission, "Factsheet: Breaking Down Barriers to Integrate Financial Markets," Finance, 2025.
[55] European Commission, "European Competitiveness Fund," 2025.

ambition and concrete, palpable action. As identified above, the generality of the proposed policy and diplomas were adopted according to schedule and underline a strong motivation to boost competitiveness and growth at the EU level. EU institutions are taking concrete action to increase their commitment to innovation while leveraging frontier technologies such as AI and quantum computing. At the same time, relevant efforts have been made to improve coordination, promote simplification, and placate excessive burdens crippling the EU's growth engine.

In line with the described achievements, on 16 September 2025, the Commission convened a high-level conference to review its progress in implementing the recommendations set out in Draghi's report. In that context, the Commission released a factsheet[56] detailing its achievements, claiming the adoption of **33 flagships** and **14 legislative** initiatives. The key takeaway was that:

"With more than half of initiatives already delivered, and over €1 trillion mobilised across innovation, clean tech and security, the European Commission is ensuring the EU remains competitive, sustainable and resilient — and on track to meet its 75% adoption target by end-2025."

However, the same factsheet contains imprecise or even misleading statements, which may be symptomatic of a dissonance between political ambitions and the delivery of concrete results. It is pointed out that tangible results include €200 billion mobilised for AI investment. Yet, although InvestAI intends to mobilise the stated amount, the Commission can only assure the mobilisation of public funds of €50 billion, with no formal framework ensuring the commitment of €150 billion from the private sector. Through the EU AI Champions initiative, the private sector did state that they are "ready to deploy that amount"; however, only €20 billion was mobilized so far.[57] President von der Leyen claimed in her speech that the Commission "received 230 billion EUR in proposals from the private sector" for the AI Gigafactories. It was not possible to find public information corroborating this claim. Moreover, it pledges €8.4 billion in savings for businesses, with six simplification omnibuses presented as tangible results. However, as of the date of this report, there are still omnibuses to come into force.

Hence, although the level of ambition, initiative, and expectations, as described above in the chapter, deserves recognition, reality may fall short of expectations. Draghi's speech, right after Von der Leyen's, offers a stark contrast in how to approach reality. Draghi points out that over that year, not only have the challenges faced by Europe grown more acute, but the foundations of Europe's growth have

[56] European Commission, *Factsheet: One Year of The Draghi Report* (Brussels: European Commission, 2025).
[57] European Commission, "EU AICI Announcements at Franco-German Summit," Second Media Release, 2025.

weakened further. **Acknowledging that "Europe's *citizens and companies value the diagnosis, the clear priorities and the action plans",* he expresses disappointment with *"how slowly the EU moves".***

Despite recognising progress, Draghi points out three areas where more ambition is needed: plans for at least five AI Gigafactories or tripling data-centre capacity over the next seven years.

The first is the removal of barriers to scaling up new technologies. Although timely, the adoption of the new proposals for the "**EU Research Area Act**" and "**EU Innovation Act**," both scheduled for 2026, may help overcome this barrier.

The second area is Regulation, with Draghi calling for a radical simplification of the GDPR and noting that it has raised the cost of data by about 20% for EU firms compared with US peers. However, the speech took place 2 months before the formal adoption of the Commission's Digital Omnibus package, which was designed to address this issue.

The third area is the vertical integration of AI into industry. Draghi underlines Europe's real advantage in potential sectoral AI applications, noting that its firms hold more than half the global market in industrial automation solutions, and referring to the "Apply AI Strategy" adopted by the Commission on 8 October 2025.

Draghi goes on to identify the two traps Europe's response has fallen into: uncoordinated national efforts or blind faith that market forces will build new sectors, leading to a lack of scaled responses. As a response, he calls upon the use of three "levers": (i) a new approach to coordinating state aid, through instruments such as the Important Projects of Common European Interest (IPCEIs), (ii) leveraging public procurement, directing the EU 14% share of global GDP to shape intended policies; (iii) improvements in competition policy.

His final considerations focus on the question of "how we increase speed (of implementation)", pointing out that "Europe must start acting less like a confederation and more like a federation", while recognising that "such reform will take time—time we may not have".

Overall, although the Commission took very significant actions since the presentation of the Draghi Report, this level of action, in the words of its own author, falls short of its objectives.

4.6. Final note: the EU institutional framework and legislation profusion

As Draghi recognised, the speed and efficiency of policy implementation in the EU are seriously hampered by its institutional framework, legislative process, and uncoordinated practices. While drafting this report, it was noted that the "adoption of 33 flagships and 14 legislative initiatives"

should not be claimed as an achievement *per se*. **Many action plans and legislative initiatives are rife with redundancies, difficult-to-trace references, and unclear timelines.**

In the case of AI, although the "AI Continent Action Plan" provides a comprehensive document outlining key measures in Europe's AI landscape, it also announces the deployment of another strategy, the "AI Apply Strategy". The Commission should focus on consolidating and centralizing soft law and planning instruments into a single comprehensive document. If the EU Commission wishes to streamline the regulatory framework, it should start with its own workstream. Stremlining increases confidence and certainty for both EU citizens and investors.

In addition, after the Commission adopts the initiatives, the complex legislative procedure involving three actors further hinders the coherence of policy and legislation. GARICANO[58] comprehensively analyses the political economy incentives that underlie the EU legislative procedure and its "trilogue" processes. The author draws an impressive quote from the Draghi Report, which accounts for an analysis that "looked at just 13 pieces of EU legislation and found 169 cases where different laws impose requirements on the same issue.

While Draghi's diagnosis and the EU's subsequent actions may be crucial for redirecting Europe's trajectory, it is important to remember that the EU consists of 27 Member States, each progressing at different speeds. In the next section, the Portuguese case illustrates how many of the difficulties identified by Draghi—particularly fragmentation and limited access to capital—are experienced at the national level..

V. Portuguese Case Study

5.1. Portugal: a growing innovation economy

Portugal's unique geographic position, low energy costs for industrial consumers and relatively cheap and qualified labor, security, strong rule of law are amongst the factors that are often pointed out as major points of attractiveness of the Portuguese economy.

Portugal has been recently portrayed has being a growing technological hub in Europe. The country's economic success has been hailed in international press, driven by above average growth and budgetary surpluses[59], with the IMF forecasting surpluses until at least 2030[60]. After the 2010 crisis,

[58] Luis Garicano, "How Brussels Writes So Many Laws," Substack, 2025.
[59] *The Economist*, "Which Economy Did Best in 2025?" December 2025.
[60] International Monetary Fund, European Dept., *Portugal: 2024 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Portugal*, IMF Staff Country Reports 2024, no. 308 (Washington, DC: International Monetary Fund, October 2, 2024), https://doi.org/10.5089/9798400288814.002.

the country has managed to steadily recover, by reducing public debt from around 134% of GDP in 2020 to 90,9% in 2025, with forecasts pointing to a record 77,4% by 2030[61]. The employment rates are also hitting records, reducing from 16,19% in 2013 to 6,4% in 2025. This financial credibility and economic robustness have strengthened the country's financial attractiveness and investor confidence. Even tough Portugal shows substantial improvements to its economy across the years, Portugal's labour productivity is still low at nearly 46% of the EU average, with a slow increase of 3,7% from 2018 according to data from the European Innovation Index.

The country's attractiveness is shown by the Foreign Direct Investment ("FDI") stocks which have steadily increased, from around €125 billion in 2015 to €208 billion in 2025. According to EY[62], in 2024 Portugal placed 9th in FDI attractiveness within the EU, although an overall drop in investors' confidence due to geopolitical shifts might have influenced the two places drop from previous years. While the number of new projects has felt, the number of total projects has increased by 21%, with Portugal accounting for 3,5% of the total share of FDI projects in the EU. Investment from non-EU countries has increased from 22% to 34% showing increasing interest of large economies including the US and Brazil, which has tripled its investments since 2022. Around 30% of all FDI projects in Portugal were in the software and IT services sectors, which is yet another indicator of Portugal attractiveness in the digital realm, as the country ranks 4 in this sector for FDI attractiveness.

A strong sign of economic diversification is the fact that 2024 marked a reversal in investment sectors, with a 21% drop-in services and a 28% increase in manufacturing. According to EY this may be a sign of Portugal's reindustrialization.

Almost half of investors signal the need for investments in physical and digital infrastructure in Portugal, while 42% point out upskilling the work force (with 38% pointing specifically the enhancement of digital data skills) and improvements access to early-stage funding as major priorities for Portugal. Investors have also referred to the Portuguese AI policy and ecosystem as some of the major factors reducing attractiveness, while 53% have recognized improvements in this field.

In terms of policy priorities, investors emphasise the need for a simplified tax framework, improvements to access capital markets and support to strategic industries such as AI and clean tech.

[61] Portugal and the IMF

[62] EY Portugal, *EY Attractiveness Survey Portugal 2025* (Lisbon: EY, 2025).

Using different metrics, the financial times fDi report for 2025[63], Portugal has recorded a 4.5% increase attracting 186 new projects, and positioning Portugal second in Europe and 16th worldwide for greenfield investment projects.

In December 2024, the Portuguese Government Launched the Portugal Digital Strategy setting goals in areas ranging from digital connectivity to skills improvement to digital adoption by companies The aim is to release Portugal's full potential, and to make it a "leading player in the European digital landscape"[64]. The report identifies gaps, sets targets, and proposes measures to strengthen Portugal's position as a leader in innovation.

Since then, the government has published an action plan for 2026 and 2027[65], with a series of initiatives that intend to foster digital adoption in the public and private sector, improve skills and launching the national artificial intelligence agenda ("ANIA"). The action plan aims to achieve the government's 20230 targets, that include 80% of the population with basic digital skills, full digitalization of public services, and AI adoption by 75% of companies.

5.2. Innovation

Portugal's innovation performance as measured by the European Innovation Scoreboard[66] has improved between 2018 to 2025 by 9 p.p., however at a slower rate than the European average which has increased by 12,6 p.p. in the same period. In 2025 Portugal performance stands at 90.7% of the EU average in 2025, ranking 16th among EU member states, and 20th among the EU and its neighbouring countries[67]. The country is currently considered a moderate innovator in a scale ranging from emerging innovators (70% of the 2025 EU average) to innovation leaders (125% of the 2025 EU average), above the 85,9% average for moderate innovators. When looking at regional indicators, the Great Lisbon Area, has become the first strong innovator in the country.

[63] FT Locations Knowledge Hub | Report | The fDi Report 2025

[64] Government of Portugal, *Portugal Digital Strategy: Portugal's Digital Transformation—The Key to Simplification* (Lisbon: Government of Portugal, 2024).

[65] Government of Portugal, *Portugal Digital Strategy: 2026-2027 Action Plan* (Lisbon: Government of Portugal, 2025).

[66] European Commission, "EIS Interactive Tool 2025," Research and Innovation, 2025.

[67] The Global Innovation Index puts Portugal in 31st ranking worldwide, and in 20th in Europe. Global Innovation Index 2025 - GII 2025 at a glance

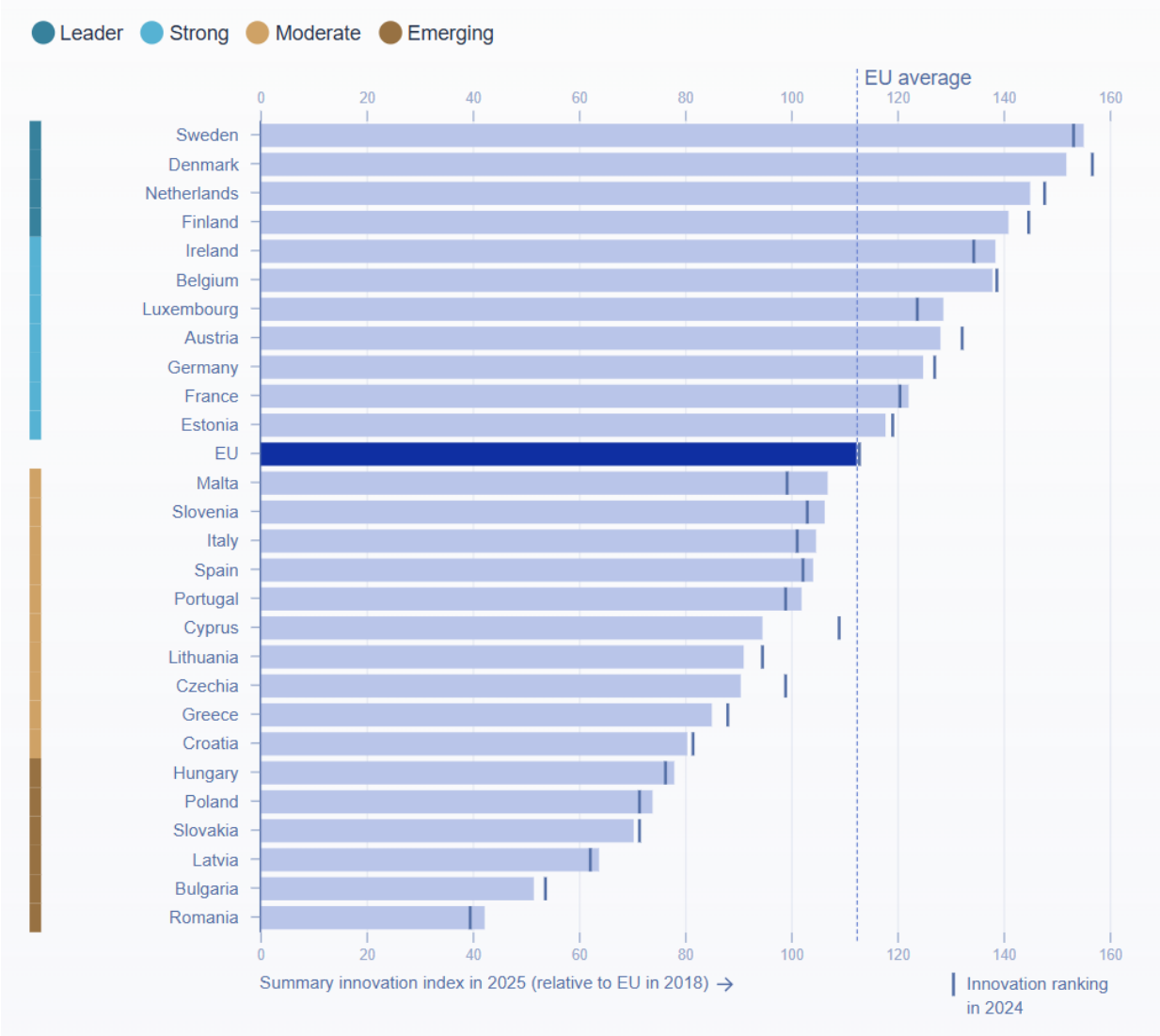


Figure 2 - Portugal is a moderate innovator still far from the top. Source: EIS interactive tool 2025 | Research and Innovation

Portugal shows sustained growth across some EIS indicators, while it has dropped in others. The country's leads in direct and indirect government support of business, ranking first amount the EU Member States, and has significantly improved in other areas such as cloud computing[68] adoption by companies (160,2 p.p. increase).

Significant drops were registered in the number of Portuguese SMEs introducing new products into the market, a relevant innovation indicator in which Portugal places 21st among the EU and neighbouring countries.

[68] According to the EIS *"Cloud computing refers to ICT services used over the internet to access software, computing power, storage capacity, etc."*

Another important indicator seen in start-ups is the very low level of cooperation between SMEs and other organizations. This indicator is especially significant, as it measures the extent of innovation collaboration, not only between companies and public institutions, but also among companies themselves. A low score in this indicator, may show weak innovation clusters, and knowledge transfers. Portugal has shown very low performance in SME collaboration, scoring at 67,1% the EU average placing it in one of lowest places in the EU. However, Portugal does show a strong collaborative environment between universities and the private sector. Portugal is way above the EU average (145,6%) in 2025, public-private co-publications have increased by 74.9% since 2018, placing Portugal in first place in 2025. These indicators show Portugal still has work to do to strengthen its innovation clusters to ensure more efficient exchanges between public sector, private sector and academia.

Portugal ranks highly in company turnover generated by new-to-market and new-to-firm innovations relative to total company turnover, placing 5th among EU countries. This indicates a significant introduction of new products to the market. However, this innovation-driven growth is not reflected in international trade figures. From 2018 to 2025, Portugal's progress in this area has been only marginal.

In terms of exports of medium- and high-tech products, Portugal ranks 21st in the EU, achieving just 56% of the EU average. Similarly, exports of knowledge-intensive services reach only 46% of the EU average, placing Portugal 24th among EU countries.

These indicators suggest that, despite strong performance in introducing new products and innovations domestically, Portuguese companies encounter difficulties in leveraging these innovations for export. The relatively low ranking in exports of medium- and high-tech products as well as knowledge-intensive services highlights ongoing challenges in expanding the international competitiveness of Portugal's innovative sectors.

R&D expenditure in both the public and private sector has dropped, remaining below the EU average in 2025. However, there was a substantial increase in government direct and indirect support of business R&D standing at 185.8% of the EU average placing Portugal in first place in this indicator which includes support through grants, public procurement, and the tax system, showing that Portugal's government is prioritizing public investment in private innovation.

These investments have been mainly driven by the SIFIDE (Sistema de Incentivos Fiscais à Investigação e Desenvolvimento Empresarial), a Portuguese tax incentive system designed to stimulate corporate investment in R&D.

It allows companies to deduct eligible R&D expenses from their corporate tax base. Since inception, SIFIDE has supported nearly 9,900 companies and approved over 36,000 applications, with a total of €11.6 billion in validated R&D investment and €865.1 million in tax credits granted in 2023 alone. This program plays a central role in Portugal's strategy to boost private R&D investment.

5.3. Skills and talent

According to the EIS, individuals with above basic digital skills have increased by 6.2 p.p. since 2018, showing a positive, although slow improvement. Employed ICT specialists have increased by 17.9 p.p. and now stand at a 105% of the EU average. The Greater Lisbon Area ranks first among all regions in Europe for the employment of ICT specialists, highlighting its strong appeal to professionals in this field. Even if IT specialists still account for as little as 5.2% of the total workforce, there was a 13% increase when compared to 2024. This is compared to a 4.2% average progress in the EU.[69]

Indicators show that Portugal is attracting more foreign doctorates students with and increase in 44 p.p. in the share of foreign students compared to the total doctorate students, while international scientific publications, those with at least one co-author outside of the country, have substantially increased by 60,8% percentage points since 2018. However, this is not reflected in high quality publications (top 10% most cited worldwide), regarding which the country's position has worsened in the same period, sitting at 78,9% of the EU average, which is likely due to low public investment in university research. Transforming volume into quality should be a priority for Portugal.

This is also demonstrated by the low level of patent applications in Portugal. According to the latest data by WIPO[70], Portugal scores 18th in Europe for patent applications, 20th in filings of industrial designs, and a little higher on trademarks (12th). The EIS shows that patent applications have dropped 2 p.p. since 2018, which places Portugal at 58.6% of the EU average in patent applications, and at 81.4% in design applications.

Portugal scores high lifelong learning[71] with a 34.6 percentage point increase since 2018, standing at 120% of the EU average. The country presents an above EU average mobility of science and technology human resources, which contributes directly to the level of knowledge creation.

The share of population with tertiary education has dropped 17.9 p.p. since 2018, although it remains close to the EU average in 2025, with the number of doctorates remaining unchanged at 100% of the

[69] European Commission, *Portugal Digital Decade 2025 Report*, 16 (Brussels: European Commission, 2025).
[70] European Union Intellectual Property Office, "Intellectual Property Statistics - Portugal," EUIPO, 2025.
[71] According to the EIS *Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence.*

EU average. Finally, employment in innovative enterprises compared to the total number of enterprises is slightly below the EU average, placing 14th in the EU, and have dropped 48 p.p. since 2018, showcasing that new employment is not being directed towards innovative companies.

This is in line with the conclusions of the IMD World Talent Ranking[72], which places Portugal in 23rd among 69 countries, but highlights major weaknesses namely when comes to brain drain, where the country places 61th showing Portugal is losing talent, with figures by the Emigration Observatory pointing to an emigration of 30% of the population aged between 15 and 39 years in 2021[73]. The report also highlights the relatively high number of sciences, technology, engineering graduates.

5.4. Private investment

Despite Portugal's strong commitment to public investment in R&D, private sector involvement remains comparatively low. Since 2018, private investment in R&D has grown by 32.8 percentage points, yet it still only reaches 70.3% of the EU average, highlighting a persistent gap in private sector engagement.

Innovation expenditures per person employed are low, scoring 36.1% of the UE average, while non-R&D innovation expenditures are currently at around 69.1% of the EU average. Both these indicators have seen decreases of respectively 12 p.p. and 55.3 p.p. from 2018 to 2025, showing scarce private investment dynamics in the country.

VC investments in Portugal are very low standing at around 36% of the EU average, with one of the lowest VC investment levels in the EU. According to a report by Nova University and Investors Portugal[74], based on OECD data, Portugal VC as a percentage of GDP in 2024 stood slightly above 0.02% while the EU's VC spending hit 0.06%. When looking at the share of the total investment VC was slightly above 0.1% of the Gross Fixed Capital Formation (GFCF), while the EU averaged close to 0,3%.

VC is essential for scaling up startups. The study by Nova shows that there is correlation and causality between VC funding and additional patent activity in invested star-ups, as well as relevant spillover effects in other startups. The study performs an analysis of the impact of VC investment in firms in Portugal. The results clearly confirm that VC plays an extremely relevant role in company development. The study reveals that VC investment in Portugal generates exceptionally strong and persistent impacts across a range of key business outcomes. Over a three-year period, VC-backed firms experience

[72] IMD Business School, *World Talent Ranking 2025* (Lausanne: IMD, 2025).
[73] Expresso, "30% dos Jovens Nascidos em Portugal Vivem Fora do País," January 12, 2024.
[74] Nova University and Investors Portugal, Investors-Portugal Study (Lisbon: Nova SBE, 2025).

dramatic growth, including a 200% increase in personnel costs, a 100% rise in employment and tangible investment, and a 200% boost in intangible investment, turnover, and exports.

Notably, net income grows by 300%, wages by 50%, highlighting not only greater scale but also improved rewards for employees. VC support enables firms to expand operations rapidly, employment, investment, and revenues all surge, while simultaneous rises in productivity and wages demonstrate that VC-driven growth is both more efficient and better rewarded for stakeholders.

Higher levels of private investment are therefore an essential tool to improve Portugal competitiveness.

5.5. The Portuguese Start-up Ecosystem

The Portuguese start-up environment is thriving. According to Start-Up Portugal's report "Portugal's Startup Ecosystem 2025: From Growth to Consolidation,"[75] the national ecosystem has achieved a historic milestone, reaching 5,000 active startups, a target originally set in the RRP. This represents a compound annual growth rate of 11%, with an evolution from 3.713 startups in 2022. The Portuguese government has defined as 2030 target reaching 6.000 start-ups, a figure that seems increasingly achievable.

Between 2024 and 2025, the ecosystem demonstrated consistent resilience, with a 9% year-over-year increase in turnover, reaching €2.856 million. This economic contribution now accounts for approximately 1% of Portugal's GDP, with wages paid these companies 81% higher than the national average salary. Most active start-ups are in the ICT sector accounting for 3.989 companies in the total active start-ups in Portugal.

The following table summarizes the key metrics on Portuguese Start-up and their evolution:

Metric	2024	2025	Trend / Growth
Active Startups	4,719	**5,091**	8%
Total Turnover	€2,602M	**€2,856M**	9%
Employees	Average 26,000	**Average 28,000**	8%
Exports	€1.502M	**€1,571M**	5%
Avg. Monthly Wage	€ 2.000	**€ 2,200**	10%

[75] Start-Up Portugal, *Portugal's Startup Ecosystem 2025: From Growth to Consolidation* (Lisbon: Start-Up Portugal, 2025).

An interesting finding is that 70% of Portuguese start-ups are owned by Portuguese individuals, who account for 89% of total ownership, while foreign capital represents only 11%. This highlights the relatively low level of foreign investment in Portugal's start-up ecosystem.

Portuguese founders have created 8 unicorns[76] – i.e. companies with a valuation of over 1 billion, and most of them are headquartered in the US and the EU. Of those currently only 2 have headquarters in Portugal, showing a very low retention of these companies, which is aligned with the overall migration of EU start-ups and scale-ups that move to other markets to access larger basis of consumers and more developed capital markets. Changes in the EU policies in these fields, like the completion of the European single market will certainly have an impact in smaller economies like Portugal. However, Portugal should continue to pursue efforts to attract foreign private capital

Portugal's tech sector currently represents close to 10% of the GDP, with these low levels of investment. A more dynamic and attractive capital market, both nationally and at the EU level, is likely to boast Portugal's innovation potential much beyond what it is achieving now.

Box 1 - Tekever

Tekever was founded in 2001 by a group of colleagues from the Instituito Superior Tecnico, a top engineering school in Portugal. The company is specialized in applying software to Unnamend Aircraft Systems. The first major client Tekever had was the European maritime Agency, which positioned the company as a European supplier.

In 2020, Tekever was contracted by the UK Home Office to monitor activity in the English Channel. In 2025, British Prime Minister Keir Starmer praised Tekever for its contributions to supporting the Ukrainian army, as the company announced €470 million in investments in the UK and a partnership with the Royal Air Force.

The following day, Tekever closed an investment round that established it as Portugal's eighth unicorn, with a valuation of €1.2 billion.

5.6. Connectivity and digital infrastructure

Portugal has one of the strongest internets connectivity's in Europe, driven by nationwide high-speed fibre infrastructure and broad 5G coverage. Fiber coverage in 2024 was at 93.18%, way above the EU

[76] Talkdesk, OutSystems, Feedzai, Sowrd Health, Remote, Anchorage Digital, Tekever and Farfetch all reached a valuation above $100 billion.

average of 69.24%, while 5G coverage was at 92.26% compared to 79.57% EU average.[77] SME basic digital intensity reached 74.26% in 2024 (EU 72.91%), with 36.98% (EU 32.66%) at high/very-high intensity, showing Portugal's companies are well poisoned in connectivity when comparing with European peers.

Portugal's plans to continue to invest in these infrastructures and reach 100% 5G and fibre by 2030.

Portugal is also the host of strategic sea cables such as the Ella Link cable that connects the country to Brazil, which substantially improved connection between Europe and South America Google is also investing in the Nuvem cable project to connect Portugal to the US through Bermuda[78]. Subsea cables carry around 99% of all international data traffic and are essential for information transfers at high-speed and with low signal loss. As the digital economy becomes central to economic growth, cables play a central role and improve Portugal's connectivity.

5.7. Technology adoption

Recent data[79] highlights the progress and challenges faced by Portuguese enterprises in the uptake of advanced digital technologies such as artificial intelligence, cloud computing, and data analytics. In 2023, 54.4% of Portuguese enterprises had adopted at least one of these technologies, aligning closely with the EU average of 54.7%. However, there is a notable disparity between SMEs and large enterprises: while 53.68% of SMEs engaged with these technologies, the adoption rate among large enterprises was significantly higher at 86.53%.

Cloud solutions saw a moderate level of adoption, with 32.29% of all businesses using cloud services in 2023, which was slightly below the EU average of 38.97%. SMEs reported a usage rate of 31.44%, compared to 70.46% among large enterprises, revealing a substantial gap in cloud adoption across company sizes.

Data analytics was embraced by 38.56% of enterprises, surpassing the EU average of 33.25%. This trend was consistent among both SMEs (37.81%) and large enterprises (71.73%), demonstrating relatively strong uptake, especially within larger organizations.

Artificial intelligence adoption remains a significant challenge. In 2024, only 8.63% of Portuguese enterprises had adopted AI technologies, lagging behind the EU average of 13.48%. The divide between

[77] European Commission, *Digital Decade 2025 Country Report: Portugal* (Brussels: European Commission, 2025).
[78] Google, "Apresentamos o Cabo Submarino Nuvem," Google Cloud Blog, 2025.
[79] European Commission, *Digital Decade 2025 Country Report: Portugal* (Brussels: European Commission, 2025).

SMEs and large enterprises is especially stark, with AI adoption rates of just 7.87% for SMEs and 41.89% among large firms.

These figures illustrate both the progress made and the gaps that remain, particularly in extending digital transformation to smaller businesses across Portugal[80].

However, a 2025 **study by Amazon** paints a more dynamic scenario[81], signaling that AI adoption in Portugal is not only accelerating but having tangible business impacts:

- **41% of Portuguese businesses now use AI**—a sharp jump from 35% the previous year and a growth rate of 17%. This corresponds to over **600,000** businesses leveraging AI solutions, with around 96,000 adopting for the first time last year.
- **Startups are key drivers:** 62% have adopted AI, and 35% are developing new AI-driven products or services, suggesting that digital innovation is concentrated in Portugal's vibrant start-up ecosystem.
- **Strategic integration:** 55% of AI adopters have embedded AI into their business strategies, well above the European average of 38%.
- **Visible business benefits:** A compelling **94%** of Portuguese businesses report revenue increases due to AI (averaging 30%), while **77%** see significant productivity improvements.

These findings indicate not only the rapid momentum behind AI adoption in Portugal, but also its increasing strategic importance and impact, especially among startups and larger organizations. The government is responding with initiatives such as the AI agenda, emphasizing the need for digital skills, enhanced support for businesses, and ongoing digital transition to sustain this trajectory.

While official statistics suggest challenges remain, particularly for SME the Amazon studies points out to a new wave of AI-driven transformation.

5.8. Incentives and funding

5.8.1. The Portuguese Company R&D Tax Incentive System ("SIFIDE")

Portugal counts with a number of tax incentives and other programs involving grants to foster innovation. Portugal's total R&D expenditure has been rising slowly across the years, evolving from

[80] European Commission, *Digital Decade 2025 Country Report: Portugal* (Brussels: European Commission, 2025).
[81] Strand Partners, *Unlocking Portugal's AI Potential 2025*, commissioned by Amazon Web Services (AWS), 2025, https://unlockingeuropesaipotential.com/portugal that surveyed 1000 members of the Portuguese public and 1000 business.

1.3% of GDP in 2023 to 1.7% in 2023 with barely any changes in 2024 according to Eurostat data[82], staying below the EU average of 2.24%. Portugal is therefore far from its 3% goal for 2030[83].

SIFIDE, is one of the most relevant fiscal instruments available in Portugal to foster private sector innovation. The SIFIDE was created in 1997 and is the main contributor for Portugal's first place in government investment in private R&D according to the EIS data. The program includes activities in R&D namely those relating to knowledge creation, the use of research findings or other scientific or technical knowledge aimed at discovering or significantly improving raw materials, products, services, or manufacturing processes. Eligible expenses are deductible up to 82,5% and ranged from staff expenditure to contributions in investment funds.

According to official estimates, the SIFIDE program has provided around €875 million in tax incentives in 2024, a 14% increase when comparing to 2023, representing 40% of Portugal's total corporate tax expenditure.[84]

The SIFIDE II was approved in 2014 and last until the end of 2025. In November 2025 the government announced the extension of the SIFIDE II until May 2027, with several amendments to the system[85]. These changes were based on a recommendation by the Portuguese Tax Authorities U-TAX unit[86], created specifically for the purpose of evaluating the Portuguese tax incentive system. In an initial report from 2019, the U-TAX had concluded that the SIFIDE was generally reaching its objectives, showing that for every euro of tax revenue forgone, more than one euro is invested by companies in R&D expenditures through the SIFIDE program[87]. However, according to the latest conclusions of U-Tax, more than one billion euros in R&D expenditures in funds had no actual implementation, despite the associated tax benefit[88]. U-TAX highlighted that there were not enough projects to absorb the capital raised, and that incentives were misaligned, failing to genuinely encourage companies to invest

[82] R&D expenditure - Statistics Explained - Eurostat
[83] European Commission, *Digital Decade 2025 Country Report: Portugal* (Brussels: European Commission, 2025).
[84] Autoridade Tributária e Aduaneira, *Relatório Despesa Fiscal 2024* (Lisbon: Ministério das Finanças, June 2025).
[85] "Governo Aprova Alterações Ao SIFIDE II Para Reforçar O Investimento Em Inovação E I&D." 2025. Portugal.gov.pt. 2025. https://www.portugal.gov.pt/pt/gc25/comunicacao/noticia?i=governo-aprova-alteracoes-ao-sifide-ii-para-reforcar-o-investimento-em-inovacao-e-id.
[86] Decreto-Lei n.º 19/2024, de 2 de fevereiro | DR
[87] Grupo de Trabalho para o Estudo dos Benefícios Fiscais, *Os Benefícios Fiscais em Portugal*, Cadernos de Ciência e Técnica Fiscal No. 217 (Lisbon: Autoridade Tributária e Aduaneira, Centro de Estudos Fiscais e Aduaneiros, 2019), 195–230.
[88] Presidência do Conselho de Ministros, *Proposta de Lei n.º 44/XVII/1.ª: Autorização Legislativa para Alteração ao Código Fiscal do Investimento—Prorrogação e Revisão do SIFIDE II* (Lisbon: Governo de Portugal, November 13, 2025). 2 *"evidence that a significant portion of the investment remains held within the funds and target companies, without actually being applied to R&D activities"*

in R&D throu0067h the available funds. Additionally, investment timelines were too short to allow for effective project completion.

As a result, SIFIDE 2026 removes the so called indirect SIFIDE, i.e. deductions via investment funds and strengthens direct applications to SIFIDE II.

5.8.2. The Portuguese patent box regime

The Portuguese patent box regime is an attractive tax incentive regime, that allows taxpayers to deduct 85% of the income earned from the assignment or temporary use of eligible rights, including patents, industrial design, copyright on computer programs. The regime allows for taxpayers to pay tax on only 15% of the income earned from sources relating to these assets, with an effective corporate income tax rate below provided all requirements are met of 5%.

The patent box is complementary of the SIFIDE incentives, meaning that companies can access both incentives.

5.8.3. The Innovation and Scientific Research Tax Incentive and the Residence permit for investment

The Innovation and Scientific Research Tax Incentive (IFICI)[89] is designed to attract top talent to Portugal. IFICI replaces the previous Non-Habitual Resident program, offering a more targeted set of eligible activities. The regime provides tax exemptions for passive income and a flat tax rate for specific activities defined by law, including researchers, board members, and highly specialized professionals.

This incentive is available to professionals relocating to Portugal to work for start-ups, as specified in the start-up law.

The introduction of IFICI aligns with the Portuguese government's broader strategic goals of positioning Portugal as a leading hub for innovation and entrepreneurship in Europe. Specifically, the government aims to increase the number of start-ups, support the commercialization of scientific research, and attract international talent. Through IFICI, Portugal seeks to create high-value jobs, accelerate economic growth, and strengthen its research and development capacity. The regime is part of a series of measures to foster a dynamic, knowledge-based economy.

The residence permit for investment ("ARI") provides residence authorization to investors from outside the EU as long as they perform a relevant investment in Portugal. The program which is also known as golden visa, was improve to target investments that create value and jobs in Portugal. These include:

[89] Ministérios das Finanças, da Educação, Ciência e Inovação e da Economia, Portaria n.º 352/2024/1, de 23 de dezembro, *Diário da República*, Série I, n.º 248 (December 23, 2024).

- **Job Creation:** Creation of at least 10 jobs.
- **Capital Transfers for Research:** Investment of €500,000 or more in research activities carried out by public or private scientific institutions within Portugal's national scientific and technological system.
- **Support for Cultural or Artistic Activities:** Investment of €250,000 or more in artistic production or the restoration and maintenance of national cultural heritage, through qualified public or private entities.
- **Collective Investment Undertakings:** Investment of €500,000 or more in non-real estate collective investment entities based in Portugal, with at least five years maturity and 60% of investment in domestic companies.
- **Company Formation and Job Creation:** Investment of €500,000 or more in forming or strengthening a commercial company headquartered in Portugal, combined with the creation or maintenance of at least five permanent jobs for a minimum of three years.

5.8.4. The Startup law

The startup law[90] was created in 2023 and was the first legal instrument creating a legal definition for startups and scaleups. The law introduced a specific tax framework for these companies which included tax benefits for stock option plans, and special rules for deduction of expenses.

5.9. Relevant initiatives

5.9.1 Free Technological Zones ("ZLT")

Portugal's Free Technological Zones (ZLTs) were introduced in 2021. They are physical environments, with limited geographic locations that are used for experiments and tests in forefront technologies. They are true innovation sandboxes, created to promote and accelerate innovation, by allowing a more flexible regulatory framework within certain limited geographical areas. These special innovation zones intend to foster innovation by domestic players but also attract foreign innovators to Portugal. The ZLTs intend to become true investment hubs, by connecting the private sector, academia, and public institutions, to create innovative dual use solutions. Each ZLT is created by the Portuguese innovation agency (ANI) in cooperation with the regulatory entities responsible for the different innovation fields.

In 2026 there are five ZLTs each focused on the development of different technologies.

[90] Assembleia da República, Lei n.º 21/2023, de 25 de maio, *Diário da República*, Série I, n.º 101 (May 25, 2023).

The ZLT Infante D. Henrique, was proposed and created in 2022 under the supervision of the Portuguese Navy (*Marinha Portuguesa)* with the purpose of experimenting on drone, robotized and other non-human tribulated solutions. This is ZLT, is focused on experimentation and operational testing of robotic systems and dual-use technologies, those applicable to both security/defense and civil purposes—in maritime, terrestrial, and aerial settings. Through close collaboration between industry, academia, and end users, the ZLT aims to drive innovation, facilitate knowledge transfers to the economy, and attract cutting-edge projects involving emerging and disruptive technologies. It intends to become Europe's leading infrastructure for maritime technology testing, supporting the advancement of scientific and technological capabilities with a particular emphasis on security and defense.

The ZLT Matosinhos was created in cooperation with the CEiiA – Center of Engennering and Development Association in cooperation with the Matosinhos municipality. This ZLT aims to establish Portugal as a leader in developing, testing, and experimenting with innovative mobility solutions focused on achieving carbon-neutral cities, with the potential for global replication. Its strategic objectives include supporting new mobility solutions, accelerating the market introduction of products and services, fostering innovation and internationalization among Portuguese companies and startups, attracting international projects for testing new technologies, drawing foreign investment, entrepreneurs, and talent, boosting the entrepreneurial ecosystem and cooperation among various stakeholders, and ultimately reducing carbon emissions to help cities transition more rapidly towards carbon neutrality.

The ZLT Aveiro was created in 2025, and it's aimed at testing innovative mobility solutions aimed at city carbon neutrality. The Aveiro ZLT covers land, river and sea territory, and intends to test new communication technologies in open environments and new communication networks, such as Internet of things and vehicle connectivity, featuring unmanned systems (either autonomous or remotely piloted) operating on land, water (surface and underwater), and in the air, as well as other associated technologies and sensors. These innovations are to be applied in various sectors that rely on communications, including mobility, healthcare, energy, public administration and territorial management, smart communities, civil security, space, agriculture, and fisheries, among others.

The ZLT Viana do Castelo is focused on innovation and development projects related to two main areas: the production of electricity from renewable energy sources based in or originating from the ocean, and the transportation and use of electricity in the ocean environment for generating other energy vectors, as well as for energy storage. This approach aims to advance new energy solutions and

technologies that leverage the ocean's potential for sustainable power and efficient energy management.

The Abrantes ZLT was recently created by the Abrantes Municipality, in cooperation with the Directorate General for Energy and Geology. Its primary focus is to develop renewable energy solutions to compensate for the closure of the Pego coal power plant. The goal is to transform this site into a renewable energy hub, replacing coal-based energy supply with sustainable, clean energy sources.

5.9.2. Mobilising agendas (Agendas Mobilizadoras)

Portugal's Mobilizing Agendas are ambitious, large-scale innovation programs implemented as part of the Portuguese RRP, that aim to consolidate and expand synergies between businesses and Portugal's scientific and technological system. These agendas are designed to bring together consortia of private companies, academic institutions, and research centers to collaboratively transform cutting-edge research into market-ready products, services, and industrial capabilities.

Selection is conducted through competitive calls for strategic proposals developed by consortia comprising scientific institutions, SMEs, large enterprises, and start-ups. Each project is implemented over a multi-year horizon and must have clear objectives tied to strategic sectors such as information and communication technologies, industrial and product technologies, aerospace, mobility, environment, and healthcare. All agendas are aligned with the National Strategy for Research and Innovation for Smart Specialization ("ENEI").

The Mobilizing Agendas are expected to deliver market-driven solutions, foster skills development, support internationalization, and advance other strategic goals critical to Portugal's economic transformation and global competitiveness.

Mobilizing agendas operate through formal agreements with the Portuguese state, with consortia committing to specified objectives, investment plans, and delivery milestones.

Public support is provided in the form of public grants for the implementation of Mobilizing agendas through two[91] complementary instruments:

- Innovation pacts that promote cooperation and lead to the development of innovative projects, which involve a minimum investment of €50 million, have to be developed by a minimum 10 entities, and be concluded by 31st December 2025.

[91] Recuperar Portugal, "RE-C05-i01.01 — Agendas/Alianças Mobilizadoras para a Inovação Empresarial," https://recuperarportugal.gov.pt/prr-resiliencia/capitalizacao-e-inovacao-empresarial/re-c05-i01-01-agendas-aliancas-mobilizadoras-para-a-inovacao-empresarial/.

- Mobilizing projects aimed at R&D and their transformation into new goods and services through public and private investment, with a minimum indicative investment of 20 million euro with a maximum duration of 36 months.

There are currently 52 green and mobilizing agendas, which represent a total investment of €7,7 billion, with a total public support of €2,8 billion. These projects involve around 1,800 co-promotors and have a job creation potential of 18,000 jobs of which 11,000 highly qualified jobs. The Portuguese government has recently requested for an extension of the December 31st deadline for project completion, to June 30th, and additional funding from the European Commission. Within this period 37 companies have requested for additional funding, with some, especially in the energy funding reviewing their budgets, which allowed funds to be redistributed to other projects.

5.9.3. Digital Innovation Hubs

Digital Innovation Hubs (DIHs) are collaborative structures designed to centralize a range of accessible services supporting the digital transition of companies. They primarily target Small and Medium-sized Enterprises (SMEs), Start-ups, and Public Administration, helping them adopt digital technologies across various sectors. DIHs focus especially on three disruptive technologies: Artificial Intelligence (AI), High Performance Computing (HPC), and Cybersecurity—aligned with European Commission priorities.

In Portugal, DIHs also cover additional strategic areas such as industry/manufacturing, tourism, mobility, the sea economy, construction, regional development, defense, telecommunications and ICT, agri-food, urban sustainability, healthcare, and data science[92].

As part of component 16 of the Portuguese RRP - *Empresas 4.0*, DIHs benefit from a €60 million allocation[93] aiming to expand and develop a national network of 126 additional hubs. This investment, managed by ANI in partnership with IAPMEI (Innovation and Competitiveness Agency), will reinforce and complement the Digital Europe Programme ("DEP"), enabling broader coverage across clusters and regions, and strongly stimulating collaboration and technology-based innovation in Portugal. Portugal currently counts with 17 Digital Innovation Hubs, which are composed of private sector actors, academia and public institutions. All 17 hubs are a part of the European Digital Innvoation Hubs

[92] DIGITAL INNOVATION HUBS | DIH | ANI

[93] Recuperar Portugal, "TD-C16-i03 — Catalisação da Transição Digital das Empresas," accessed February 28, 2026, https://recuperarportugal.gov.pt/transicao-digital/empresas-4-0/td-c16-i03-catalisacao-da-transicao-digital-das-empresas/.16

network. Of these, 3 are European Digital Innovation Hubs (EDIHs) funded by the Digital Europe Programme and the remaining 14 hold the EDIH Seal of Excellence.

5.9.4. Portuguese Start-Up Hubs

Portugal's startup ecosystem has grown into a vibrant network of innovation hubs that actively shape the entrepreneurial landscape. These hubs connect startups with mentors, investors, universities, and corporates, guiding founders through challenges such as validating ideas, developing scalable business models, and preparing for growth. By offering structured programmes, mentorship, and access to resources, the hubs accelerate ventures and help them navigate the path from early-stage experimentation to sustained growth.

Interaction within and between hubs strengthens the ecosystem as a whole. Startups benefit from talent mobility, knowledge sharing, and connections to more experienced ventures, investors, and area experts. The philosophy of Give First[94], where founders mentor newcomers and best practices spread quickly, reinforces innovation and growth. Operating as part of an interconnected network, hubs amplify the impact of individual startups and generate spillovers that benefit the wider entrepreneurial community.

Portugal has emerged as one of Europe's leading startup ecosystems. In the latest Financial Times Europe's Leading Start-Up Hubs ranking[95], twelve Portuguese hubs are featured, reflecting a structured innovation environment across multiple regions, namely the following:

Lisbon:

- Unicorn Factory Lisboa (formerly Startup Lisboa) – A Lisbon City Council flagship initiative that empowers entrepreneurs to develop and scale their ideas, fostering a continuous pipeline of innovative talent. It has supported over 800 startups and their portfolio has raised around €1 billion in funding.
- Lispolis – Pólo Tecnológico de Lisboa offers offices, laboratories, and incubation services for startups and scaleups, with strong ties to universities and research institutions that support technological development. It currently hosts 144 companies.

[94] Techstars, "Give First," accessed February 28, 2026, https://www.techstars.com/give-first.

[95] FT ranking: Europe's leading start-up hubs 2026

- Casa do Impacto – The social entrepreneurship hub of Santa Casa da Misericórdia de Lisboa, supporting ventures that generate positive socio-environmental impact. In five years, it has supported over 400 projects and invested around €3.2 million.
- Building Global Innovators (BGI) – A Lisbon-based accelerator that equips startups with mentorship, networks, and tools for growth. It has accelerated around 330 startups, raised over €600 million, and maintained a 70% survival rate.

Braga:

- Startup Braga – Supports projects with high entrepreneurial potential and global ambitions, fostering a strong local ecosystem and providing acceleration, incubation, and investor access.

Coimbra:

- Instituto Pedro Nunes (IPN) – University-linked incubator helping early-stage companies access scientific and technological resources while providing support in management, quality, and marketing.

Leiria:

- Startup Leiria – Incubator and accelerator supporting innovative businesses through mentoring, acceleration programs, and connections to investors. Since its creation in 2020, it has helped around 600 entrepreneurs and achieved significant growth in the last years.

These hubs create a connected ecosystem where startups can access resources, guidance, and networks. By linking regional initiatives with national partners, they foster collaboration, knowledge spillovers, and the development of high-potential scaleups. Together, they help sustain Portugal's entrepreneurial landscape and support the emergence of more innovative companies across the country.

Box 2- Unicorn factory

Unicorn Factory Lisboa supports the emergence of innovative scaleups across Portugal. Through its Scaling Up Program, an acceleration track for post-seed startups with product-market fit, revenue, and clear growth and international expansion ambitions, UFL provides strategic guidance, mentorship, international opportunities and investor and corporate access, to help ventures scale effectively

The Scaling Up alumni have received recognition in WIRED Lisbon's Top 10 Startups 2025[96] and the Deloitte Technology Fast 50 Portugal 2025[97], reflecting recent growth and market impact. Collectively, these companies generated over €250 million in annual recurring revenue (ARR) in 2025, have raised approximately €479 million in funding, and employ more than 2,100 people, demonstrating the measurable impact of UFL's support in nurturing high-potential scaleups.[98]

5.9.5. Strategy on Semiconductors

Portugal's National Strategy for Semiconductors[99] is closely aligned with the objectives of the EU Chips Act, which seeks to strengthen Europe's capacity in semiconductor production and research and ensure a secure and sustainable supply for critical industries. The strategy, developed by the Ministry of Science, Technology and Higher Education in collaboration with economic and innovation authorities, sets out four main pillars: strengthening specialized training and skills, expanding the national ecosystem for chip design and advanced packaging, increasing technology transfer in emerging areas such as photonic integrated circuits and sustainable electronics, and promoting large-scale sensor manufacturing. By leveraging new European tools and initiatives introduced under the EU Chips Act, Portugal aims to maximize its participation in continental programs and foster greater institutional, industrial, and research cooperation.

Portugal's ecosystem benefits from over 30 years of expertise in microelectronics, supported by excellent university education, internationally recognized start-ups, and dedicated research centers. This foundation has attracted multinationals like Synopsys, Renesas, Aurasemi, Nanopower, and Monolithic, which have set up operations in the country. Relevant national projects include collaborative efforts between universities and CoLABs (e.g. Braga, Porto, Lisboa, Aveiro), which have produced highly skilled graduates and fostered an innovative culture directly tied to industry needs. Additionally, the sector is bolstered by ongoing initiatives in chip design, advanced packaging, and emerging technologies such as flexible electronics and photonics. By establishing strategic lines of action and participating in EU-wide programs, Portugal is reinforcing its contribution to the joint

[96] Noxus, OSCAR, and sheerME (Scaling Up alumni) & DOJO AI, Lampsy Health, Manie, The After Cancer, ZeroPact (UFL Incubation) https://www.portugalbusinessesnews.com/post/the-wired-ranking-of-the-top-10-startups-in-lisbon-in-2025?srsltid=AfmBOorntDS9su_pE1A8SsNOt1hUCOr53L9Ujv7bovTR6pb0Ow2vg8vV

[97] Bridge IN, Sensei, Lyzer, Knok, DareData, Nutrium, Musiversal *Scaling Up alumni)

[98] Unicorn Factory Lisboa, "Growth Stage,", https://unicornfactorylisboa.com/for-founders/growth-stage/.

[99]Fundação para a Ciência e a Tecnologia (FCT), Estratégia Nacional para os Semicondutores, January 2024, https://www.fct.pt/wp-content/uploads/2024/01/estrategia_nacional_semicondutores.pd

resilience of the European Union, enhancing digital competitiveness, and positioning itself as a hub for semiconductor innovation in Europe.

These concerted efforts and investments are expected to spur technological advances and industrial innovation, providing Portugal with a unique opportunity to strengthen its position in the global value chain. The alignment with the EU Chips Act further amplifies opportunities for collaboration and growth, ultimately driving the country's competitiveness in the digital sector and contributing to Europe's strategic autonomy.

In addition to its strategic initiatives, Portugal has recently reinforced its commitment to the semiconductor sector through the approval of two major projects—INOV.AM and Chip4Future—supported by €6.4 million from the Portuguese National Innovation Agency (ANI). These projects are designed to accelerate technological development and innovation in microelectronics and semiconductors, focusing on the creation of advanced solutions and new applications for the industry. By fostering collaboration between research institutions, universities, and private companies, this funding supports Portugal's ambition to strengthen its position both within the national ecosystem and in alignment with Europe's broader semiconductor strategy. The investment in INOV.AM and Chip4Future demonstrates Portugal's proactive approach to driving digital competitiveness and supports the country's strategic priorities under the EU Chips Act.

Portugal participates throughs EU's Chips Joint Undertaking pilot lines APEC and PIXEurope. One of the projects supports by the joint undertaking is the Portuguese Competence Center in Semiconductors. POEMS is a central hub that supports the development of the semiconductor sector in Portugal. It connects national organizations with European initiatives, helping to strengthen collaboration, innovation, and growth within the industry.

Box 3 – Amkor

Amkor Technology, specifically its ATEP Amkor facility located in Vila do Conde, is a central player in Portugal's semiconductor landscape and is notable as the only OSAT (Outsourced Semiconductor Assembly and Test) dedicated to advanced high-volume packaging in Europe. With a workforce of 750 employees, including 200 engineers, ATEP Amkor boasts impressive infrastructure, featuring 36,900 m² of technical and social facilities and a 20,600 m² clean room dedicated to high-volume chip packaging, testing, and research and development.

The company serves key industries such as automotive, telecommunications, and security, supporting the entire value chain from design to implementation of multiple technological solutions. ATEP Amkor

offers a wide range of advanced Wafer Level Packaging techniques, including Wafer Level Chip Scale Packaging, Wafer Level Fan-out, and microelectromechanical systems (MEMS) and sensors at wafer level. Additionally, they have recently introduced a Flip Chip Ball Grid Array (FCBGA) line. Their growth plans focus on developing new lines dedicated to high-density packaging and assembly techniques in panel format, which will improve process efficiency and enable the integration of sensors and heterogeneous packaging—allowing multiple interconnected modules within a single chip. Amkor is also investing in power modules using emerging materials beyond silicon, which are crucial for high-power devices in electric vehicles and renewable energy technologies. These capacities put Portugal at the forefront of advanced semiconductor packaging in Europe, aligning with the sector's increasing importance under the EU Chips Act and supporting European initiatives for greater supply chain resilience and innovation.

5.9.6. Data centers

Data centers serve as the physical backbone of the digital economy. As economic growth becomes increasingly tied to digital activities, reliable data center infrastructure has become essential for maintaining competitiveness. Services such as cloud computing, digital payments, financial markets, e-commerce, and artificial intelligence all depend on the efficient operation of data centers.

With AI adoption surging and more economic activity moving online, the demand for secure and efficient data centers is rising rapidly. Across sectors like healthcare, industry, finance, and public administration, AI requires substantial computing power to train, run, and scale advanced models, further increasing the importance of robust data center infrastructure.

If AI adoption is vital for economic competitiveness, then data centers become strategic assets for securing that competitive edge. These capacities are important nationally but also at a European level, s the contribute for the internal market's overall computing power.

Portugal has recently become more attractive for data center investments, due to beneficial conditions that include its strong Atlantic connectivity of subsea cable routes and landing points, a power mix with a growing share of renewables, strong land and network connectivity (fiber and 5G), and increasing investor interest in the county's economy. Conversely the country's current live capacity is still low when comparing with its European peers, and public debate as increased as whether data centers do translate into long term economic value, considering the large energy demand and potential low spillovers in terms of job creation and economic growth.

According to data from a Portuguese Data Center association, Portugal DC, Portugal will receive €12 billion in data center investments over the next 5 years. Of those investments 80% will be allocated to data centers with intensive use of AI.

Using total power supply capacity as a measure, Portugal still stands below most of its European peers with Frankfurt alone at top of the EU hailing 745 MW capacity and Madrid 110 MW capacity[100], while Portugal's total capacity currently standing at 47,5 MW[101]. However, capacity is set to expand to substantially with 310 MW currently in development, and with the announced building of 1.2 GW capacity in the Start Campus project alone, which will boost Portugal's position in the data center market.

The Start Campus Sines project has become the reference point for Portugal's hyperscale ambitions. According to the developers, start campus will be the largest and most sustainable of its kind in Europe. It features unique capabilities, namely a Water Usage Effectiveness of 0 as it uses the oceans cooling power.

The developer presents the project as a gigascale campus targeting cloud, AI and high-performance computing workloads, with a planned capacity of up to 1.2 GW, with installed capacity currently standing at 30 MW.

The developer announced that it plans to deploy €8.5 billion by 2030, with one building already operational and further phases under development. An additional €8.6 billion investment on the campus has recently announced by Microsoft[102]. The project has already secured grid power for its total projected capacity[103].

While projects such as Start Campus are touted as drivers of economic growth for Portugal, they can also present significant challenges if not carefully planned and managed.

Box 4 - Comparative assessment: Benefits and drawbacks of data centres

[100] German Datacenter Association, *Datacenter Outlook Germany 24/25*, ed. Anna Klaft (Frankfurt: German Datacenter Association, September 2024).
[101] Research and Markets, *Portugal Data Center Market - Investment Analysis & Growth Opportunities 2025-2030* (Dublin: Research and Markets, June 2025). there are different figures that point to between 11 MW to 15 MW load, depending on the research method used:
[102] AICEP Portugal Global, "Microsoft to Invest $10 Billion in AI Data Hub in Portugal," accessed February 28, 2026, https://portugalglobal.pt/en/news/2025/november/microsoft-to-invest-10-billion-in-ai-data-hub-in-portugal/.
[103] Start Campus press release

In 2025, Start Campus commissioned a study to Copenhagen Economics[104], a consulting company focused on deep knowledge and applied economics to assess the socio-economic benefits of data centers for the Portuguese economy. The report concluded that, between 2022 and 2024 the data center sector, created 1,723 new full-time jobs and estimated a €311 million GDP contribution in the same period (including direct, indirect and induced effects).

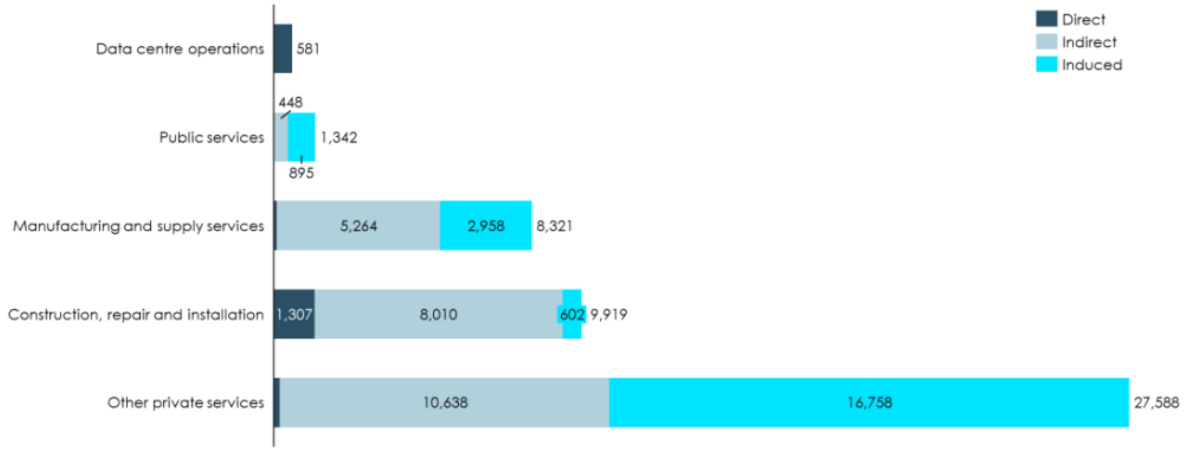
The report forecasts that, with supportive investment and regulatory conditions, the data center sector could contribute up to €26.2 billion to Portuguese GDP by 2030, averaging roughly €4.4 billion per year in economic activity between 2025 and 2030. Even in a low bound projection, the sector is expected to add €6.7 billion to GDP during this period. These projections include direct, indirect and induced impacts across construction, services and wider supply chains.

In addition to GDP growth, the report suggests the data center ecosystem could support around 50.000 full-time jobs annually by 2030 (including both direct positions within facilities and jobs generated through upstream and downstream economic activity). Despite this headline figure, direct operational employment remains minimal, with only 581 full-time roles directly tied to data center operations.

[104] Copenhagen Economics, *Assessment of Socio-Economic Benefits of the Data Centre Sector in Portugal*, prepared for Start Campus, April 15, 2025.

Employment supported across the economy between 2025-2030 in the expansion scenario

Full-time employees, yearly average



Note: 'Other private services' includes (but are not limited to) retail trade, transport, hotels and restaurants, real estate, and legal, accounting and employment activities. Contrary to other employment figures and supported contributions in this report, we calculate those for this figure with an alternative IO matrix calculation. Due to the way our input data is structured, this alternative calculation overestimates the total effect by 0.5 per cent.

Source: Copenhagen Economics based on data provided by Start Campus, an estimate of capacity for the rest of the sector and our input-output model.

Figure 3 - Copenhagen Economics claims 50.000 jobs will be created by Start Campus, however only 581 of these are direct jobs in data centre operations. Source: Copenhagen Economics, Assessment of Socio-Economic Benefits,74

Economically, proponents argue these investments strengthen Portugal's position in digital infrastructure, connectivity and AI readiness. They highlight benefits such as attracting foreign capital, consolidating talent pools, and spurring growth in cloud and digital services. This, could help shift the Portuguese economy away from its traditional reliance on sectors like tourism and toward new, higher-value digital activities.

While the potential economic upsides are substantial, data centers do not come without a cost. A Deutsche Welle report on Portugal's data center[105] boom highlights that the aggregated planned energy demand for upcoming data center projects, totals around 26.5 GW of registered demand, which exceeds Portugal's current power generation capacity of around 23.4 GW. This gap shows the scale of grid and capacity planning challenges as new facilities come online.

[105] Jochen Faget. 2025. "Portugal Faces Energy Hurdles amid Data Center Boom." Dw.com. Deutsche Welle. November 20, 2025. https://www.dw.com/en/portugal-faces-energy-hurdles-amid-data-center-boom/a-74795599.

Despite Portugal's abundant renewable resources such as wind, solar and hydropower, experts note that even if reported demand estimates are reduced significantly, electricity consumption by data centres remains extremely high. This creates pressure on existing grid infrastructure and requires expansion of renewables, storage and transmission networks to avoid bottlenecks[106].

Meeting this demand entails not only scaling up new generation, especially offshore, but also large grid upgrades and storage investments (e.g battery systems, hydropower reservoirs). Because these systems often require long lead times and significant capital outlays, there is a risk that public budgets or regulated electricity tariffs may absorb part of the cost, potentially leading to higher energy prices for consumers and industry. As seen elsewhere[107], such costs are frequently passed on to end users.

Environmental considerations[108] are another dimension of the trade-off. Data centers' energy intensity means that, without strong renewable integration and efficiency measures, emissions and ecological footprints can grow[109]. This has raised concern among environmental groups, which argue that the environment costs of building large renewable infrastructure projects, should be limited and controlled.

Academic research broadly confirms that while data centers are economically enabling infrastructure[110], they also pose systemic challenges that are often underrepresented in headline investment narratives, with benefits often overstated[111].

Studies demonstrate that large data centers create highly concentrated and inflexible electricity demand, driving up system costs by necessitating further grid reinforcement, additional reserve capacity, and generation investments. The costs are frequently born by the final consumers[112]. According to data of the International Energy Agency data centers currently represent 1.5% the world's

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[106] Ibid.

[107] Ibid.

[108] Alex de Vries, "The Growing Energy Footprint of Artificial Intelligence," *Joule* 7, no. 10 (October 2023): 2191–2194, https://doi.org/10.1016/j.joule.2023.09.004 *AI is being applied is limited, so regulators might consider introducing specific environmental disclosure requirements to enhance transparency across the AI supply chain, fostering a better understanding of the environmental costs of this emerging technological trend.*

[109] Arman Shehabi et al., *2024 United States Data Center Energy Usage Report*, LBNL-2001637 (Berkeley, CA: Lawrence Berkeley National Laboratory, December 2024), https://escholarship.org/uc/item/32d6m0d1 shows that 4% of the total US electricity consumption is driven by data centers. Another study reaches the same conclusion

[110] Mark Muro and Yang You, "Turning the Data Center Boom into Long-Term Local Prosperity," Brookings Institution, August 6, 2024, https://www.brookings.edu/articles/turning-the-data-center-boom-into-long-term-local-prosperity/.

[111] AlgorithmWatch, "Infrastructure or Intrusion? Europe's Conflicted Data Center Expansion," accessed February 28, 2026, https://algorithmwatch.org/en/infrastructure-or-intrusion-europe-data-centers/.

[112] The Cloud Next Door: Investigating the Environmental and Socioeconomic Strain of Datacenters on Local Communities

electricity consumption, a figure that is set to double by 2030[113]. According to a report[114], data centers consumed 200 terrawat-hours of electricity which is equivalent to Thailand's total electricity consumption in a year.

The advent of artificial intelligence has further magnified these concerns, [115] with recent research demonstrating that AI training and inference workloads rely on significant amounts of computing power, significantly more than traditional cloud-based activities, with limited scope for demand response thereby increasing congestion risks[116]. This has led some companies to consider radical solutions such as bullying modular nuclear reactors to power these facilities.[117]

Beyond energy, data centers also place pressure on water resources and land use, particularly when clustered geographically. This can have significant social effects in the areas with high concentration of data center buildings[118], with increasing competition for resources, and less space for social purposed construction (like public housing).

Finally, although data centers may lead to increased tax revenues for governments, their direct economic impact is often limited. Most job creation is temporary and concentrated in lower-skilled positions during the construction phase, while ongoing operations require relatively few highly qualified staff due to the automated nature of data centers[119]. Additionally, the data stored in these facilities does not necessarily generate significant local economic benefits, as it is often owned and managed by external entities.

Data centers can be important drivers of economic growth. However, governments must carefully weigh immediate economic benefits these facilities provide against potential long-term negative externalities associated with their construction and operation. Policymakers should ensure that new

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[113] International Energy Agency, "Energy Demand from AI," in Energy and AI, accessed February 28, 2026, https://www.iea.org/reports/energy-and-ai/energy-demand-from-ai.
[114] Shehabi et al., *2024 United States Data Center Energy Usage Report*, [page number]
[115] de Vries, "Growing Energy Footprint," [page number]
[116] James O'Donnell, "We Did the Math on AI's Energy Footprint. Here's the Story You Haven't Heard," MIT Technology Review, February 10, 2025, https://www.technologyreview.com/2025/02/10/we-did-the-math-on-ais-energy-footprint/. *"From 2005 to 2017, the amount of electricity going to data centers remained quite flat thanks to increases in efficiency, despite the construction of armies of new data centers to serve the rise of cloud-based online services, from Facebook to Netflix. In 2017, AI began to change everything."*
[117] O'Donnell, "AI's Energy Footprint."
[118] Kanoppi, "Search Engines vs AI: Energy Consumption Compared," https://kanoppi.com/search-engines-vs-ai-energy-consumption-compared/.
[119] Wacuka Ngata et al., "The Cloud Next Door: Investigating the Environmental and Socioeconomic Strain of Datacenters on Local Communities," arXiv preprint arXiv:2506.03367v1 (June 3, 2025), https://arxiv.org/abs/2506.03367.

data deliver tangible advantages for local communities and contribute positively to the broader national economy by addressing challenges related to energy use, environmental protection, and equitable resource distribution.

The Portuguese Government has announced plans to launch a Data Center Strategy by the end of 2025. However, the strategy had not been released at the time of this report's publication.

VI. Proposed improvements and recommendations

European Union: Strategic Direction and Implementation Challenges

The European Union has entered a decisive phase in redefining its position within the global digital economy. The Draghi Report represents a major turning point in the European debate on competitiveness, providing a comprehensive diagnosis of the Union's structural weaknesses and outlining a coherent strategic framework to address Europe's innovation gap. By identifying the need to close the innovation gap, deepen market integration, mobilise private investment, and strengthen technological infrastructure, the report establishes a concrete roadmap for restoring Europe's long-term competitiveness.

The European Union has already begun to act in response to this diagnosis. Policy initiatives adopted under the Competitiveness Compass, and proposals such as the EU Inc. framework, demonstrate a clear political commitment to strengthening Europe's innovation ecosystem and enhancing its capacity to scale firms across the Single Market. In particular, the integration of European capital markets and the harmonisation of regulatory frameworks emerge as central priorities to enable investment mobilisation and reduce fragmentation across Member States.

However, the effectiveness of these initiatives will depend primarily on the speed, coherence, and clarity of implementation. The complexity of the EU institutional framework and the proliferation of policy instruments risk slowing reform and reducing policy transparency for citizens and investors. Ensuring Europe's technological competitiveness requires not only ambitious policy commitments but also clearer regulatory frameworks and simplified policy structures. Taking these steps is a critical way to scale innovation and strengthen Europe's strategic autonomy in an increasingly competitive global technological landscape.

Portugal: Opportunities, Structural Constraints, and Strategic Positioning

The Portuguese case illustrates both the opportunities and structural constraints identified by Draghi at the European level. Portugal presents several positive indicators that support its growing position as an innovation-driven economy. The country benefits from strong digital infrastructure, a dynamic start-up ecosystem, and growing international investment attractiveness. The number of start-ups has grown significantly in recent years, reflecting a vibrant entrepreneurial environment and sustained public support for innovation.

Portugal has also developed ambitious policy initiatives to strengthen innovation capacity and foster collaboration between public and private actors. Mechanisms such as Technological Free Zones and the Mobilising Agendas represent structured frameworks to promote experimentation, technological development, and industry–academia cooperation. These initiatives demonstrate a strong institutional commitment to innovation. Nevertheless, despite their robust governance structures, their concrete economic impact and long-term contribution to productivity growth, industrial transformation, and firm scaling remain uncertain.

At the same time, significant structural weaknesses continue to restrain Portugal's innovation performance and international competitiveness. Portuguese start-ups face difficulties in scaling internationally and generating export-driven growth, with innovation performance not translating proportionally into high-tech exports or knowledge-intensive services. The country also shows persistently low levels of patent applications and limited production of high-impact scientific publications. Such trends reflect structural constraints in research capacity and the need for stronger investment in universities and research institutions. Human capital dynamics present further challenges, as Portugal continues to experience significant brain drain, limiting its ability to retain highly skilled talent and develop high-value innovation ecosystems.

Access to private capital remains a critical constraint. Venture capital investment levels in Portugal remain among the lowest in Europe as a share of GDP, limiting firm scaling capacity and reinforcing dependence on foreign financing. The relatively small number of Portuguese unicorns and the tendency of high-growth firms to seek capital and market expansion abroad reflect the country's structural financing gap.

Despite these challenges, Portugal holds important strategic opportunities within the European technological landscape. The country has the potential to play a relevant role in European semiconductor supply chains, supported by existing industrial capabilities, specialised firms, and dedicated research institutions. The RRP deployment and the increasing speed with which institutions such as the Portuguese Development Bank distribute funds create a favorable context for innovation.

Portugal also possesses favourable conditions to contribute to the expansion of European computing capacity through large-scale digital infrastructure projects, including initiatives such as the Start Campus data centre. These investments may strengthen Europe's digital sovereignty and technological infrastructure. However, their long-term sustainability requires careful management of energy consumption, environmental impact, and social externalities. In this context, developing a comprehensive national data centre strategy will be essential to ensure balanced, sustainable growth.

More broadly, Portugal would benefit from a more integrated and coherent national innovation strategy that aligns existing policy instruments — including innovation hubs, start-up ecosystems, Technological Free Zones, and public investment programmes — within a unified strategic framework. Stronger coordination across these initiatives would enhance policy effectiveness, improve resource allocation, and enable Portugal to position itself more prominently within the global innovation landscape.

Overall, while Portugal has developed strong foundations for innovation and technological development, structural constraints in capital markets, research capacity, talent retention, and internationalisation continue to limit its long-term competitiveness. Addressing these challenges will be essential for Portugal to leverage its potential within the European digital economy fully.

Policy recommendations for Portugal

The recommendations below address the key challenges facing the Portuguese innovation ecosystem, drawing on this report's conclusions. They intend to address three main challenges:

(i) Mobilising domestic private capital to drive innovation and scale.

(ii) Reducing fragmentation and execution friction across the innovation policy landscape.

(iii) Enhancing the conversion of research excellence into patents, products, and internationally competitive firms.

These recommendations draw on international best practices that have successfully fostered innovation-led growth in other countries.

1. Targeted tax incentives for improvement of Portuguese capital markets

Portugal is one of the countries with the lowest level of private capital investment in innovation could introduce targeted tax incentives to dynamize its capital markets and attract investment towards innovation to respond to its capital shortages

a) Enterprise Investment Scheme ("EIS")[120]

The UK's EIS is a measure aimed at promoting investment in early-stage and smaller, high-risk companies established in the UK. The regime applies to companies with gross assets below GBP 15 million, fewer than 250 full-time employees, and no more than 7 years since their first commercial sale that perform activities within a broad range of qualifying trades. Companies cannot raise more than GBP 5 million within 12 months, with knowledge incentive companies availing of a higher 12 million period.

Investors are allowed to deduct 30% of the amounts invested in EISs, with an annual limit of GBP 300,000. To access the deductions, investors must hold the shares for at least 3 years. The regime also provides an exemption from capital gains on the sale of shares in EIS companies held for more \

The EIS is considered a success, having supported more than 59.000 companies and facilitated GBP 34 billion of investment, with statistics demonstrating that the scheme helped fund 46.5% of all UK unicorns.

The success of the EIS could serve as inspirations for Portuguese law makers to adopt a similar scheme, adapted to the Portuguese market.

b) Roll over relief

Introduce a general deferral mechanism for capital gains arising from any asset class (e.g., listed securities, fund units, real estate, business participations), provided that the realized gain is reinvested within a defined window (e.g., 12 or 24 months) into qualifying companies. Under such as scheme, taxation would be deferred until the final disposal of the investment.

The scheme would incentivize investors to use the proceeds of investments of any kind to invest in highly innovative companies, fostering the use of funds to promote productive investments. The scope of companies could be defined with reference to the start-up law but extended to other sectors where productive investment is relevant (e.g. high-tech industries). Similar to the EEIS scheme, policymakers should consider introducing a clause to prevent investors from removing the funds immediately after investing, namely by providing tax incentives for long term investments in these companies.

2. Measures for mobilization of savings for productive investment

[120] For further information Apply to use the Enterprise Investment Scheme to raise money for your company - GOV.UK

Empirical evidence shows that Portuguese households hold a very large share of their financial wealth in bank deposits, representing a substantial pool of liquidity relative to the size of the economy. A significant portion of household financial assets remains in low-yield accounts rather than being allocated to productive investment. At the same time, wealth and savings are highly concentrated, with a disproportionate share of financial assets held by a relatively small segment of households. This combination of high liquidity, low participation in capital markets, and savings concentration reinforces the structural underdevelopment of domestic risk capital and limits the availability of patient financing for innovation. Mobilising even a small share of these existing resources could significantly increase venture and growth financing in Portugal.

Creating a Portuguese Savings and Investment Account would be a relevant step to improve the mobility of capital towards investments. Successful examples such as the Swedish ISK or the UK's ISA[121] allow individuals to invest their savings in a large range of products while providing tax benefits on income generated within these accounts. The Swedish model is particularly interesting because it's built in a streamlined way, with the hosting entity automatically calculating taxes and reporting them to the tax authorities, reducing the burden on taxpayers.

In line with the recommendations of the Draghi report, the European Commission issued a recommendation for Member States to introduce a Savings and Investments Account, which fosters an investment culture within the Union and strengthens its capital markets. The Commission recommends a simplified, flexible approach, combined with broad investment opportunities and tax incentives, to encourage EU citizens to invest their savings for higher returns. Saving and Investment Accounts represent an opportunity for Portugal to improve its capital markets.

3. Building a university-to-industry pipeline

Portugal should foster the creation and incentivize the establishment of applied research intermediaries to strengthen professional technology transfer and accelerate the development of market-ready products. Effective technology transfer requires more than increased university funding; Portugal must build repeatable, institutionalized mechanisms that bridge academic excellence and industrial application.

The German model, embodied by the Fraunhofer-Gesellschaft, illustrates how dedicated applied research organizations systematically convert scientific advances into patents, products, and globally

[121] 25-ppr-roadmap-towards-successful-siu.pdf

competitive enterprises. Portugal should establish applied research institutes through robust partnerships between universities, the private sector, and the state.

These institutes should operate under hybrid investment models that combine state funding with industrial contracts to commercialize research outcomes. By expanding the interplay between academic research and industry, Portugal can transform scientific innovation into high-value products and drive sustainable economic growth.

4. Consolidate innovation governance.

Portugal's innovation landscape remains fragmented across multiple agencies and programs. Although recent government initiatives—such as the merger of the Foundation for Science and Technology (FCT) and the National Innovation Agency (ANI)—represent positive progress toward consolidation, further action is necessary. Fragmentation increases transaction costs for businesses and undermines accountability across the system.

Portugal operates multiple innovation channels that are valuable but dispersed. The country should prioritize establishing streamlined "one-stop shop" structures that centralize all aspects of the innovation process, from research to funding. Creating a unified agency for innovation, industrialization, and economic development would simplify access to support, facilitate funding, and expedite the transformation of ideas into products and competitive enterprises. These uniformized structures could serve as a hub for entrepreneurs, universities, investors, and the state as a public buyer, enabling them to interact in a streamlined, strategic way.

As part of this simplification process, Portugal should consider streamlining innovation instruments into an integrated ecosystem. The country has digital innovation hubs, Free Technological Zones, and Mobilizing agendas, all initiatives that intend to foster innovation and ultimately create marketable solutions. As things currently stand, it is hard for the public to understand the activities ongoing in the context of these initiatives.

Creating a Portuguese Innovation Map with an interactive portal that makes innovation and product data easily available to the public would

5. Modernize patents and IP commercialization to reduce time-to-protection and time-to-market

Portugal’s patent activity is rising every year, reaching a peak in 2025. However, the country still ranks low in patent activity compared to its peers, despite rising innovation. The intellectual property system in Portugal is under the Ministry of Justice, a decision driven by the need to ensure legal protection for

innovation. However, some[122] experts suggest that, in line with best practices observed elsewhere in Europe, the Ministry of Economy should manage the intellectual property institutions. Such a shift would help align the Portuguese patent system more closely with national innovation policies and broader economic strategy.

[122] Patentes para o futuro - Expresso

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