



Attracting Life Science Investments in Europe

Fourth Edition, 2023

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Executive Summary

The report "**Attracting Life Science Investments in Europe**" is an initiative of the BioMed Alliance, EuropaBio and Johnson & Johnson.

Considering the magnitude and importance of life sciences in Europe, from education to academia, research, manufacturing, exports and health delivery, the topic deserves a strong and coherent long term policy vision and plan. Europe spends an estimated 1,400 billion euro on healthcare annually, and its life science industry has a production turnover of 425 billion euro. There are around 9,51 million people employed in healthcare in the EU, and another 840,000 in the life science industry.

The objective of this report is to provide a set of indicators of importance for life science investments, allowing each country to identify its position on key aspects and to assess its strengths and weaknesses, making it possible for them to fill specific gaps or to work towards distinct investment profiles by adopting new policy measures.

As a second objective, the report benchmarks Europe versus the United States and China, based on the same set of indicators. Assessing Europe's position and performance in life sciences is essential to better respond to future crises and to protect the health of Europeans.

The 22 selected indicators are grouped in four broad categories

- **the political, social & economic environment** includes political stability, national competitiveness, innovative environment and gender equality
- **the industrial investment context** includes labour productivity, hourly labour cost, availability of qualified staff, life science trade balance, R&D incentives, complexity of the regulatory procedures, corporate taxes, payroll taxes
- **life science innovation** includes life science publications, life science staff, the number of clinical trials, life science R&D investments, and life science degrees
- **the healthcare investment environment** includes quality of care, the size of the healthcare budget, pharmaceutical spending, the size of the medtech market, and time to availability of medicines.

The data used for the indicators are sourced from internationally available and published reports, primarily from international organisations such as OECD, the European Commission, the World Bank as well as industry associations and management consultancies. The indicators try to balance both qualitative and size-related measures. Quality aspects are critical but size is equally important in this context: the large availability of highly educated staff is a critical factor for investments, the actual amount of research funds is more important than the per capita amount, and larger markets tend to be prioritised for product launches.

Executive Summary (Ctd.)

Analysis within Europe

Twenty-two European countries were selected for the analysis. The fourteen countries of our previous report are Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain, Sweden, Denmark, Finland, Poland, Norway, Switzerland, and the United Kingdom. In this year's report we added Austria, the Czech Republic, Estonia, Greece, Latvia, Lithuania, Portugal and Slovenia. This selection was based on the size of the countries and their role in life science, both academic and industrial, as well as on data availability.

Even if the strength of a life science ecosystem is based on all the different indicators, it is possible for countries to differentiate by developing a unique position. Germany and Switzerland come out well on many indicators, but countries such as Ireland have managed to create a strong position in manufacturing and France in driving innovation. When it comes to building effective biotech start-ups in the last 10 years, the UK and Switzerland show the largest progress.

For each of the selected countries, a Life Science Dashboard is provided, based on the indicators, with a more detailed overview of the specific life science investment characteristics for each country as well as recent policy measures. This allows individual countries to identify their position versus the median and the highest scores in Europe.

Analysis of Europe versus the United States and China

The second part of the report compares the position of Europe at a global level.

The key findings are:

- Despite the growth of life sciences in Europe, the gap with the United States and China is increasing significantly.
- Europe does not manage to translate its scientific knowledge into economic value at the same rate as the United States. Public funding and private equity are much more available in the United States than in Europe, and the economic returns for industry are also significantly higher. Public investments in health research are almost three times higher in the United States than in Europe and four times higher than in the European Union.
- The United States outperforms Europe on most life science innovation indicators.
- China shows a more contrasted picture but benefits strongly from its size and low costs. Despite the current slower economic context in China, the country is still expected in the coming decade to outperform the rest of the world in life science degrees and in manufacturing capacity.

Executive Summary (Ctd.)

How the report should be used

The report should be considered as a 'debate starter'. The 22 selected indicators cannot possibly cover the entire life science ecosystem in all its complexity, but they can be the basis of a discussion for further analysis, identification of a desired positioning and the determination of policy measures to move forward in the desired direction.

The report is not meant to compare the countries vis-à-vis each other on each indicator but to serve as a base for assessment by national policy makers and investors on relative positions.

The ultimate question of where to invest for life science companies depends clearly on each company's specific strategic needs (research, start-up, manufacturing, ...) and its current physical presence.

Key policy observations and questions

- It is possible for individual countries to create a distinct profile for life science investments, even within a very competitive environment.
- The United Kingdom and Switzerland, two of the strongest life science countries in Europe, are outside of the European Union – the question in the future will be when and how to collaborate while in competition.
- Europe has lost its leadership position in life science globally, and the United States and China are investing more and showing faster growth.
- Within life science and healthcare, Europe is still strongly fragmented, and not fully taking advantage of its size potential as a region. Research funds are lower than in the US, less concentrated in areas of excellence, with insufficient sustainability of research funding in areas of excellence and healthcare is still a predominantly national matter.

Executive Summary (Ctd.)

Key recommendations

This is the fourth iteration of our report, and the key recommendations remain the same: the European Union urgently needs to address the increasing gap in the life science ecosystem with the US and China, from funding of basic research over commercial value creation to global supply chain leadership, and each European country should work on a long term vision and national strategy to increase its position within life sciences.

The EU has taken the initiative to build a strong European Health Union with the aim to place Europe as a leader in life science. Current policies and investments are not likely to be sufficient to achieve that goal.

- European countries and the European Union should have a **stronger long-term vision** on how its life science ecosystem should develop. This requires a **concerted, collaborative and sustained policy effort**. All aspects of this ecosystem are connected and should reinforce each other: political stability, industrial policy, life science education, public life science research investments and sustainability for biomedical research funding, incentives for private research and manufacturing investments, the availability of venture capital and a welcoming regulatory environment for innovative technologies.
- Next to a strong and sustained vision and strategy, this requires **much more focused public funding in education and research**, both at EU level and in the individual countries, to avoid inefficiencies related to fragmentation of resources.

The COVID-19 crisis pointed out some of Europe's strengths while revealing a range of weaknesses pointed out in the report as well. The war in Ukraine and the resulting global instability and unclear geopolitical alliances, has immediate impact on global life sciences collaborations and supplies. In order to reduce dependence on other regions, Europe should increase its manufacturing capacity within the global supply chain setting.

The European Union will have to re-assess its own position in life sciences and re-invent itself in a more fundamental way than the corrective measures suggested by for instance the European Pharmaceutical Package. This initiative represents a unique opportunity to secure Europe's position in biomedical innovation for generations to come. To achieve that, the proposal put forward by the European Commission should aim for a regulatory system that adapts to scientific advancements and promotes innovation, while Member States should enable fast, equitable and sustainable access to medicines for patients. The EU will have a critical role to ensure the proper preparation and implementation of a coherent strategy to propose coordinating mechanisms to help Member States to reinforce their position in life sciences.

Life science investments create value: they contribute to health improvement, they create a strong knowledge base, they create high quality jobs, and enhance manufacturing capacity and exports, which in turn generate more economic value. Strong life sciences are an asset for Europe and being a leader in this field will have direct impact on the European citizens' health and will contribute to excellent research.

The partners of the Initiative

- The **Biomedical Alliance in Europe** is the result of a unique initiative of 36 leading European medical societies that together include more than 400,000 researchers and health professionals.
- **EuropaBio** the European Association for Bioindustries is the recognised voice of the European biotechnology community championing world-class solutions for society's challenges and representing healthcare and industrial biotechnology sectors.
- **Johnson & Johnson** the world's largest and most broadly based healthcare company. It has more than 130,000 employees worldwide. Johnson & Johnson financed the study.
- The data collection and analysis was made by **Sebio Health Policy Consulting**, a specialised consulting firm in healthcare and life sciences.



Introduction

The value of life science investments was already well understood, but it becomes even more acutely perceived in the context of COVID-19, the war in Ukraine, global competitiveness and the changing political landscape in Europe. Despite the health progress made, significant challenges remain, not only from a scientific and medical perspective, but also from a strategic capacity perspective: how excellent research ideas are transformed into solutions, who owns the technology, where the manufacturing plants are located, and how our citizens get access to treatments.

The European Union spends an estimated 1,462 billion euro on healthcare annually¹, and its life science industry has a production turnover of 300 billion euro². There are around 9,51 million people employed in healthcare in the EU³, and another 840,000 in the life science industry⁴. The size and importance of life science in Europe demands dedicated strategies with a long term perspective, as a matter of importance to the health of citizens and the socio-economic strength of the region.

The EU's innovation capacity is falling behind on the global stage. The United States and China are the leading players in the number of life science mergers and acquisitions. They are ahead in conducting clinical trials, in producing life science patents and they massively invest in health innovation. This loss of leadership is important not only in terms of jobs and growth. It also has much wider ramifications, like being best positioned to create excellent research and provide best solutions to citizens. **The key question today is whether the EU wants to regain its historical leadership and become a frontrunner in life science ecosystem.**

The objectives of this report are:

- to provide a set of key indicators and policy considerations for a coherent life science ecosystem,
- to identify how selected European countries score on these life science indicators. The selected countries are Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom,
- to offer a snap-shot of Europe's position vis-à-vis the United States and China in the area of life science attractiveness and investments,
- to present country dashboards, allowing each of the selected countries to view their position within Europe.



Steps toward a coherent life science ecosystem

Steps toward a coherent life science ecosystem

1. Key factors that facilitate the boost of life science ecosystems

A country's or a region's success in life science is the result of a strong and sustained effort to create a coherent life science ecosystem:

- a high quality **education** with sufficient availability of life science graduates;
- a strong academic **research** with the necessary funding of excellent research;
- the availability of **tech transfer** mechanisms allowing academic research to develop into commercial products and solutions that are based on solid interactions between public and private sectors;
- a medical and health environment that **integrates public and private research**, such as for translational medicine and clinical development of new treatments;
- the availability of sufficient **venture capital** to turn ideas into viable businesses;
- a good **industrial policy** allowing to recruit skilled staff, to manufacture and to export;
- a **healthcare investment policy** which embeds digital health, healthcare innovation and medical technology as priority sectors;
- a strong **EU industrial policy**, that strategically invests in innovation (digitalisation and sustainability) of its industry and infrastructure. This includes incentives schemes to invest in staff and modernisation of manufacturing (moving to industry 4.0 etc.);
- a **tax framework** that encourages investments in innovation;
- a flexible and speedy **regulatory framework** combined with a solid healthcare budget that allows for fast uptake of new technologies including digital solutions;
- an effective and efficient healthcare system that allows for **quality of care** at acceptable costs for society.

Steps toward a coherent life science ecosystem

2. Key Policy Considerations

A coherent life science ecosystem can only be achieved by having **a clear and long-term vision** on how all these building blocks fit together to create an environment for life science competitiveness. National Member States can create their own vision of national priorities, but the European Union needs to **foster a collaborative vision and rethink its competitiveness towards other continents**.

Public investments in education and academic research will have a good return on investment for society if the entire value chain is coherent and efficiently organised. Long-term investments in education and public research can create vibrant economic environments which will pay more money back to governments in the form of employment, exports and taxation. This all may result in the development of new medicines and treatments that contribute to better public health, which in turn also results in clear economic gains.

The unprecedented crisis created by the COVID-19 pandemic has proven the critical importance of ensuring Europe's positioning and capacity in life sciences is on a level playing field with other continents. The war in Ukraine has only exacerbated the situation, putting pressure on public funding, generating geopolitical uncertainty and the need to have fully integrated life science ecosystems within the political and geographical boundaries.

In order to achieve this, **an open and constructive dialogue** among different stakeholders is needed to identify how Europe compares with the US and China, and which policy measures can be adopted to advance innovation, investments and quality care, and create an environment for life science excellence in Europe.

It is important for countries to understand that they operate in a very competitive environment. They have to keep track of what's happening in other countries and to identify how they can become or remain attractive for investments or what they can do to generate local value by collaborating with other countries.

Policies are designed to have a **positive balance between high quality and costs**. Relative higher costs for staff or taxes can be acceptable if there is proportionally higher level of quality aspects : high education levels, an innovative and open economy, limited bureaucracy, good collaborations between academic and private partners.

The ultimate measures of success are high quality jobs and high quality healthcare. Policy-makers should understand that the **investments made will generate even more revenue** in terms of job creation and a healthier population.

Steps toward a coherent life science ecosystem

3. How the perspectives of investors and policy-makers can be matched

Even if investors and policy-makers have different perspectives, they should be able to meet and improve the context taking four elements of stability, size, quality and cost into account, critical elements to attract any level of investment.

Stability

- What investors want is **stability and predictability**. The sustainability of investments and the output and outcome can only be successful if the environment is not disruptive, and that includes political stability, social peace, solid economic foundations. This includes the certainty that the tax systems will not change every few years, that commitments made by the authorities are also met, and that there is a minimum rule of law, including intellectual property protection.
- Europe has strengths at the level of political stability, with clear long-term policies of what it wants to achieve. The recent rise of nationalism goes against the investors' desires for an open economy and access to a large European market.

Size

- Establishing or expanding activities in large markets has obvious advantages in getting access to a large market of patients, access to funding that is more substantial in absolute figures and access to more abundant talent (United States, Germany, China).
- Despite the efforts by the European Union to create a single market, to a large extent this remains a far-off reality for healthcare. Even if approvals are now made centrally, the decision-making at the level of pricing & reimbursement becomes even more fragmented and cumbersome. If the European Union wants to use its size to keep a major role at global level, the single market should become a reality in healthcare. This also implies an openness to the world, both from a human resources as from a global supply chain perspective. Export bans, restrictions and protectionism do not create a favourable business context.

Steps toward a coherent life science ecosystem

3. How the perspectives of investors and policy-makers can be matched (ctd.)

Quality

- At the same time, smaller countries can take advantage of more qualitative aspects, offering better education in life science, offering more specific programmes for life science research, or having faster and less bureaucracy. Several smaller countries have created dedicated policies to attract life science investors and with success. Ireland and Belgium are good examples. In Europe, two of the major countries for life science research, the UK and Switzerland, are located outside of the European Union. Both countries represent significant public investments in health research, as compared to other EU Member States, as well as a vibrant biotech environment with significant presence of venture capital.
- The most attractive countries invest heavily in improving the qualitative aspects of their market: the quality of education, the academic quality, the healthcare system quality, the quality of the interaction between public and private partners. They have set up specific schemes to facilitate early access to treatments, such as France. This also includes a more flexible and agile regulatory framework (eg. for rolling reviews, e-labelling, e-leaflets).

Cost

- The fourth factor is cost. Cost can be calculated in terms of the inputs needed to obtain results. At the most basic level it is to be measured in labour cost and productivity, but other factors such as slow or complex bureaucracy and high taxes will also play a role, as well as the increasing need to invest in energy transition and sustainability.
- Countries can work on the cost aspects of doing business, by reducing taxes on people and profits. Many countries have set up specific tax schemes, either for innovation or for manufacturing. These incentives can also include direct subsidies, either at national or subregional level, in the form of financial support or cheap access to land.



Methodology

Methodology

What is new in this report

We added eight countries: Austria, the Czech Republic, Estonia, Greece, Latvia, Lithuania, Portugal and Slovenia to the analysis. This addition lowered the median as a reference used in each country's data graph in comparison with the previous report.

We added two indicators: tax incentives for R&D, and the complexity of the regulatory procedures.

We removed one indicator – the Digital Health Index – because no meaningful recent data were available despite the importance of the topic. Initiatives to collect the data are under way, but were not available yet at the moment of publication.

We now have identified **22 indicators** that are of relevance for life science investors, based on four major pillars of a country's life science context: the socio-economic situation, the industrial capacity, life science innovation and healthcare organisation. The indicators were selected based on "inward investment" publications and based on the input of specialists from the BioMed Alliance, Europabio and Johnson & Johnson. We also want to thank EU-LIFE, the association of European life science research institutes for their valuable input. Some initial indicators were dropped because there were no data available or insufficiently available for all countries.

Twenty-two European countries were selected for this overview: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom. This selection was originally based on the size of the countries and their role in life science, both academic and industrial. Over the years, other countries were added to the list. Unfortunately not all countries were represented with comparable indicators in the published data sets, meaning that for some indicators the information has been left blank for some countries. Because of the addition of those countries, this year's individual country results cannot be compared with the results of the same country in the previous reports, because the 10-point scale is now based on a larger sample of countries.

This report gives **a snap-shot** of reality based on a number of indicators at a given moment in time. It does not give the final answer on which country is the absolute best to invest in today.

Rather, it forms the **basis for open debate** and constructive discussions with stakeholders and policy-makers interested to attract life science investments in their country. In a rapidly evolving environment such as life sciences the report intends to give a snapshot of the ecosystem to benchmark the European countries but might be subject to updates related to the time between the collection of data and their official publication.

All sources of information to develop the country indices are available for further consultation and their references can be found at the back of this document.

Methodology

The analysis is made on the basis of 22 indicators, grouped in the following four categories:



Political, Social & Economic criteria

We selected "political stability & absence of violence", "national competitiveness", "innovative environment" and "gender equality" as key criteria. All metrics in this cluster are indices, in the sense that they aggregate a number of other data to evaluate the very abstract items discussed. We added the measure of the 'complexity of regulatory procedures' as an indicator.



The Industrial Investment Context

The metrics in this group are the ones that are most common in investment reports. Availability of qualified staff and their relative cost are critical for any investment decision, together with the costs involved in taxation. Many countries offer tax exemptions for innovative companies, or offer subsidies for manufacturing investments in less developed regions. Since there are no easy comparators, we refer to the second page of each country analysis for more details.



Life Science Innovation

Specifically for life science investments, the quality of education, and the availability of staff is an important factor. To get a feel of the opportunities for research, we included the local life science R&D investments by industry and the number of clinical trials, both of which give a good indication of the life science ecosystem in the country. We included the life science university degrees (both Master and PhD) in health and biological sciences by country.

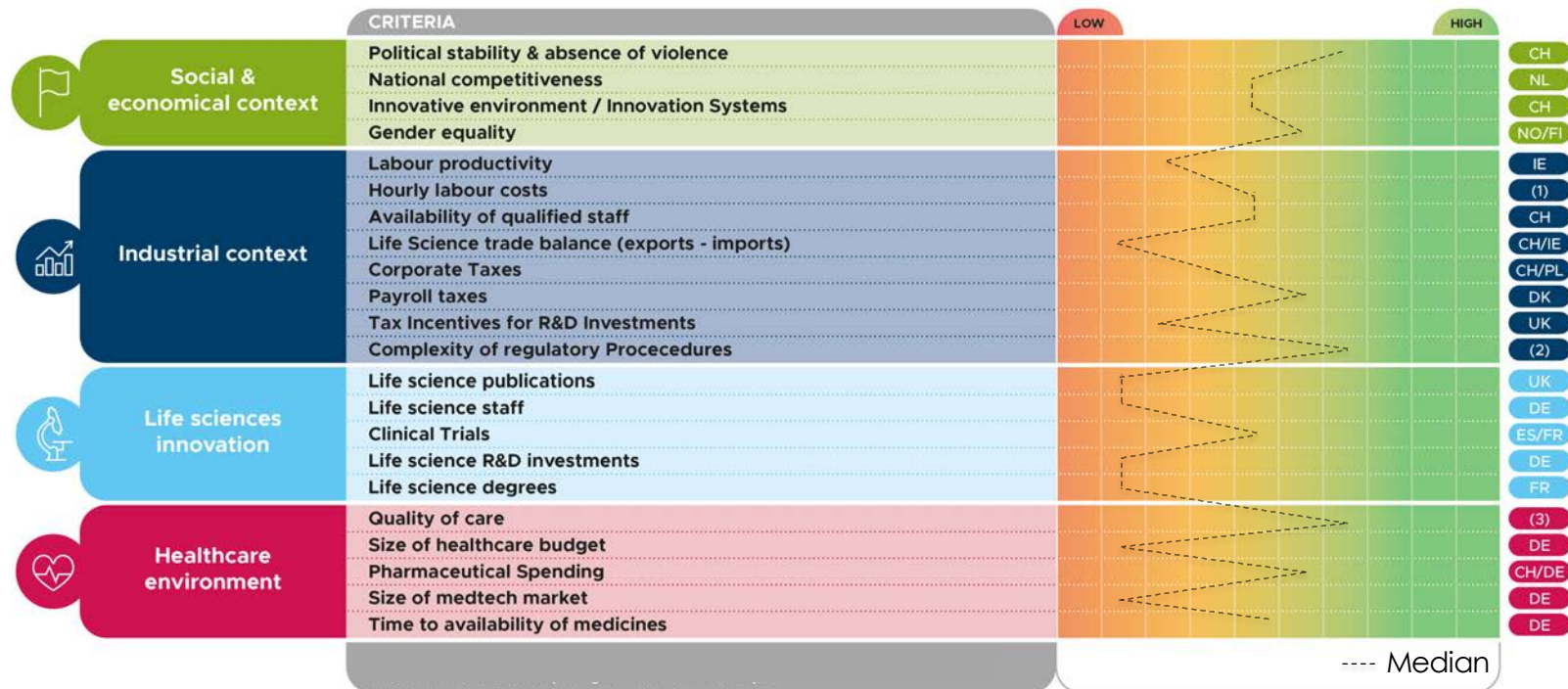


The Healthcare Investment Environment

We selected the "quality of care" index as a general metric that covers access, innovativeness and outcomes data. We included the overall size of the healthcare budget and pharmaceutical expenditure per capita indicators of the importance the political world gives to new technological innovations. We also include the time between formal approval of new technologies and the availability in the market.

EUROPE

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV – (2) LV/CZ/NL/ES – (3) FI/NL/CH/NO

Methodology

Types of metrics:

- **Absolute figures** - are used when size matters in the decision-making process.
- **Rankings and indices** - rankings are used when the metrics behind the rankings are indices themselves, for instance the “Competitive Economy Index” of the World Economic Forum. In this case we took the actual index.
- **Percentages** - percentages are used when this is deemed the most relevant figure.

Choice of scale values in metrics chart:

- The choice of values on the left and right determine the relative position of the individual countries. The values are chosen to make a meaningful distinction between the selected countries in this overview.
- The graphic representation shows relative data. This represents how each individual country scores vis-à-vis the other selected countries. For instance, when Germany has a relatively average score on the “Quality of Care” indicator, this does not mean that “Quality of Care” in Germany is average, it just demonstrates that it has an average score compared to the other countries in this study.
- The “highest scores” is an aggregation of the selected countries.

All metrics originate from public and existing analyses and surveys, conducted by international organisations such as WHO, OECD, Eurostat, the European Commission, by industry associations, or by consulting firms such as KMPG, Ernst & Young, PWC, Deloitte and others.

All sources of information to develop the country indices are available for further consultation and their references can be found at the back of this document.

Methodology

Indicators have only indicative value

All the indicators are almost by definition a simplification of a complex underlying reality. The figures offer a snap-shot based on the most recent published data available for each selected criteria. Between the international analysis and the publication of this report, many decisions have been made by governments that may potentially change the landscape too.

The example of taxation : as with many indicators, the appreciation between high and low scores may be determined by the company's specific strategic needs and environment. In tax planning at a corporate level, low tax levels are not necessarily always the best context for a company's specific situation. A high tax rate might be useful for high, risky R&D investments spread over a long period, whereas future profits are preferably taxed at a low rate (so low risk R&D investment that may give a short-term return might be better made in low tax countries). These rates then need to be combined with R&D tax credits and patent & IP box regimes. Comparing the patent box regimes in Europe is quite a challenge and it can't be summarised in a single tax rate. The nature of the company also matters: a US multinational company has a different tax context than a local medium-sized company.

The example of the EFPIA Patient W.A.I.T. Indicator : the indicator gives the average period in every geography between EMA approval and actual market access in the respective country. The reality behind this figure may vary significantly depending on each specific medicine introduction.

So, as for any indicator, this high level picture gives exactly that : a general picture. Recent changes and complexities will have to be taken into account for actual corporate investment decisions. That being said, it is clear from this report, that the overall environment for life sciences may differ strongly from country to country.

This selection of indicators intends to give an overall picture on a broad landscape of criteria and does not take into account particularities and additional complexities necessary for actual corporate investment decisions. The report shows that the overall environment for life sciences differs significantly from country to country.

The **highest scoring country for each indicator** is to be found on the right of each graph. The dotted line represents **the median** of all selected countries: 50% of countries are to the left of the line, the other 50% to the right.

Methodology

Explanation of some indicators

All indicators and sources are further explained in the annex

Political stability index. The index is a composite measure as it is based on several other indexes from multiple sources including the Economist Intelligence Unit, the World Economic Forum, and the Political Risk Services, among others. The underlying indices reflect the likelihood of a disorderly transfer of government power, armed conflict, violent demonstrations, social unrest, international tensions, terrorism, as well as ethnic, religious or regional conflicts.

Performance of innovation systems is measured by average performance on 27 indicators of the European Innovation Scoreboard (EIS). The new EIS measurement framework distinguishes between four main types of indicators and ten innovation dimensions, capturing in total 27 different indicators. Framework conditions capture the main drivers of innovation performance external to the firm and cover three innovation dimensions: Human resources, Attractive research systems, as well as Innovation-friendly environment.

Availability of Qualified Staff. The INSEAD Global Talent Competitiveness Index (GTCI) measures how countries' policies and practices enable them to attract, develop and retain human capital that contributes to productivity. In the context of the GTCI, talent competitiveness refers to the set of policies and practices that enable a country to develop, attract, and optimise the human capital that contributes to productivity and prosperity.

Quality of Life Science Academia. The Leiden Ranking takes a multidimensional perspective on the ranking of universities around the world, and by research discipline: universities can be ranked by their performance for a combination of parameters. For this analysis we selected the number of publications in top 5% journals for biomedical and life sciences by the top-20 universities in each country.



Analysis within Europe

Analysis within Europe

Switzerland leads on 7 of the 22 indicators, followed by Germany with 6 indicators.

Germany leads primarily because of size-related indicators: life science staff, life science R&D investments, size of the healthcare budget, pharmaceutical spending per capita, size of the medtech market and availability of pharmaceuticals after EMA approval.

Switzerland leads in more qualitative criteria: political stability, most innovative environment, availability of qualified staff, life science trade balance, corporate taxes and quality of care.

Ireland scores well for manufacturing, with highest labour productivity, low taxes and a good trade balance. France has relatively high scores on all life science innovation indicators.

France gives an almost mirror image of Ireland, with its strengths in life science in general and in healthcare, but with a relatively expensive industrial context.

Despite a drop in inland investments and equity raised in the United Kingdom, its life sciences sector remains one of the strongest in Europe, and tops the rank in life science publications. The UK government is aware of the challenges and has set up an ambitious programme to increase investments, although a difficult commercial environment and the voluntary scheme for branded medicines pricing and access (VPAS) persists.

We integrated several smaller countries from across Europe. Few have very distinct profiles in life sciences. Considering the high need for manufacturing capacity in Europe, the opportunities for low cost production clearly lie in Eastern Europe and Greece.

The metrics and the way the analysis was developed makes it clear that it is almost impossible to have the highest score on every single indicator. There is a clear discrepancy between low wages and high innovation, with the most innovative countries also being the most expensive. Quality and cost tend to keep each other in balance.

Countries can work on a distinct investment profile within the life science ecosystem.

Analysis within Europe

The key findings for Europe are:

- Overall, Europe is doing well especially when it comes to political, social and economic criteria, the industrial context and quality of care.
- However, there is a clear need for efforts to further improve the life science environment, for example when it comes to facilitate life science publications, degrees and the availability of life science staff.
- Europe and the European Union are not taking advantage of their size: the healthcare market and life science research funding are still very fragmented, and not concentrated in the areas of high excellence.
- There is a lack of strategic coordination and a long-term vision in European health research funding.
- It is important to compare European performance to its competitors at the global level, to truly get a sense of its performance.



Europe vs the United States and China

Europe vs the United States and China

In the last few years, some major events shaped the international trade and investment environment.

- The **war in Ukraine** has had a significant impact on all policy decisions, budget allocations and international alliances. It disrupts international trade, and creates high levels of uncertainty in international geopolitical alliances. This also shows the vulnerability of international supplies and the need for local capacity. Whereas five years ago, the routine aspects of manufacturing were outsourced to India and China, this now offers opportunities for countries with low production costs to build capacity and replace the reliance on other regions.
- The **COVID-19 crisis** has at its start brought to light a strong international dependence on production for some medical equipment, test material and the active pharmaceutical ingredients (API) of some generic medicines. This demonstrates the need in Europe to build more sustainable production capacities and rethink strategic value chains. We have also seen a significant increase in research investments – both public and private in life science research during the two years of the pandemic. After this two-year peak, investments are back to normal in 2022.
- The **Brexit** has forced the United Kingdom, already one of the leading life science innovators in Europe, to take measures for investment attractiveness to further strengthen its position, but now not within but vis-à-vis the European Union, even if recently an agreement has been reached with regard to the Horizon Europe research programme.
- These are three current drivers that illustrate how the European Union could be further lagging behind the other regions. Efforts are being made, with public spending on life sciences R&D slightly increasing, and with an increase in private investments and raised equity, but the potential of an integrated approach based on scientific excellence translated into commercial innovation is still not happening.
- It seems fair to sound an alert to European policy-makers with regard to its life science innovation environment. If the European Union truly wants to remain a global leader in life sciences, it should possibly double its current efforts, both at national and European level. We would recommend the European Union to develop a strategic life science innovation plan with a clear dashboard of key performance indicators to track progress. This report could serve as the basis for this.

Europe vs the United States and China

In comparison with the United States and China, Europe is characterised by more limited public funding for basic research, insufficient capacity for turning knowledge into health products and solutions, the lack of a harmonised and collaborative vision between European countries, insufficient incentives for venture capital and higher regulatory complexities. All these factors are hampering Europe's international position. European Life Sciences are at a crossroads and at a time when innovation in biosciences and digital technologies are accelerating, the European Union is at risk of losing its international standing.

One important factor in this respect is the amount of public research investments made by the United States in health research, which represents €40 billion in 2021¹, as compared to 8,4 billion euro annually in the European Union². Next to the EU, the United Kingdom, Switzerland and Norway combined invested €4.7 billion in life science research.

The number of clinical trials is also very low in some European countries, creating important discrepancies from one European country to another. Such differences are also important with regards to R&D investments, the size of the MedTech market and overall pharmaceutical spending. This shows how, in some aspects, Europe lacks a harmonised approach to medical innovation.

The COVID crisis also highlighted the relevance of investing in research & innovation to retain authorship of breakthroughs. This does not mean that everything should be manufactured in Europe. Global supply chains are essential for all of us, but we need to strengthen investment in the EU while keeping our borders open and working in a global open trade framework. The war in Ukraine distorts these global trade routes and agreements even more, emphasising the need to have a European supply strategy.

The key question today is whether the EU wants to regain its historical leadership or become a follower in life sciences in the future. In our analysis it is clear that Europe has some strengths versus the other continents. On the other hand, there is also a lack of strategic coordination and a long-term vision in European health research funding.

Europe vs the United States and China

Europe continues to produce world class science

Of the top-100 universities specialised in life science, 35 are based in the United States, 21 in China, and 22 in Europe, of which 7 outside the European Union. Within the European Union, the Netherlands scores best with no less than 6 universities listed ¹.

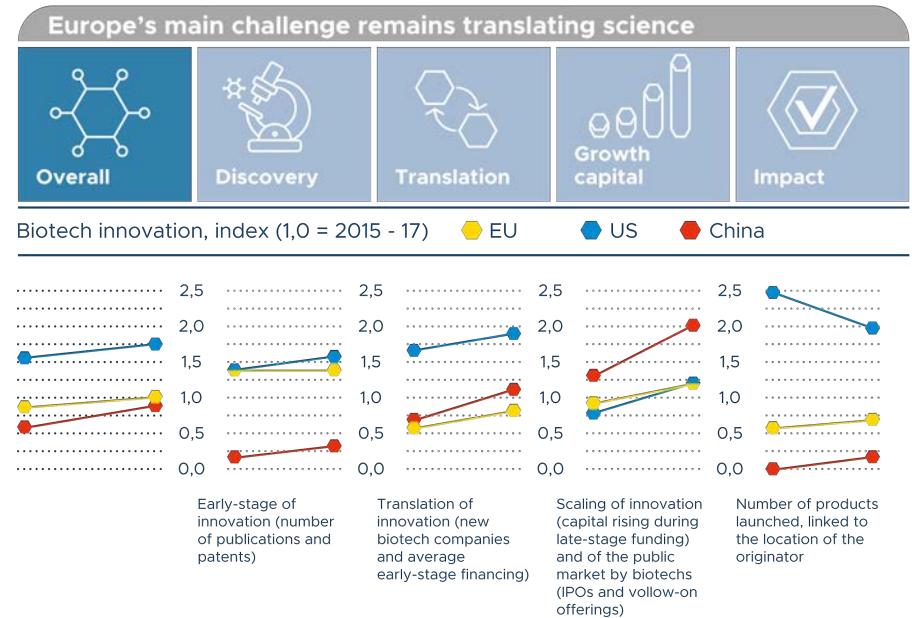
This knowledge does not necessarily transform itself into new treatments or medicines.

In terms of high quality publications on health (2017-2020), Europe still has the lead with 281 articles, versus the United States with 256 and China with 154 articles ².

McKinsey comes with the recommendation: *“One way to breathe new life into Europe’s biological-innovation capacity and capabilities is to establish goals for improving citizens’ health and mitigating climate risk and then to ensure that Europe’s Bio Revolution delivers on those goals. In other words, Europe could pivot to a demand-led rather than supply-led view, making mission-led innovation a core strategy for meeting these challenges”*. In this way Europe’s excellent track record in healthcare outcomes will drive the investment strategies.

¹ Leiden Ranking 2023, Life Sciences impact in top 10% journals

² McKinsey: Europe’s Bio Revolution: Biological innovations for complex problems, January 2023 – Graph adapted from the same report.



Europe vs the United States and China

For many indicators, the United States and China are beyond the scale of Europe. From a life science innovation perspective, the United States outperform all other regions in the world. China takes at the moment all the benefits of its size and low cost manufacturing, resulting in a very positive trade balance.

The United States scores very well on all issues related to life science innovation. They are the life science leader of the world, combining massive life sciences investments with attracting global talent and strong incentives to turn basic research into commercial applications.

The United States also has huge healthcare budgets and good healthcare outcomes, as well as fast access. The United States has lower scores on labour productivity and international trade balance.

One of the newest evolutions is the use of Artificial Intelligence in life science research and healthcare. The market is estimated at \$1.43 billion in 2022, and expected to grow to \$8.92 billion by 2032. With the global top-10 companies, the United States are currently dominating the market of AI in life sciences¹.

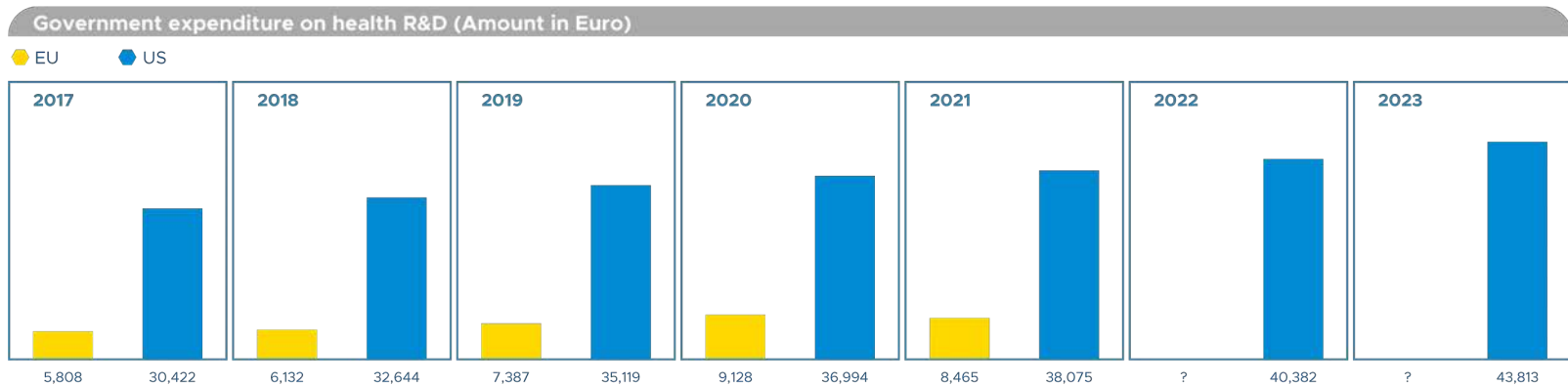
China shows a more diffuse picture, with strengths primarily resulting from the country's size. The country has taken a strong position on its future global leadership in life science. In the coming decade, China is expected to outperform the rest of the world in life science degrees and in manufacturing capacity. There are 4,500 pharmaceutical manufacturers in China, led by a small number of big players.

China is still a long way from having a globally competitive pharmaceutical industry. Its focus is primarily on local markets, with the manufacturing of generics and supply of active pharmaceutical ingredients (API) to international players.

Europe vs the United States and China

Government expenditure on health R&D

Government expenditure on health R&D has been steadily increasing over the years, with a little bump in 2020 as a result of the Covid-19 pandemic. In absolute terms, the United States is growing faster, and earlier this year, on 9 March 2023, President Biden submitted to Congress his 2024 budget request of \$51.1 billion (€45 billion) for the National Institutes of Health. Comparable government funding statistics for health or life science R&D in China are not available.



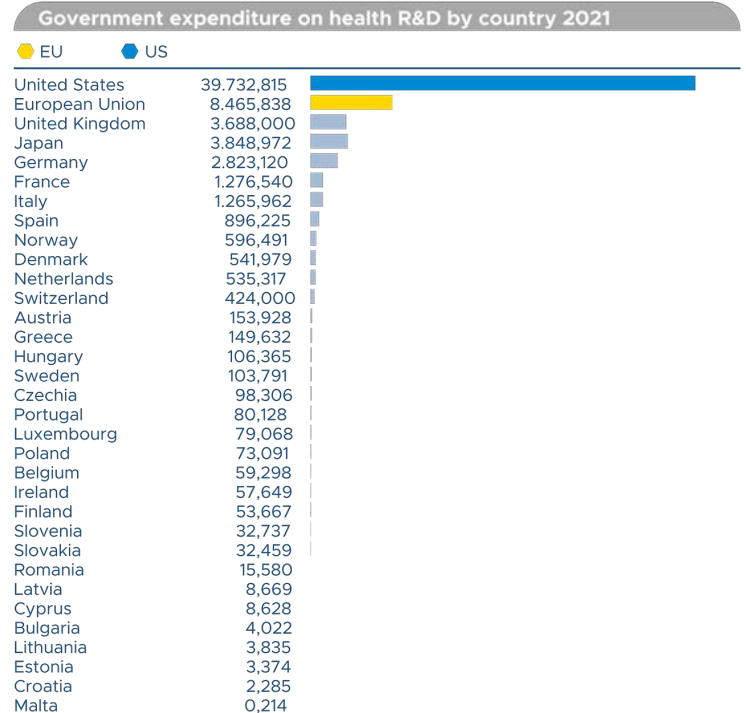
Europe vs the United States and China

Government expenditure on health R&D

Within Europe, the differences are great. The United Kingdom, Norway and Switzerland spent €4.7 billion in health research, as compared to the total of 8.4 billion by the European Union.

In contrast to the United States and other places in the world, the European funding is often a measure of re-distributing research money, and upgrading all member states to a higher level, and not necessarily to invest where the highest levels of excellence are attained.

It is unclear how much the Chinese government invests in life science research. The overall budgets for resesarch have increased significantly.



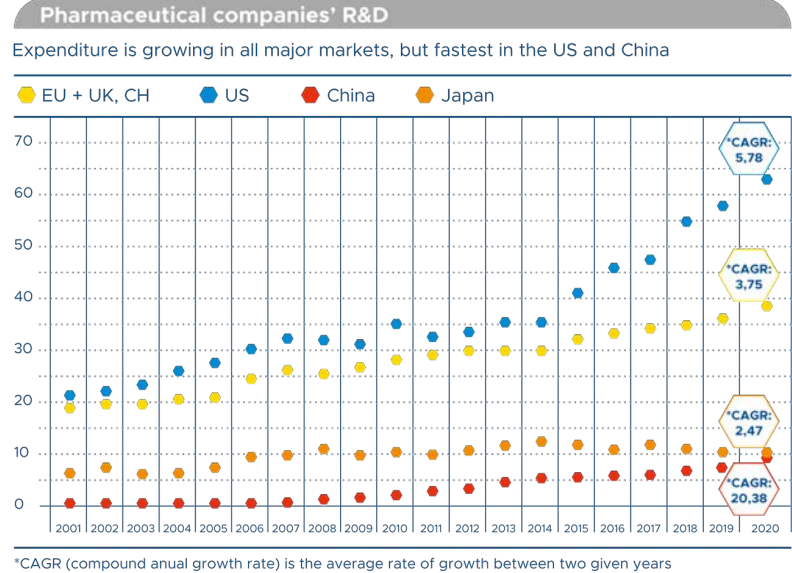
Europe vs the United States and China

Bio-Pharmaceutical R&D

In 2022, the global biopharmaceutical industry invested €212 billion in R&D, as compared to 50 billion euro by all public health research investments, primarily led by the United States and Europe¹.

In 2002 the US spent \$2 billion more than Europe on R&D; today the difference is \$25 billion.

According to McKinsey analysis based on the World Intellectual Property Organization's (WIPO) patent data, over the past five years, more than 40,000 health-biotech patents were granted in Europe, compared with about 50,000 in the United States and 39,000 in China².



¹ Evaluate Pharma - World Preview 2022 Outlook to 2028

² McKinsey: Europe's Bio Revolution: Biological innovations for complex problems, January 2023

Europe vs the United States and China

Private Life Science Equity

The equity raised in life science during pandemic years 2020 and 2021 have gone back to normal, with a sharp decrease vis-à-vis the previous years, but a steady growth if we make abstraction of the pandemic years.

IPOs have slowed to a crawl in 2022, with the number of deals down by 45% and proceeds dropping by 61% compared with a record-breaking year in 2021. But comparing with pre-pandemic 2019, IPO numbers are up by 16% in 2022¹.

Aside from cyclical shifts in investor focus, reasons for the decline likely include the poor performance of many of the companies that went public in the preceding two years. Of the 22 IPOs of 2022, 17 were in the USA, 3 in the UK, 1 in Switzerland and 1 in France, with the US firms representing 88% of the money invested².

An ongoing trend for large life sciences companies to spin off business units (including generic drugs and consumer health segments) may fuel increased IPO activity in future.

European biotechs are listed on 15 different European stock exchanges, with 90 percent listed in their home countries. Institutional investors hold a smaller share of the top ten regional biotechs in Europe (60%) than they do in the United States (85%). Although mutual funds are maturing, Europe still lags the United States: the three largest US biotech funds are twice of the size of their European counterparts, with a collective value of around \$12 billion³.

Country	2016	2017	2018	2019	2020	2021	2022
USA	30.741	42.812	50.323	53.401	102.285	96.245	53.537
China	14.333	9.105	12.983	1.885	33.930	39.922	23.263
UK	3.009	2.664	3.678	4.541	4.220	7.226	3.334
France	943	1.475	1.117	1.396	1.449	1.901	2.660
Sweden	708	1.267	737	933	1.796	3.117	1.744
Germany	389	826	9.660	822	5.020	4.310	1.438
Switzerland	708	3.323	1.376	1.419	2.633	3.510	1.092
Netherlands	300	580	1.152	811	1.175	1.773	1.036
Ireland	461	704	828	740	1.377	802	454
Denmark	224	426	368	973	1.359	1.462	307
Italy	60	49	340	131	79	777	200
Total	51.876	63.230	82.562	77.051	155.323	161.044	89.067

¹ EY Global IPO Trends 2022

² Beyond Borders: EY Biotechnology Report 2023

³ McKinsey, Can European biotechs achieve greater scale in a fragmented landscape?, 2021

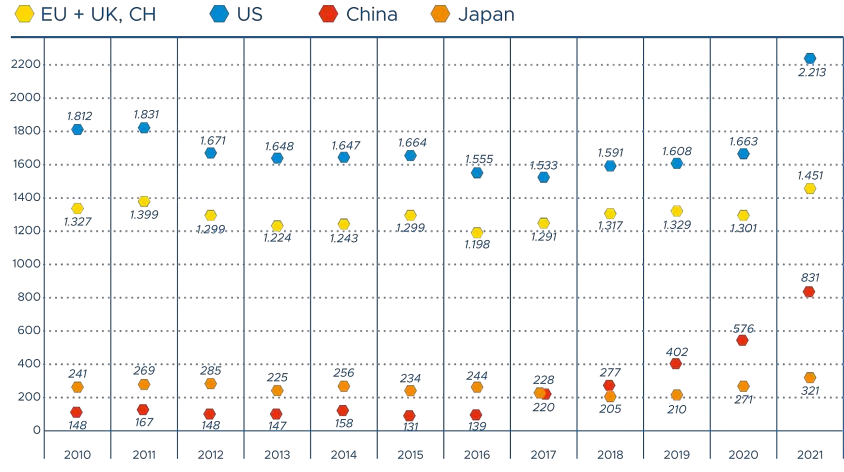
Europe vs the United States and China

Clinical Trials

The United States keep leading the world with regard to industry-sponsored clinical trials. Europe also increases, but the level of increase in China is even steeper.

Clinical Trials

US continues to outcompete Europe, China and Japan as the most attractive location for industry-sponsored clinical trials



Total number of clinical trials

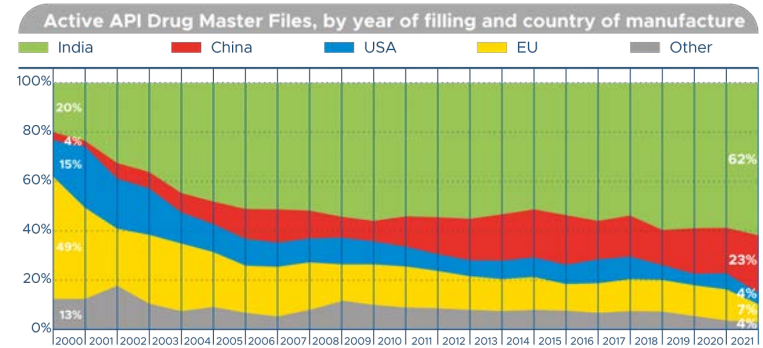
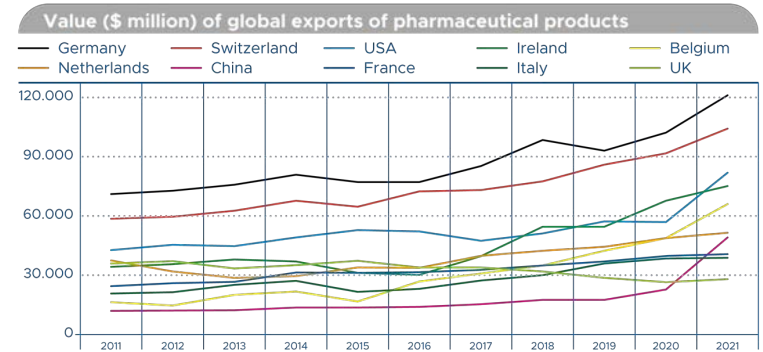
Europe vs the United States and China

Manufacturing

Europe strengthens its position as a pharmaceutical manufacturing hub, outperforming the United States and China in terms of value of the exports.

The dominance of India in the production of active pharmaceutical ingredients (API), which are the intermediates from which medicines will be manufactured, is constantly increasing. With the low cost manufacturing and the knowledge we have in Europe, it might be worthwhile expanding our capacity for manufacturing in Eastern Europe.

Since the start of the pandemic, the United States government has allocated over \$34 billion to improve United States medicines supply chain resilience. There has been significant attention paid to increasing onshoring and reducing reliance on foreign countries – China in particular¹.



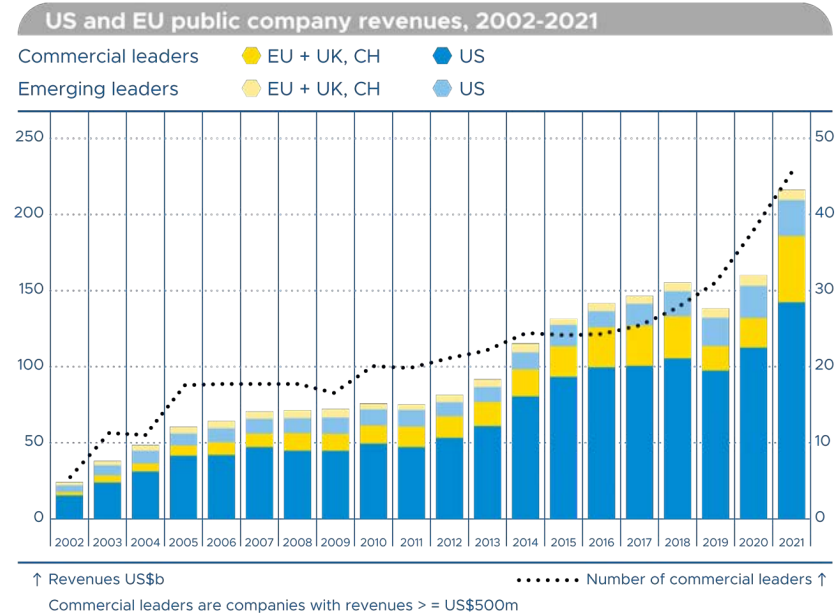
¹ U.S. Pharmacopeia, Supply Chain // May 18, 2022

Europe vs the United States and China

Life science industry revenues

While in the 1980s, Europe was still a world leader in pharmaceutical discovery, development and manufacturing, the United States has changed the picture completely. By itself, the revenue of European companies is increasing, yet whether established companies or emerging leaders, the United States dominates. High revenue leads to high investments in research and development, which gives US pharma companies an even stronger position for the future.

Of the global top-50 pharmaceutical companies by revenue, only 10 are headquartered in the EU¹.



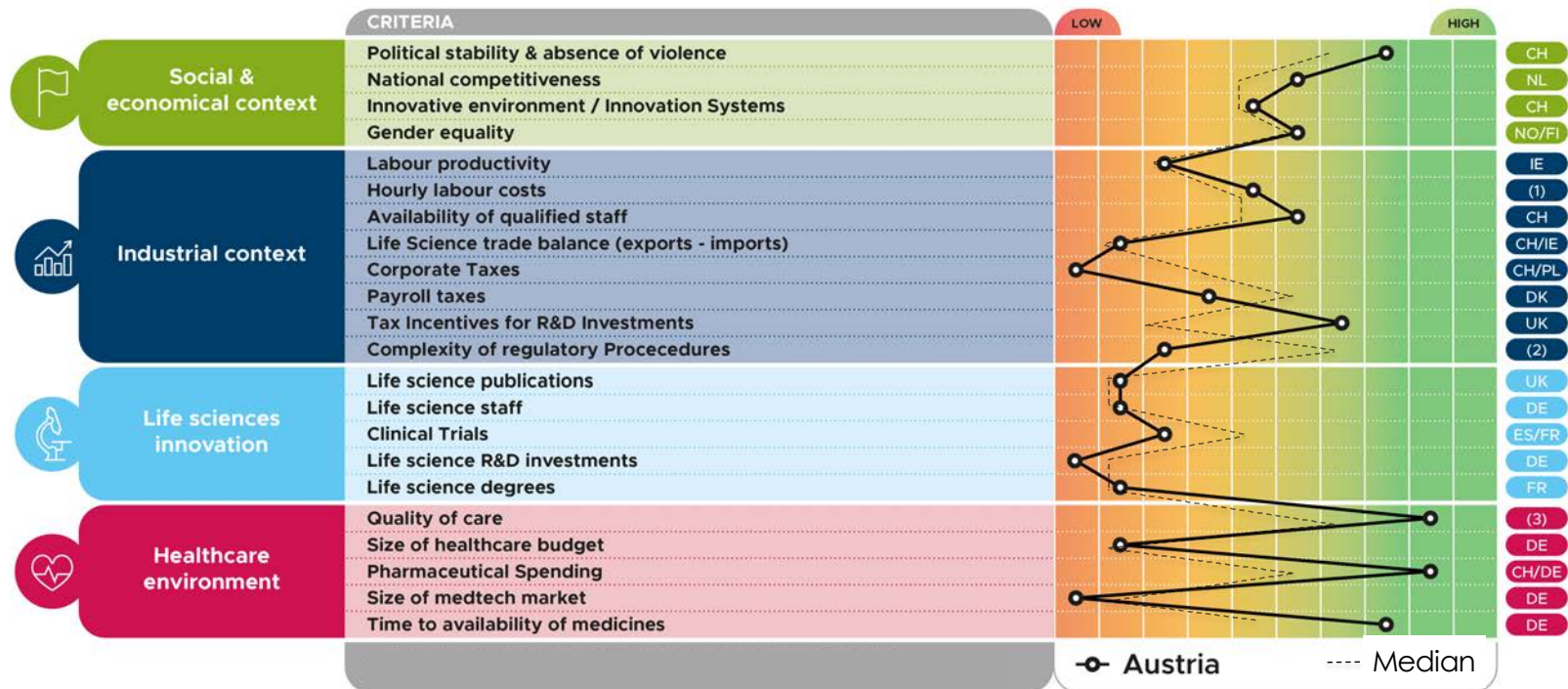
Source: EY analysis, company reports



Country Dashboards

AUSTRIA

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

AUSTRIA

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- 982 biotech, pharmaceutical and medical technology companies operate in Austria. These companies were responsible for a turnover of €25.1 billion. From 2017, revenues increased substantially by 12.1%. The life science companies also employ a large chunk of the Austrian workforce. In 2020, more than 60,000 people earned a living working for an Austrian life science company, which means an increase of 8.9% compared to 2017.
- The life sciences sector accounts for 7% of GDP, thus making a key contribution to national gross value added.
- More than 24,000 life sciences related employees are working at 17 universities, 13 universities of applied sciences and 25 non-university research institutes.
- Approx 150 highly innovative firms operate in Austria's biopharmaceutical sector. With about 12.8% of its GDP in 2021, Austria is among the top ten countries regarding health expenditures in the world. (Pharmig Daten und Fakten 2023)
- The medical technology industry specialising in telemedicine, implants and in vitro diagnostics generates annual revenue of € 9 billion, employing a workforce of 28,420 people. More than one-third of all medtech companies focus on eHealth and advanced medical technology.

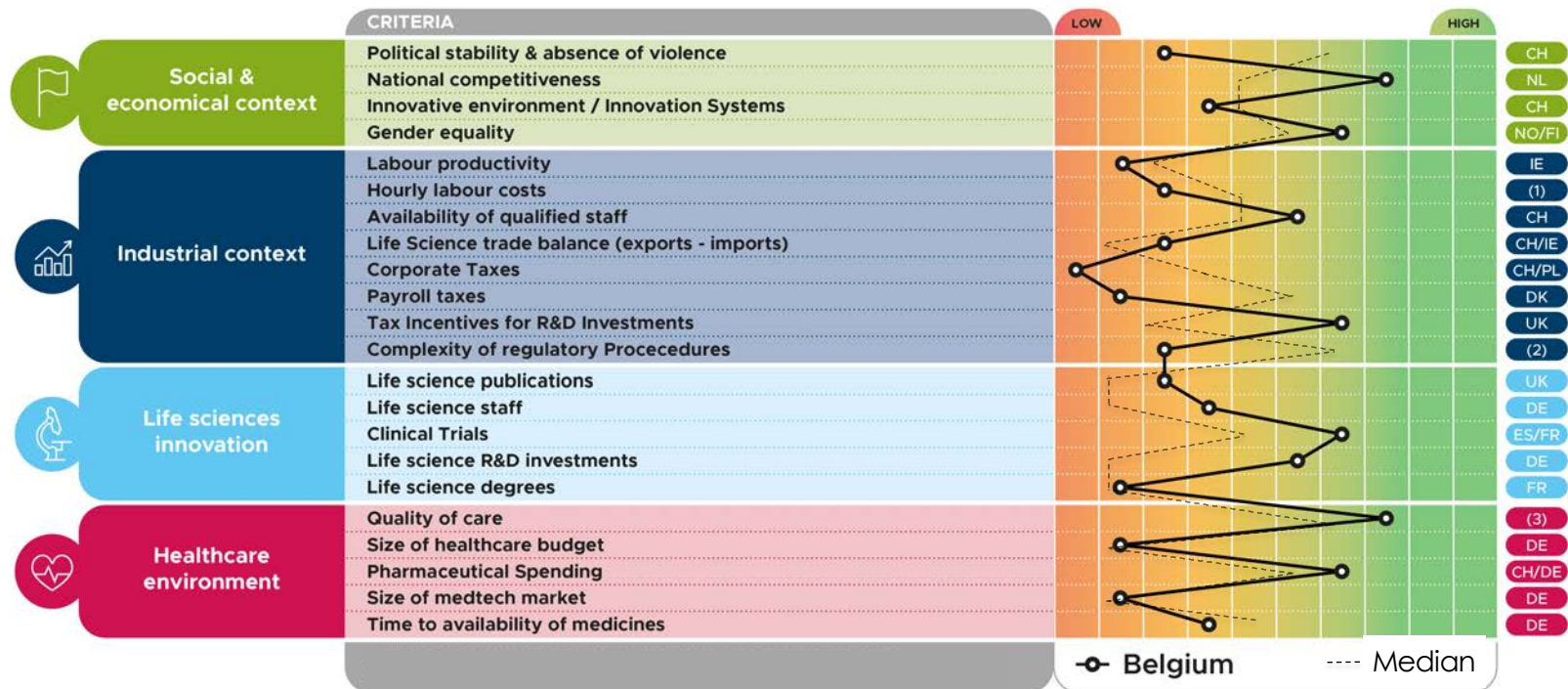
TAX MEASURES

- The Austrian Research Promotion Agency (FFG) provides direct support to R&D projects of companies along the entire value chain. A total of € 860 million in funds were distributed in the year 2020.
- The Austrian Science Fund (FWF) supports basic research.
- Austria Wirtschaftsservice GmbH (aws) is the promotional bank of the Austrian federal government assisting companies which aim to take advantage of low-interest loans and grants. 73% of all applications are approved. More than € 1 billion in funding was made available in the year 2021.
- Austria pays an uncapped research tax credit in cash to companies equalling 14% of R&D expenses (e.g., in-house and outsourced research expenditures and staff costs). In 2020 and 2021, the research tax credit applied for by firms exceeded the € 1 billion threshold in both years.
- Tax deduction on income from scientific work.
- Foreign entities conducting research in Austria can take advantage of tax benefits. The so-called "Zuzugsfreibetrag" is a tax deduction of 30% limited to five years on income from scientific work in Austria and abroad.

RECENT POLICY MEASURES

BELGIUM

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

BELGIUM

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- The (bio)pharmaceutical industry accounts for 32% of total R&D investment in Belgium. In 2022, the sector invested € 5.7 billion in R&D, which is more than 45% increase compared to 2017. In 2021, research and development expenditures in Belgium amounted to 3.43% of gross domestic product, making the country a solid leader in Europe.
- Belgium remains a European top 3 leader in clinical trials (per capita).
- Belgium hosts more than 40 manufacturing sites. Daily export by the pharmaceutical sector is set at € 230 million. The total amount of export is € 84 billion in 2021. Pharmaceutical export contributes to 18% of the total Belgian export.
- The Belgian social security system covers nearly the entire population of 11.8 million inhabitants. In 2023, the medicines expenditures are estimated at \$5.9 billion which represents approximately 16% of the total expenditures for healthcare. The Belgian market for medical equipment and supplies is estimated at \$3.4 billion in 2022.
- The R&D Bioplatfrom is a formal concertation between the federal government and the innovative pharmaceutical industry to improve the general investment attractiveness and to strengthen the ecosystem.

TAX MEASURES

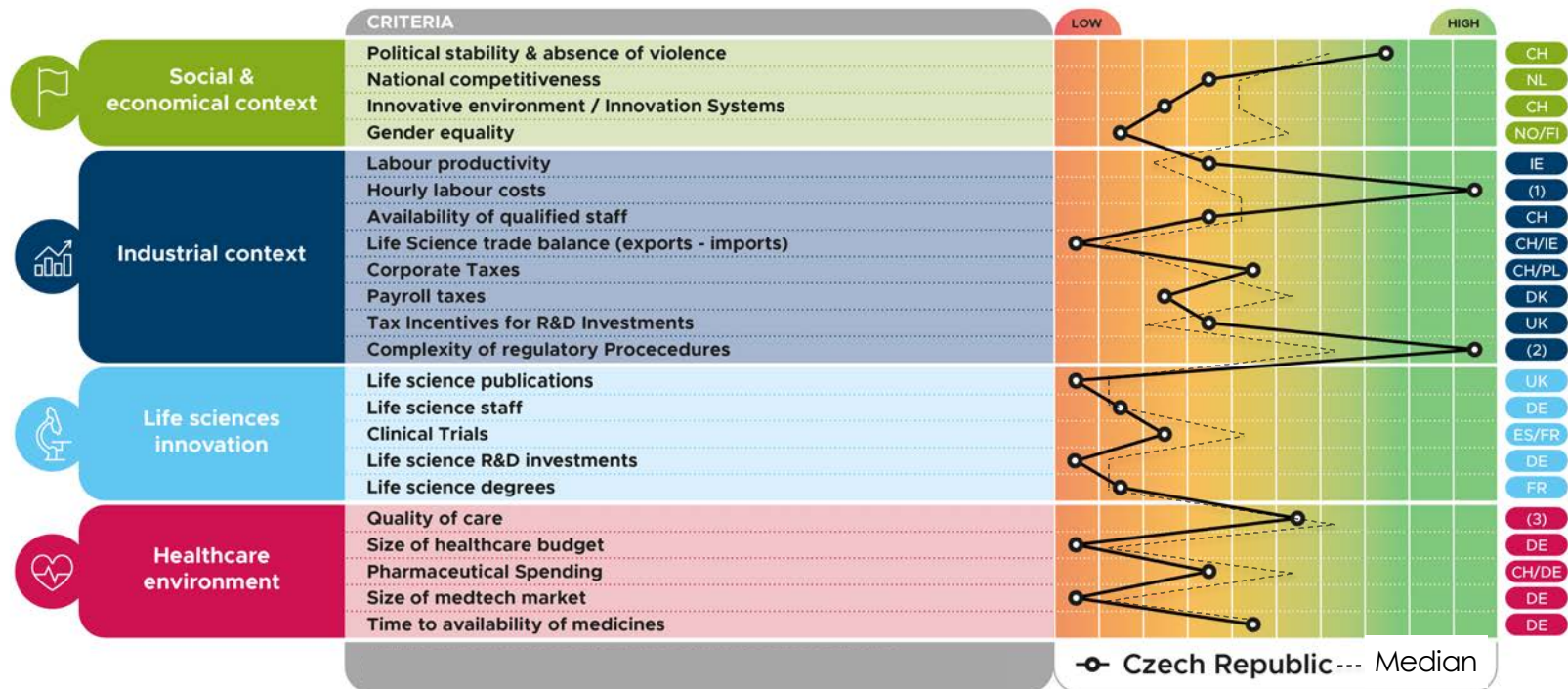
- 80% deduction on the withholding tax for R&D employees;
- Up to 85% deduction on innovation income tax (patent box);
- Tax deductions and refundable cash advances for investments in patents and R&D, including R&D super deduction;
- Special tax statute for internationals;
- Tax modulation system supporting fundamental research;
- Regional grants for R&D projects and climate neutral and circular economy technology.

RECENT POLICY MEASURES

- In October 2021, the Belgian government, under the leadership of the Prime Minister and in close partnership with academia and the health and biotech industry, signed a joint charter pledging to further strengthen Belgium's leading position in biopharma R&D and production.
- The three regional governments of Flanders, Wallonia, and Brussels also actively support innovation (e.g., ATMPs, vaccines, radiopharmaceuticals, clinical research, environmental sustainability) in diverse ways. Each regional government works closely with its own public service organization to promote foreign trade and attract foreign investment.
- Health Data Agency - On March 10th, 2023, the Belgian Health Data Agency bill was approved. This agency will be responsible to facilitate the secondary use of health (care) data in a secure and controlled manner for research and healthcare purposes.

CZECH REPUBLIC

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

CZECH REPUBLIC

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Development of the sector is supported by effective patent protection, adoption of international standards of Good Manufacturing Practice, Good Laboratory Practice and Good Clinical Practice, relatively non-restrictive genetic engineering and the government's support for R&D and knowledge transfer between the science and business communities.
- Over 20% of all university students study natural sciences.
- Life Science industry represents 32.1% share of industry in the economy (highest in EU).
- There are in total 68 universities in the country, of which 18 provide high-quality STEMM education and conduct research in these fields. The Czech Republic's research infrastructure has been strengthened by the Operational Programme Research and Development for Innovation with a total budget of more than €2.1 billion. Approximately two-thirds of these funds have been used to construct eight large infrastructure facilities in the category of European Centers of Excellence and forty regional R&D centres.

TAX MEASURES

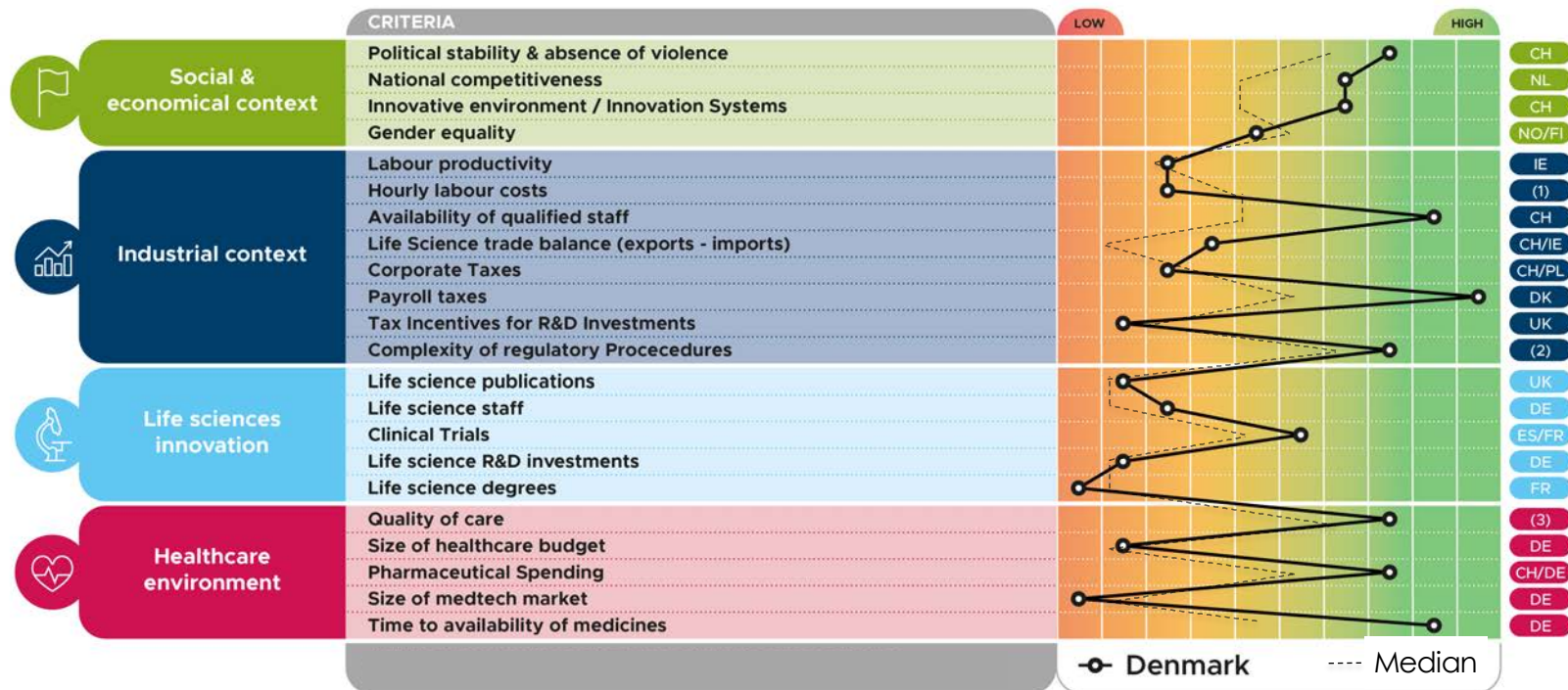
- In 2024 the standard corporate tax rate will be increased from 19% to 21%.
- The investment deduction for R&D is based on the principle of a double application. This means that you apply the R&D costs twice. First as costs and second in tax deduction. In this way, 100% of the costs can be deducted from the tax base. The upper limit of the tax deduction is not set by the law.

RECENT POLICY MEASURES

- The Czech government set development of new pharmaceutical treatments and diagnostics as one of the top priority areas and allocated public funding of over €2.5 billion in the last decade to strengthen the sector's research infrastructure. New state-of-the-art research facilities have been completed in Prague, Brno, Olomouc and Plzeň to complement the existing institutes of the Czech Academy of Sciences and universities.

DENMARK

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

DENMARK

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Home of Medicon Valley, one of Europe's leading life science clusters, based in the south of Sweden and Denmark
- Denmark was ranked the best country in Europe for biotech research and development in 2019 (Nordic Life Science News).
- Denmark was in 2019 one of the most R&D-intensive countries in the world, and the best in Europe regarding researcher concentration (Bloomberg Innovation Index).

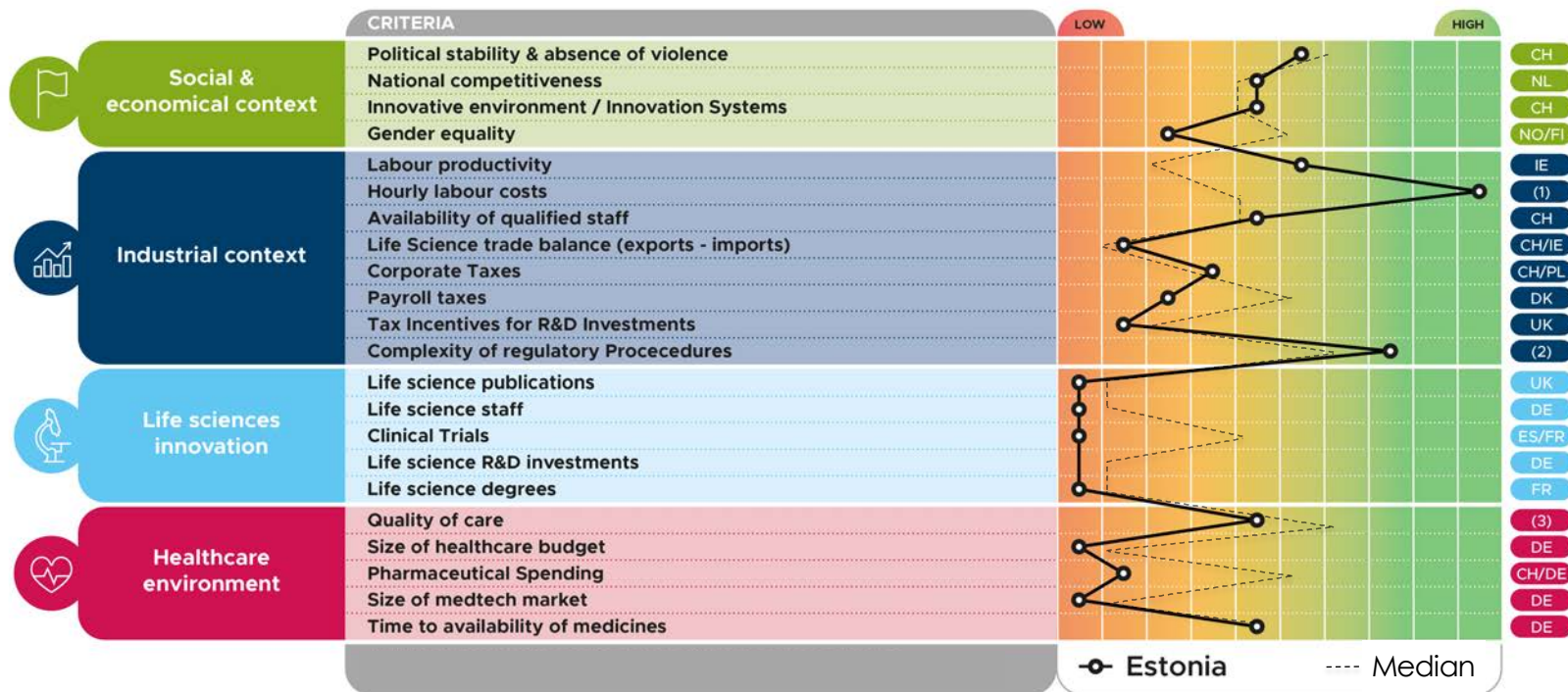
TAX MEASURES

- The system offers a corporate tax rate of 22%, an extensive network of tax treaties, and tax rules for expatriates.
- Other tax incentives include full deduction of patents and expertise in the year of acquisition and deduction of R&D expenses when such expenses are incurred.
- A special taxation scheme is available for high salaried expats. The scheme enables the expat to pay a reduced income tax of 27 % for up to 7 years.
- Businesses with R&D costs resulting in losses are currently entitled to a cash reimbursement of 22% of the losses relating to R&D costs. The cash credit amount is maximised to the tax value of DKK 25 million.

RECENT POLICY MEASURES

ESTONIA

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

ESTONIA

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Estonia has a collaborative ecosystem for industrial R&D including academia, accelerators and competence centres. Estonia has a highly competitive digital environment, offering opportunities for industrial product and technology R&D.
- There are six Competence Centers in Estonia, including on health, biotechnology, and food. Competence Centers are associations that are based on innovative cooperation between the public authorities, research and development institutions and enterprises. Their main objective is to provide support for regional business development represented by qualified specialists, various research and trainings, as well as a physical environment.
- The main principles of R&D in Estonia are defined in the Organisation of Research and Development Act (first version adopted in 1997), which stipulates the bases for the organisation of R&D and secures the legal means for the preservation and further development of scientific and technological work as a part of the Estonian culture and economy.
- Research in Estonia is mainly financed by the government and businesses, which both account for approximately 40% of research funding. The rest comes from foreign funds (mainly EU framework programmes).

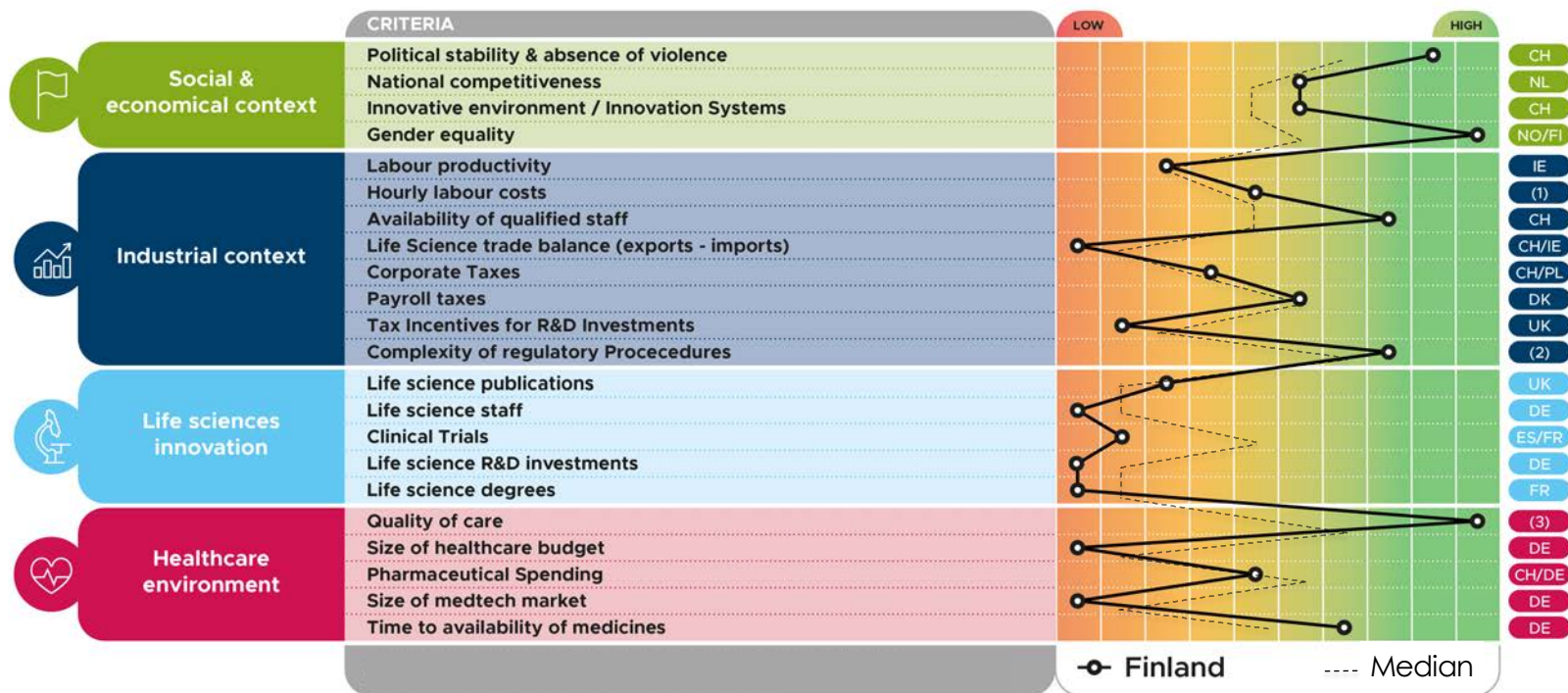
TAX MEASURES

- There is no corporate income tax on retained and reinvested profits.
- This means that Estonian resident companies and the permanent establishments of foreign entities (including branches) are subject to 0% income tax for all reinvested and retained profits and a 20% income tax only for all distributed profits (both actual and deemed).

RECENT POLICY MEASURES

FINLAND

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

FINLAND

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- As one of the first countries to compile social and welfare data in digital registries, and with a 100% population penetration in electronic health records, Finland's digital health data is globally unique when it comes to scope and depth.
- The Finnish data system is unique in terms of breadth and depth. It is fully digitized and assessible reflecting recent legislation – Finnish Biobank Act (2012) and Act on the Secondary Use of Health and Social Data (2019). It is further linked to all electronic health records, which include all clinical information, social care, prescription records, patient reported outcomes, and biobank and genomic data.
- Foreign-owned companies in Finland can benefit from several different types of aid, especially for certain regions of Finland: the 15 regional offices of Centers for Economic Development, Transport and the Environment (ELY Centers), provide advisory, training and expert services and funding for investment and development projects.
- Next to its visionary use of health data, the country is also trying to take a lead position in the use of Artificial Intelligence and Augmented/Virtual Reality in health and life sciences.

TAX MEASURES

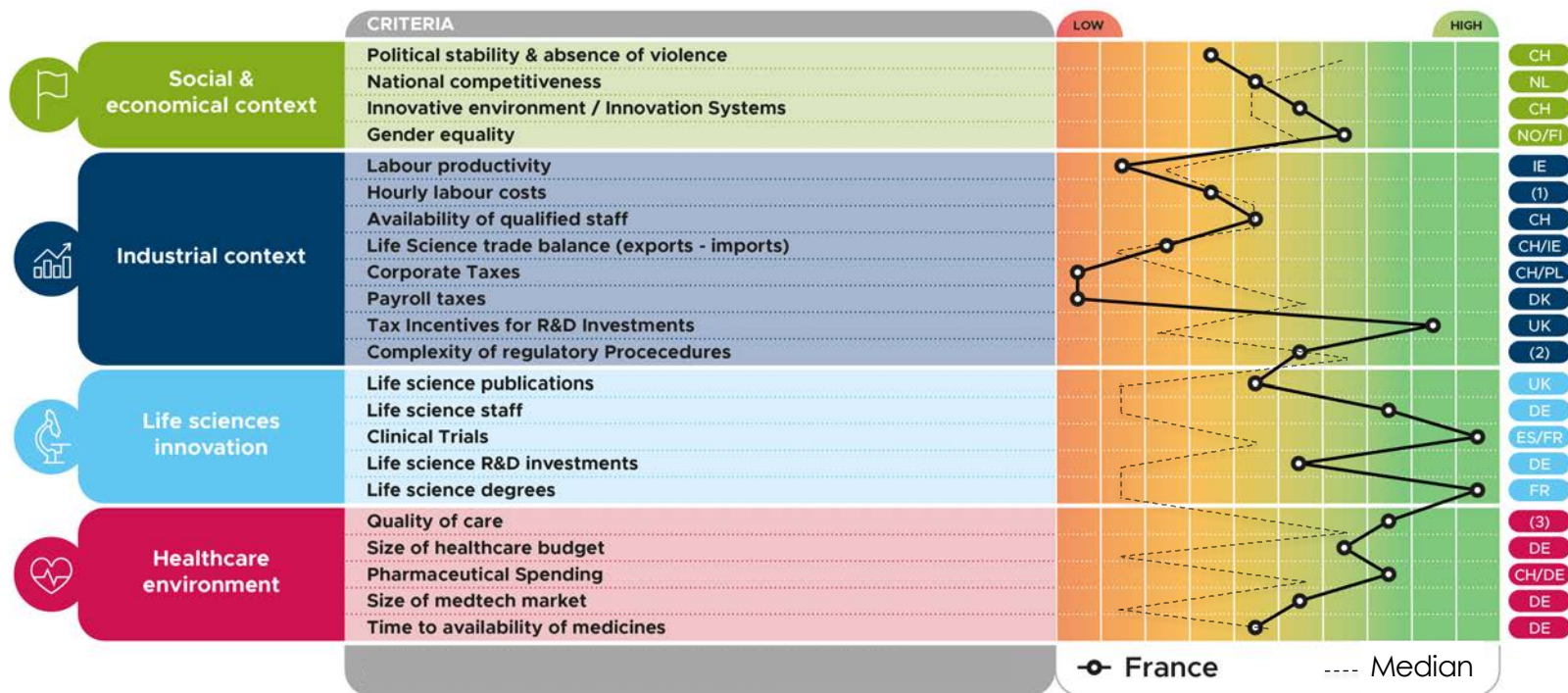
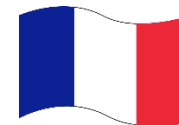
- Corporate tax at 20%.
- The former Finnish Minister of Finance announced that "companies will be encouraged to make intangible investments through the introduction of a fixed-term additional tax deduction for R&D related research cooperation in 2021-2024. The companies would be granted an additional tax deduction of 50% for expenditure on research and innovation projects carried out in cooperation with higher education institutions and research institutes".

RECENT POLICY MEASURES

- In cooperation between the Ministry of Economic Affairs and Employment, the Ministry of Education and Culture and the Ministry of Social Affairs and Health, a research, development and innovation programme to boost growth and renewal in the health and wellbeing sector, including the use of health technology and promotion of exports, will be launched as a follow-up to the health sector RDI growth strategy. The programme responds to the rapidly changing operating environment by reforming the structures and procedures by which the sector's data, infrastructure, research results, digitalisation and technology are utilised in RDI activities in cooperation with wellbeing services counties, higher education institutions, financiers and companies in the sector.
- A good partnership between the public and private sectors will be promoted, for example, to develop skills and innovation related to digitalisation in healthcare and social welfare.
- The Government is committed to the national target of increasing Finland's research and development (R&D) expenditure to four per cent of GDP by 2030. In line with the national target and the current Act on Research and Development Funding, the Government will raise central government funding for R&D activities to 1.2% of GDP by 2030, provided that private sector investments increase to 2.8%.

FRANCE

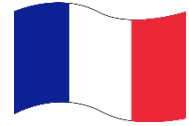
Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

FRANCE

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- In 2022, France was, for the 4th time in the row, the leading host country for foreign direct investment in Europe, in Europe (EY, 2023). More specifically, France is the first country to welcome investment from the United States (16% of total investments).
- France's ecosystem fosters synergies and partnerships that lead to the emergence of innovations, products and services offering high-quality personalized healthcare, with 1700 healthtech companies. The government supported the launch of major bioclusters such as Paris Saclay Cancer Cluster, and Station F (World's largest startup campus in Paris).
- France is the 2nd European country in fundraising for Healthtech companies (€1.8 Billion).
- France spends 11% of its GDP spent on Health expenditure (#4 country in OECD).
- France is the fifth largest market in the world for human medicines, and the second largest in Europe.
- France is ranked fourth in the world and second in Europe for medical devices and technologies. There are more than 2,000 companies in the French medical device sector, generating revenues of €28 billion.
- World's recognized research institutes: Inserm, APHP, CNRS, Gustave Roussy, Curie institute.
- 28 universities in the Shanghai Ranking, among them 3 are in the top 50.
- Presumed innovative specialties can be granted an Accès Précoce, which means they are accessible for patients before the Marketing authorization and before the French HTA assessment under special circumstances.

TAX MEASURES

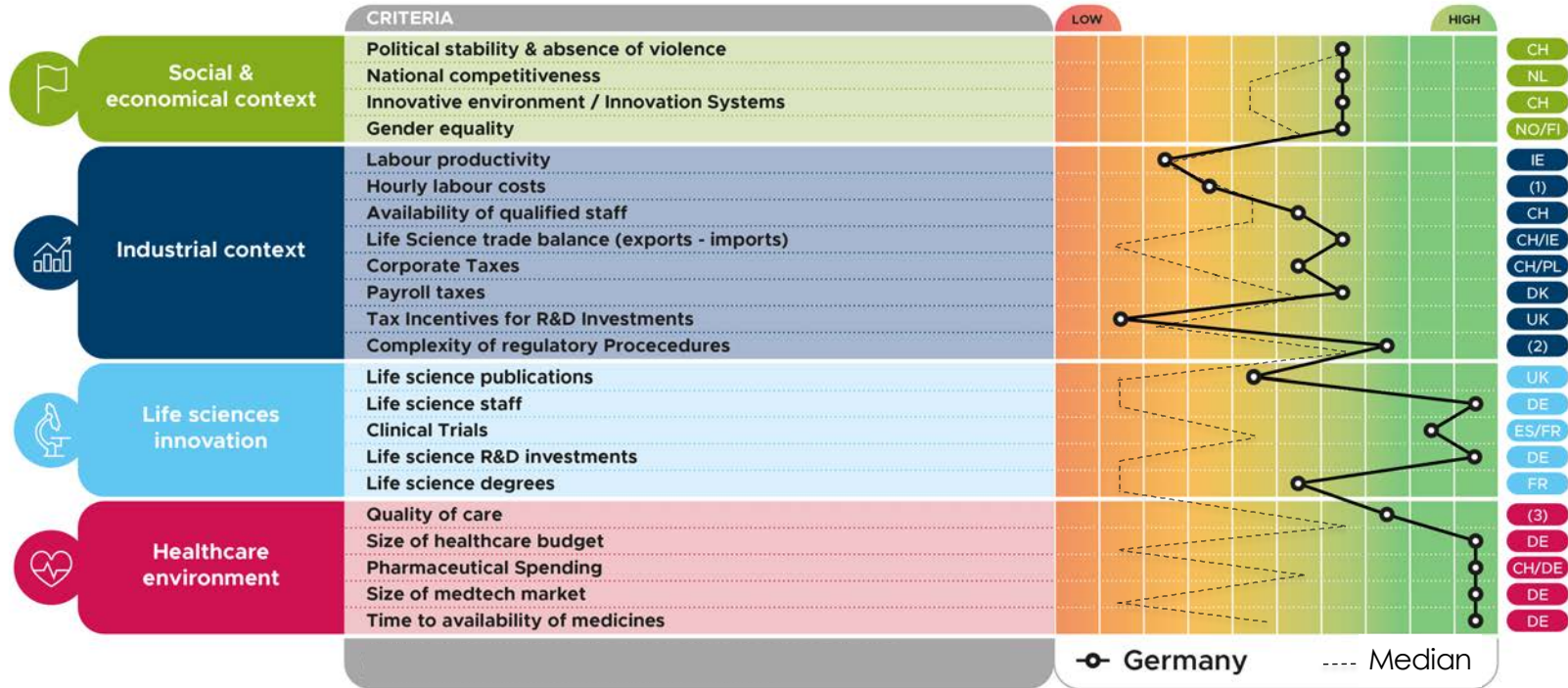
- Tax on income from IP at 10%.
- R&D tax credit of 30% is available for the portion of R&D expenses below €100 million, reduced to 5% for the portion exceeding that amount. Moreover, a rate of 400% is applied for two years to the cost of employing a recent PhD graduate. R&D expenses are eligible until marketing authorization is received for medicines and CE marking is obtained for medical devices, although the French administration is arguing about the eligibility of what is considered as pre-Marketing Authorization.
- Basic CIT rate step-by-step decrease, from 33.33% to 25.825% (2022)
- 50% decrease of the late penalties applied in case tax reassessment (from yearly 4.8% to 2.4%).
- Local business tax (CVAE) gradually cancelled as from 2027.
- Local tax on real estate divide by two as from 2021.
- Specific healthcare products regulation: unprecedented clawback clause for Pharma in 2023 (€2.2 billion expected). Upcoming clawback for medtech with potential heavy impact.

RECENT POLICY MEASURES

- Overarching government strategy to promote innovation/startups/skills.
- Since 2021, announcements of €7 billion of investments in the health sector, including 1.2 in Research and development, €800 million in biotherapies, €718 million in digitalisation, ...
- This led to the creation of the Agency for Health Innovation in oct. 2022, the launch of the "Health data hub", a €2 billion program for digital transformation of the healthcare system, or the Hop'en programme which aims to digitalize hospitals, and digital health record for patients.
- Two early access pathways are available: Accès précoce (since 2021) and Accès Direct (since 2023), that allow quicker patient access to innovation.
- An inter-ministerial mission on innovation was launched by Prime Minister Elisabeth Borne in January 2023 to analyze the perspectives for funding and regulating the healthcare system prior to the next wave of innovation. Its recommendations were delivered in August 2023 and comprise 64 propositions for a "New Deal" on regulation.
- In 2023, President Macron announced €7 billion in private funds (Tibi 2) mobilized for the development of tech companies, with priority given to the decarbonisation of the economy, in connection with the "Green Industry" plan.

GERMANY

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

GERMANY

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Representing Europe's most populous country, Germany's healthcare market is No. 1 in Europe by market volume, number of patients, medical technology manufacturers, and healthcare providers.
- There is strong support and commitment from the Ministry for Economic Affairs and Climate Action to keep Germany an attractive location for life-science companies.
- Germany has a highly quality and educated workforce in the field of life-sciences.
- A highly attractive R&D location, Germany ranks 4th for clinical trials in Europe, and 7th in the world.
- 2022, healthcare spending in Germany totaled €474 billion
- The world's leading exporter of pharmaceuticals.
- 30 BioRegions and LifeScience Clusters - with facilities dedicated to biotech research and innovation.
- The pharmaceutical industry consists of more than 614 companies, employing a workforce of 140,000, which is the second highest in the world (2020 figures).
- German Federal Government's "High-Tech Strategy" programs also include healthcare as a major focal point. A number of federal programs, including the Central Innovation Programme (Zentrales Innovationsprogramm Mittelstand – ZIM), promote cooperation between research institutions and the private sector.
- The German Trade And Invest (GTAI) agency offers a one-stop shop for foreign investments in Germany, from the initial concept to its finalisation.

TAX MEASURES

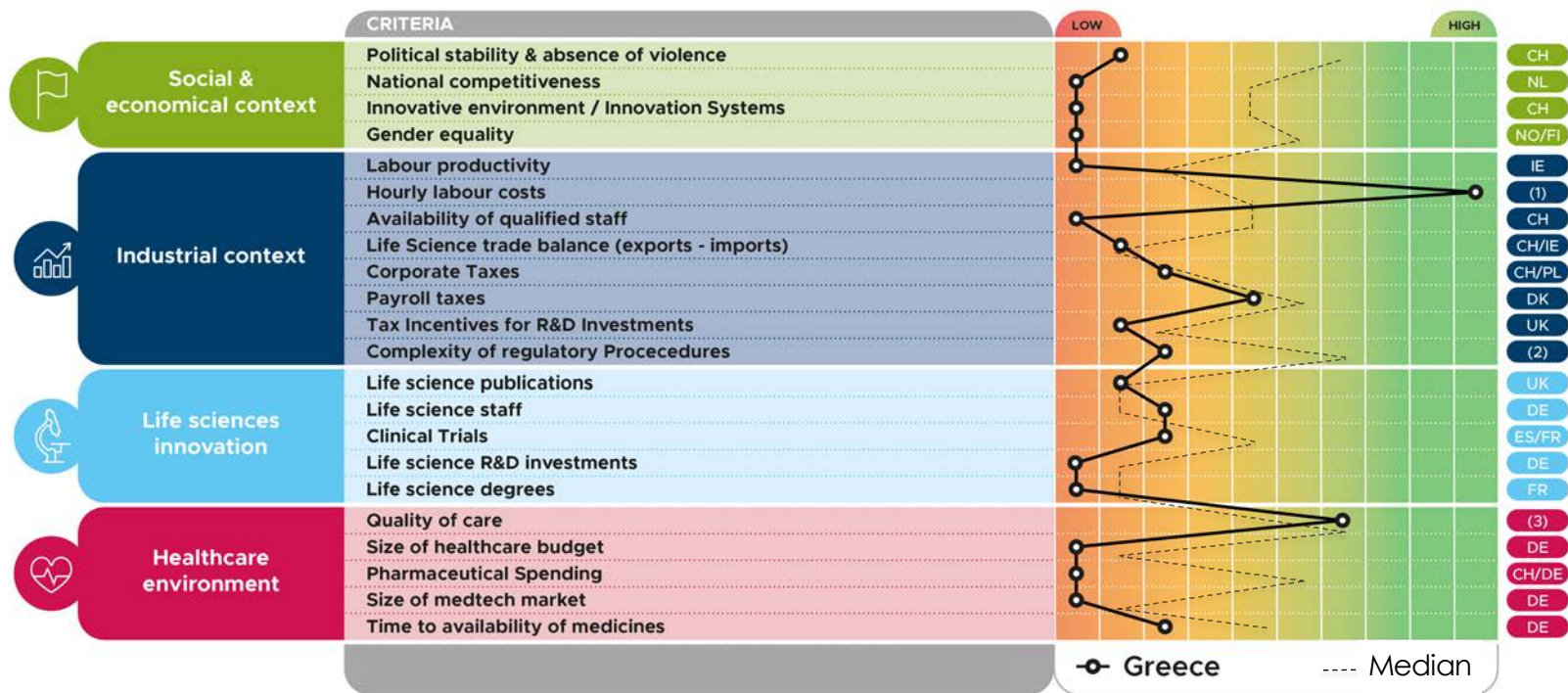
- The average overall tax burden for corporations is just below 30%. Significantly lower rates are available in certain German municipalities – up to eight percentage points less – with the overall corporate tax burden as low as 22.3% in some cases.
- Germany does not offer R&D tax incentives. State grants in cash for eligible R&D projects are applicable instead.

RECENT POLICY MEASURES

- The reimbursement system for medicines (AMNOG) has been changed by the recent reform which increases the mandatory clawback from 7 to 12% for pharma companies and by introducing additional guard rails, as well as an additional mandatory rebate on combination therapies. On the MedTech side, hospital funding constraints have resulted in more limited access to innovative treatments and price volatility.
- Creation of life science industry expert committee in the German Trade and Invest department to discuss with stakeholders how to establish a welcoming investment environment.
- Development of the "Future Research and Innovation Strategy" of the Ministry of Education and Research to secure Germany's position as a key innovator in Europe and the world and increase competitiveness.
- Plan of the Ministry of Finance to pass a "future opportunity law" that will lower corporate taxes and is meant to boost the attractiveness and competitiveness of Germany as a location for companies.
- New Immigration Bill passed that creates and expands pathways for skilled workers from non-EU countries to come to Germany.

GREECE

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

GREECE

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- In the period recovering from the crisis (post-2009), the government has undertaken great cutbacks in healthcare and pharmaceutical spending.
- Compared with the rest of the EU, per capita expenditure is low and private sector contribution is much greater, leading to suboptimal public health outcomes in this field. In addition, the public sector experiences significant delays in invoicing the medical and biotechnological products that it consumes. Moreover, public hospitals have accumulated high overdue debts that take up to 12 months to repay.
- Several reforms have been planned which aim at increasing system efficiency and promoting prevention and well-being as well as investments with key focus on modernisation of existing infrastructure.
- E-prescription, to monitor prescribing behavior & dispensing patterns set therapeutic protocols.
- National HTA process.
- Increasing use of generics, prescription by active substance & maximum price with branded drug as benchmark.
- Structural reforms, creation of a unified health fund & redesign of primary care.
- Greece has launched an incentives framework, aiming at attracting and facilitating investments both in the pharmaceutical industry, as well as in the general economy.

TAX MEASURES

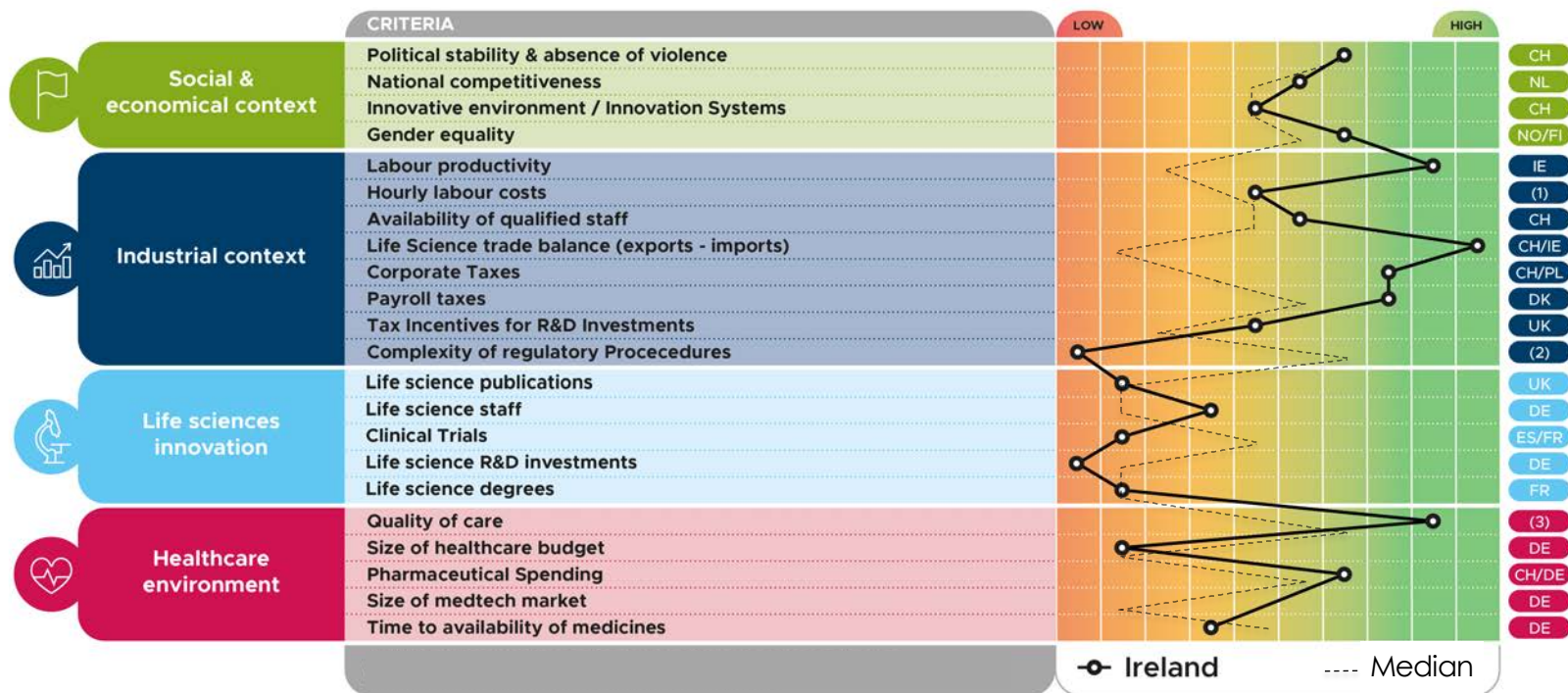
- For the tax year 2021 onwards, the corporate income tax (CIT) rate of legal entities, with the exemption of credit institutions, has been reduced to 22%.
- Reductions in corporate tax (to 22%), dividend tax rate (to 5%) & total insurance contributions to 36.66% in 2021, with plans to reduce it below OECD average by 2023. Solidarity Contribution repealed for 2021, with complete disposal under consideration.

RECENT POLICY MEASURES

- A joint ministerial decision issued by the Greek government on 31 December 2020 sets out the circumstances in which a pharmaceutical expenditure claw back may be offset with research and development (R&D) expenses and investment expenses for the development of products, services, or production lines.
- On 19 May 2023, a Ministerial Decision was issued, regulating specific issues for the organization and operation of Hospital Homecare (the internationally accepted term is "Hospital at Home"). The Hospital at Home programs are expected to have numerous and significant benefits for the patient, the Hospital-Reference Centre, as well as the National Health System (ESY).

IRELAND

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

IRELAND

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Ireland has an outsized life sciences sector relative to other sectors of the Irish economy and to comparably sized peer countries.
- Ireland has evolved into a strong manufacturing hub for biopharmaceuticals and medtech. Collaborative clusters in Pharmaceutical, Biotechnology, Medical Devices and Diagnostics have been a key element behind the remarkable growth of a sector that employs 42,000 people.
- Ireland exported approximately €80 billion in medical and pharmaceutical products in 2022, accounting for almost 40% of the total value of merchandise exports. This represents a significant increase of over €17 billion from 2021.
- The biopharmaceutical and chemical industry has made a capital investment of approximately €10 billion in new facilities in Ireland over the past 10 years, representing one of the biggest waves of investment in such new facilities anywhere in the world.
- Ireland is an attractive hub for overseas groups, while there is comparatively little SME activity in the life sciences. Foreign direct investment is encouraged through a strong tailor-made approach to supporting overseas investors through the Industrial Development Authority (IDA Ireland).

TAX MEASURES

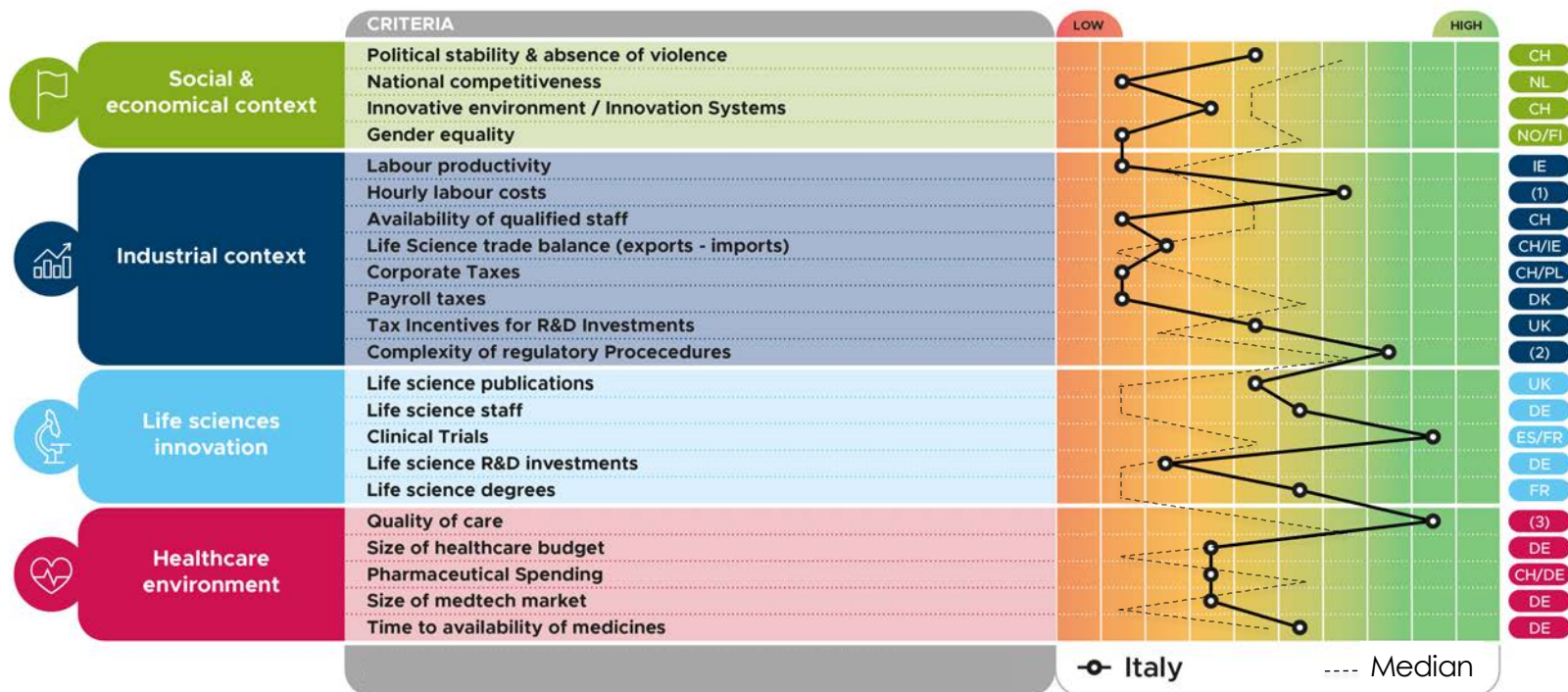
- Ireland has a flat 12.5% rate of corporation tax on trading income.
- Research & Development Tax Credit of 25% is available on qualifying R&D expenditure, the excess of which may be available as a cash refund.

RECENT POLICY MEASURES

- "Impact 2030", Ireland's Research & Innovation Strategy was launched in May 2022 and promises the establishment of a new research and innovation agency and increased collaboration between industry and academia. It identifies advanced manufacturing and healthcare transformation as emerging sectoral 'mega-trends' and targets sectoral opportunities in areas like consumer led wellness, digital health, and personalised medicine and diagnostics.
- The National Institute for Bioprocess Research and Training (NIBRT), created from a €60 million investment by the IDA organises staff training for the biotech industry. Senior executives from the sector sit on the NIBRT board in the knowledge that the availability of suitably trained staff is a key determinant of success in Biopharmaceutical manufacturing.

ITALY

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

ITALY

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- The 8th largest economy in the world, the fourth largest in Europe with a GDP of 2 trillion dollars. On a world scale, the Italian pharmaceuticals market ranks seventh for total sales.
- In 2019, the value of production increased to €34 billion, thanks to the growth of exports (+26%), which accounted for 85% of it in the last three years. Italy has been a leading player in the EU for years in terms of production value. The growth has been generated by the exports, for which Italy has recorded, in the last ten years, the highest increase among the big European countries (+1.68% compared to +8.6% for the EU average).
- Between 2014 and 2019, the pharmaceutical industry increased employment more than all sectors, +10% compared to +5% for the average. There are 66,500 pharmaceutical employees in 2019 (252,000 in downstream and upstream sectors), 90% graduate (43% women - 29% in other sectors - reaching 52% in R&D activities). In 2019, pharmaceutical companies invested €1.6 billion in research and development, 7% of total investments in Italy. Pharmaceutical research is focused on biotechnologies with more than 300 biotech products in development and a European leadership in advanced therapy medicinal products (2 out of 10 advanced therapies authorized in Europe are Italian).
- In 2019, healthcare spending in Italy totaled €117,3 billion, an increase of €1.3 billion compared to 2018. In 2022, the Italian Budget Law has approved a 1.6% yearly increase of the Healthcare Fund. Italy's Recovery Plan aims at investing approximately 20 Bn € of EU resources to strengthen and reform Healthcare.
- Starting from 2017, the Government has allocated €1 billion annually to fund innovative drugs.
- The medical device sector in Italy consists of more than 4,400 companies, of which more than 2,500 manufacturers and more than 290 start-ups and innovative SMEs, employing a workforce of 118,837 (44% women). The medical device industry investments in R&D are €1.4 billion and €140 billion in clinical trials
- There are 2,527 medtech manufacturing sites and Mirandola (Emilia Romagna) represents the most important medical devices district in Italia and in Europe. Ranking third in the world after Minneapolis and Los Angeles, it's called the Italian Silicon Valley of Medical Devices. The medical device sector has a €17,3 billion turnover and exports represent €5,7 billion.

TAX MEASURES

Incentives to investors:

- Italy's Industria 4.0 plan.
- Tax credit for Research and Development⁴ Companies that increase their R&D expenditure in the 2017-2020 period benefit from a 50% tax credit on their additional expenses (incremental credit), with an annual ceiling of €20M. The measure applies to basic research, industrial research and experimental development – including personnel expenditure, research agreements with other entities – and IP costs. Moreover, the tax credit can be used to offset a wide range of taxes and contributions, even if companies report losses.

Patent Box

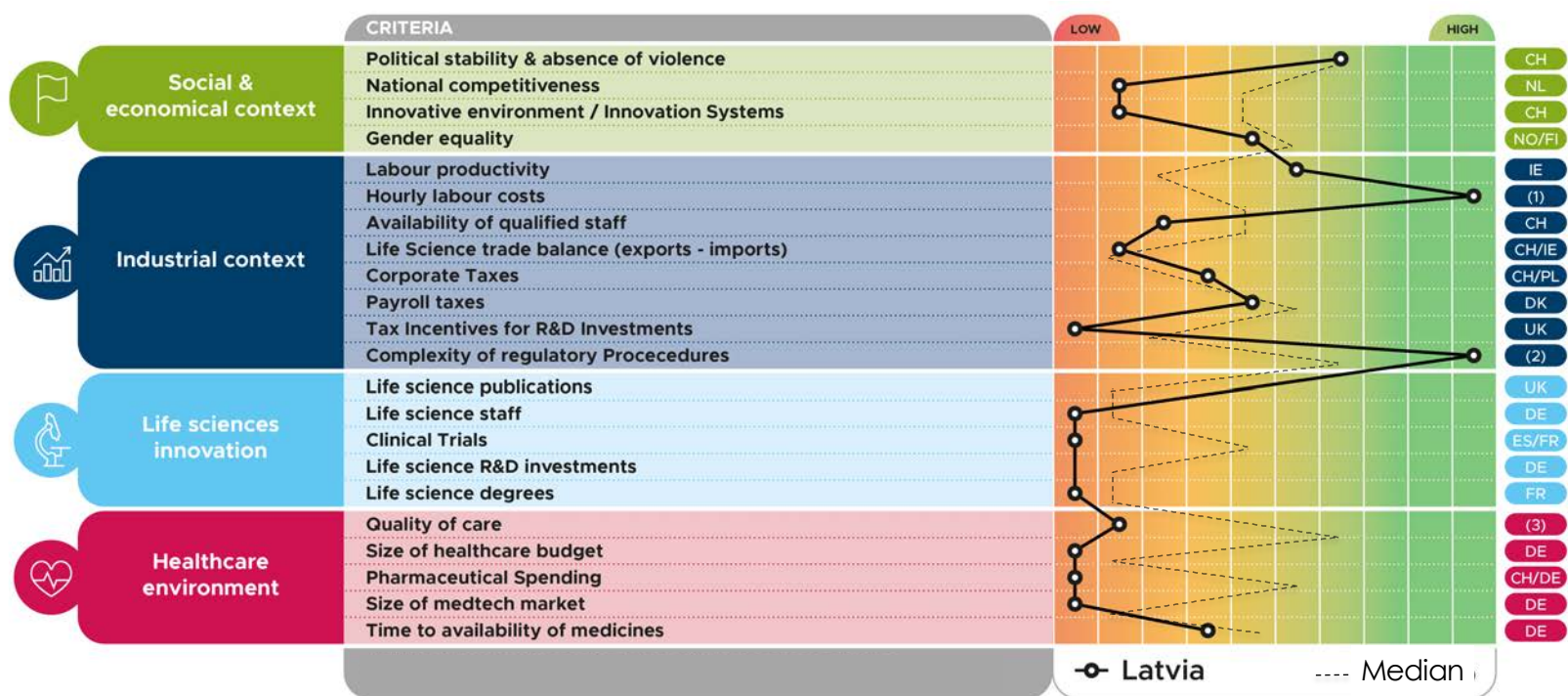
- It is a special fiscal regime consisting of a 50% reduction in corporate tax on income deriving from direct and indirect use of intangible assets (i.e. industrial patent rights, industrial design and models, know-how and copyrighted software).

RECENT POLICY MEASURES

- National Research Programme 2021-2027 implemented in December 2020 which contains a cluster focused on Health (health technologies, biotechnology, pharmaceutical and pharmacological technologies).
- Recent implementation of a working table between the Italian Government (Minister of Economic Development) and Farmindustria to create a public-private vaccine production centre with government's funds and the participation of major pharmaceutical companies.
- Starting from 2017: Implementation of 2 Innovative Drug Funds (Oncological and non-oncological) with a yearly financial allocation of €500 million each.
- 2019: new process in place to update the list of essential services provided by NHS (LEA) based on a comprehensive assessment of the value of the technology (HTA) and on the outcome measurement, new HTA program on Medical Device to foster adoption and uptake of innovation, new governance of medical devices to assess the demand and supply through the early recognition of innovation and the evaluation of the additional clinical care value of innovative medical device, by the application of Health Technology Assessment (HTA), a tool that favors development and innovation, safeguarding the sustainability of universal health systems and qualifying care processes.
- 2019: Memorandum of understanding between Confindustria Dispositivi Medici and Milano Innovation district for the creation of a LifeScience Hub in Milan.

LATVIA

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

LATVIA

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

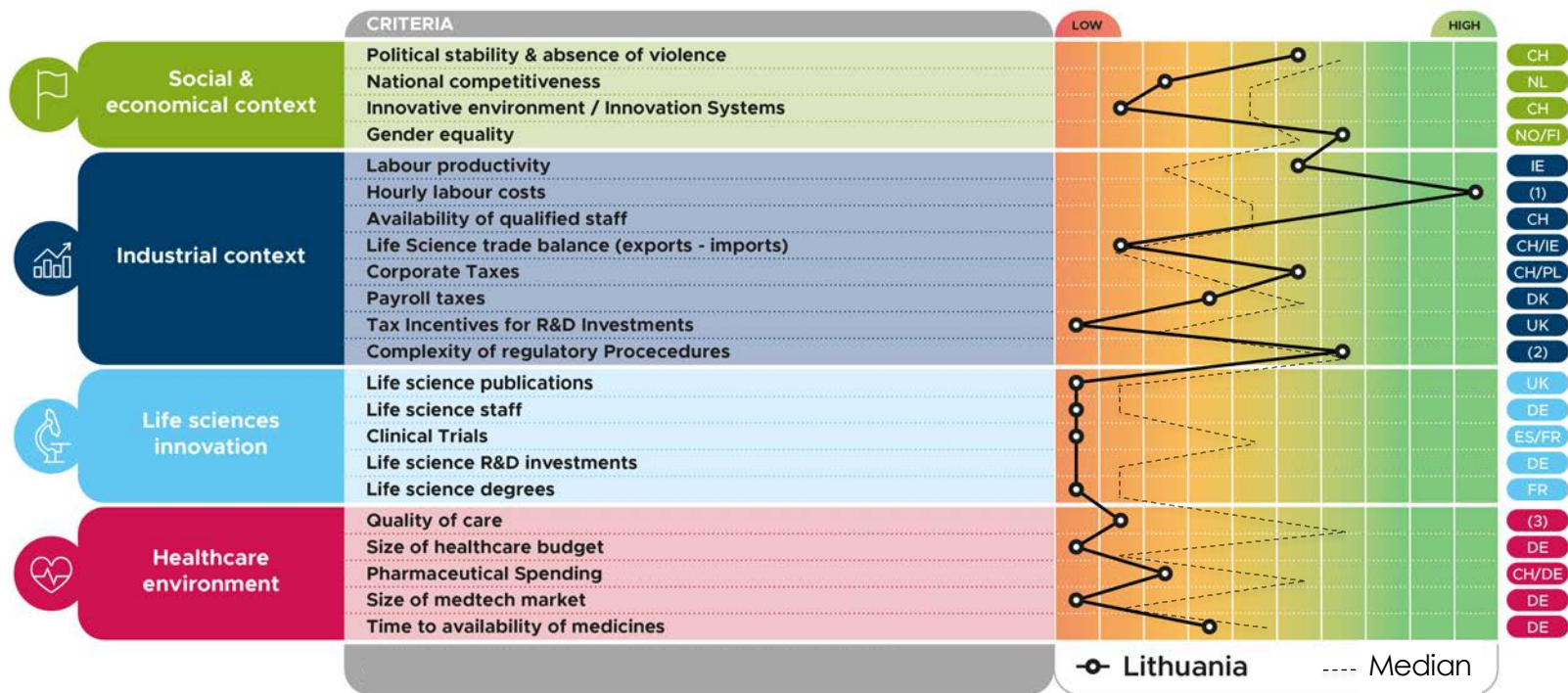
- Among the three Baltic States, Latvia leads the life science sector with the highest value-added. It reached 52.4% in pharmaceutical manufacturing and 20.2% in chemical production in 2020.
- This sector is nothing without innovation and the introduction of new products and services. Due to the historical roots, many years of know-how, legacy, and production, Latvia also provides an established manufacturing infrastructure.
- Pharmaceuticals are leading the export, making up 33% of total industry exports. In 2020, the total turnover of the pharmaceutical sector reached €256 million.
- Most parts of the goods are shipped abroad. The country exports 75.7% of the manufactured chemicals and pharmaceutical products. Pharmaceuticals compile 1.2% of total national exports (2021).
- The sector is currently ranked 3rd by turnover and export amount among manufacturing industries in Latvia (2021).
- The number of employees in chemical and pharmaceutical companies exceeds 5390. Moreover, Latvia is 1st in the EU in the percentage of female researchers (OECD, 2021).

TAX MEASURES

RECENT POLICY MEASURES

LITHUANIA

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

LITHUANIA

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- With an annual growth rate of 22.1%, Lithuania's Life Sciences sector is regarded as one of the most developed in Central and Eastern Europe. With historical competences in biotech and medical devices, the country is ranked No. 1 in the region for university- business collaboration in R&D. In addition to that, Lithuania's scientific talent market is well balanced, with over 57% of scientists and engineers being women.
- The country has more than 600 Life Sciences companies. More than 95% of Life Sciences products manufactured in Lithuania are exported. Medical and dental instruments account for 38% of export while basic organic chemicals make up 31%. The main export markets are the USA (29%) and Germany (14%).
- 23% of students enroll in life sciences programs (Ministry of Education, 2022).

TAX MEASURES

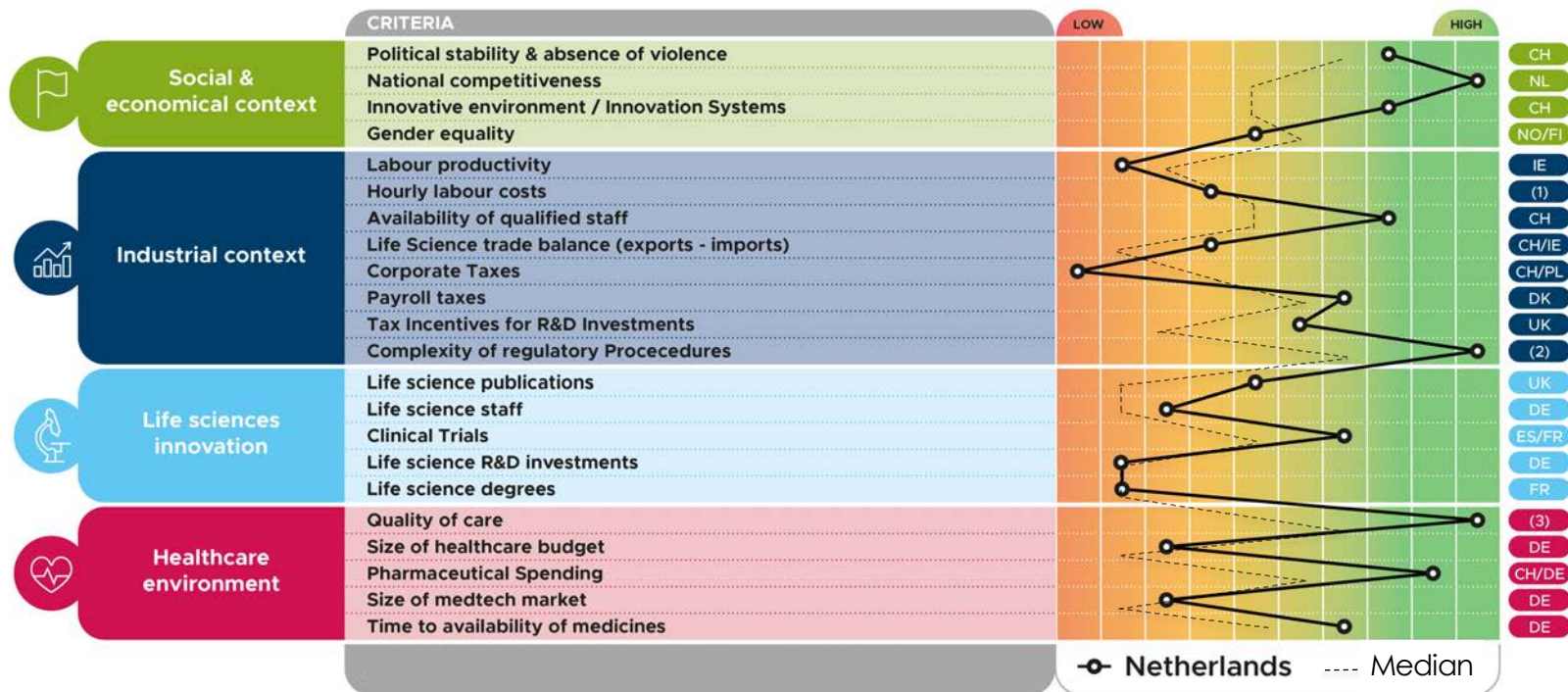
- In the 6th place for International Tax Competitiveness Index Rankings (out of 36 OECD countries) (International Tax Competitiveness Index Rankings, 2020).
- Lithuania has seven Free Economic Zones in various locations across the country.
- These provide conditions to develop businesses by offering ready-to- build industrial sites with physical and/or legal infrastructure, support services and tax incentives. Businesses that choose to locate themselves in these zones enjoy 0% tax on corporate profits during their first 10 years of operation, and only 7.5% tax over the following six years. In addition, these businesses are exempt from tax on dividends and real estate tax.
- A reduced corporate tax rate of 5% applies to profits from copyrighted software created by Lithuanian subsidiaries, as well as inventions that meet the criteria for patentability.
- To promote research and development, Lithuania's government offers companies the opportunity to reduce their expenses incurred on R&D. R&D expenses are fully tax-deductible three times during the tax period in which they are incurred.

RECENT POLICY MEASURES

- The Lithuanian parliament has adopted a new package of laws, which came into force on 1 January 2021. The package offers significant new tax incentives for large- scale projects, including 0% corporate tax for 20 years, as well as streamlining key processes involved in land acquisition, planning, and migration.

THE NETHERLANDS

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

THE NETHERLANDS

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Home of the European Medicines Agency since March 2019.
- Life Sciences & Health (LSH) is one of the 10 "top sectors" Healthcare is one of the 5 "central missions" in the government's innovation policy strategy.
- With many life science companies, world-class universities and an attractive business climate, the Netherlands is a good location for biopharmaceutical innovation in Europe. Biotechgate (leading global biotech database) currently lists 503 biotech companies, 132 medtech companies, 60 digital health companies and 42 pharma companies in the Netherlands. There are 186 products in preclinical development phase and 151 products in the clinical development phase.
- In total, life science companies raised \$914 million (~€853 million) in the Netherlands. Biotech companies accounted for the largest share of that with \$767 million (~€716 million).
- Biotech Booster program (public private cooperation, funded by the Dutch government), to increase the impact of scientific knowledge by creating more robust new propositions that develop knowledge into products and services.
- Fertile grounds for VBHC collaborations: despite the Ministry of Health particularly focusing on costs only, many stakeholders in Dutch healthcare are looking for ways to focus on outcomes and to move to outcomes-based commissioning.
- In general, the Netherlands rank #10 in the 2022 WIPO IP Facts & Figures on resident patent applications relative to GDP.

TAX MEASURES

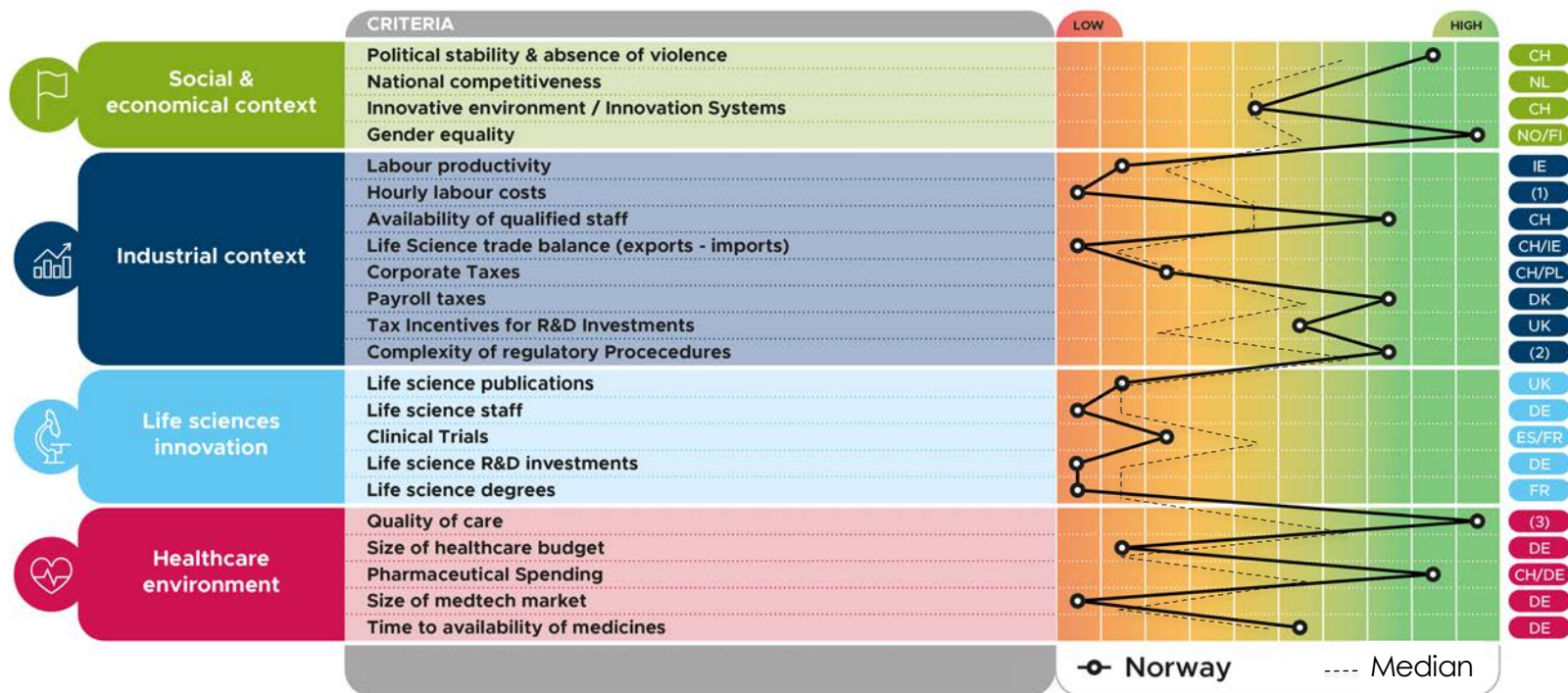
- The 2023 Tax Plan package of the Dutch government includes many of measures with a total amount over €17 billion. The government aims to make it pay more to work, by striking a better balance between tax on labour and tax on wealth. For example, the employment tax credit will be increased and the rate of income tax payable in the first tax band will be decreased. Companies will pay more corporation tax on their profits and the self-employed tax deduction will be phased out more quickly. Part of the amount generated by these increases in the tax burden will be ploughed back into structural measures that will benefit SMEs. For instance, €600 million will be set aside on a structural basis to reduce employers' costs and make it more attractive for them to invest.
- Tax on income from IP at 9% is among the lowest in Europe.
- Companies can receive a 32% to 16% tax credit on R&D investments. This is effectuated via a reduction of wage tax due.

RECENT POLICY MEASURES

- The Dutch government wants to capitalize on the opportunities offered by life sciences & health. In June 2023 a trade mission to Boston (USA) – organized by the Dutch government in cooperation with the pharmaceutical industry – took place, led by the Dutch Ministers of Health and Economic Affairs.
- The Dutch government considers biotechnology a key high-tech area in its contribution to solving problems in the fields of health, food safety, nature conservation, biodiversity and the environment.
- The vision on future-proof biotech policy of Dutch biotech industry association HollandBIO is gaining support. That optimal policy is comprehensive, mission- and product-driven, and has clear, rapid procedures for its implementation. Since the beginning of 2021, companies and scientific institutions can start more quickly with clinical research into medicines and vaccines with genetically modified organisms. The duration of the mandatory licensing procedure for much of this type of research has been shortened, thanks to the efforts of HollandBIO and its members.

NORWAY

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

NORWAY

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Norway was recently ranked the world's most resilient country. It also ranks among the top ten countries in the world on the world happiness ranking, the world talent ranking, the world competitiveness ranking, the environmental performance index and the ease of doing business ranking.
- Norway's industry is largely defined by its natural resources: it has a strong presence in energy, both fossil fuel and green energy.
- The country has set up specific integrated clusters for cancer and dementia: the Oslo Cancer Cluster and the Center of Biology of Memory.

TAX MEASURES

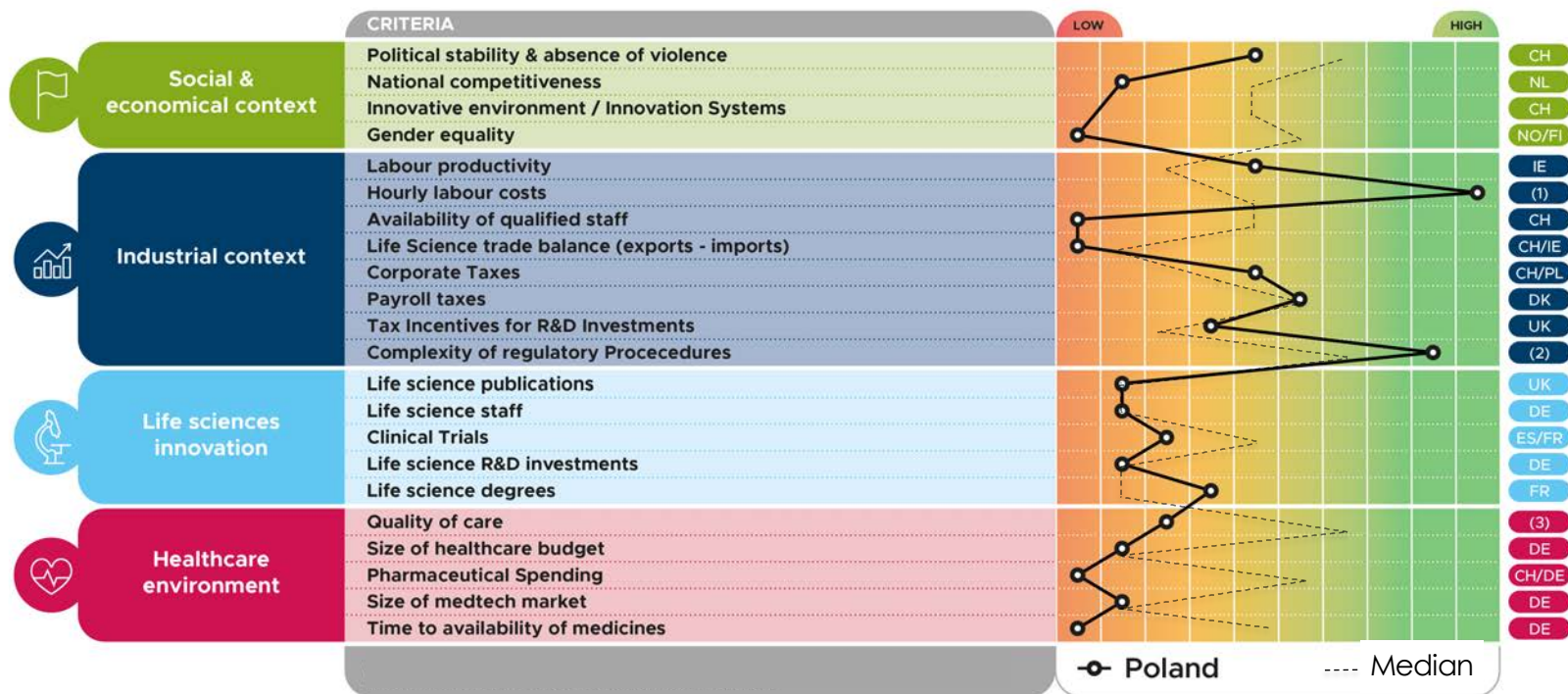
- Companies in Norway are subject to a corporate income tax of 22% on their net income.
- Norwegian tax rules do not offer many incentives, but an R&D incentive scheme called "SkatteFUNN" offers tax credit for R&D costs up to certain thresholds. The scheme is funded and administered by the research council of Norway.

RECENT POLICY MEASURES

- In 2019, the Government released a Whitepaper for Health industry in April 2019. The main objective of the white paper is to contribute to improved competitiveness in the Norwegian health industry, and at the same time contribute to a more sustainable health and care service, through more efficient prevention, treatment and care.
- In 2021 the National Action plan for clinical trials was released which introduces a vision that clinical research should be an integral part of all patient treatment. The aim is to double the number of clinical trials by 2025, and the report describes the need for private public partnership and need for attracting foreign investment.
- Following these initiatives, the Minister of Industry and the Minister of Health and Care have announced in June this year that the health industry will be a priority sector for a national export investment and in August, a Roadmap for Health, which presents 40 measures to contribute to profitable business development and sustainable health and care services.

POLAND

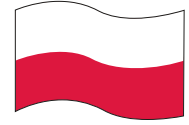
Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

POLAND

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- In 2019, Poland was ranked highest in the CEE region and third in Europe in terms of greenfield investment value - \$21.8 billion.

TAX MEASURES

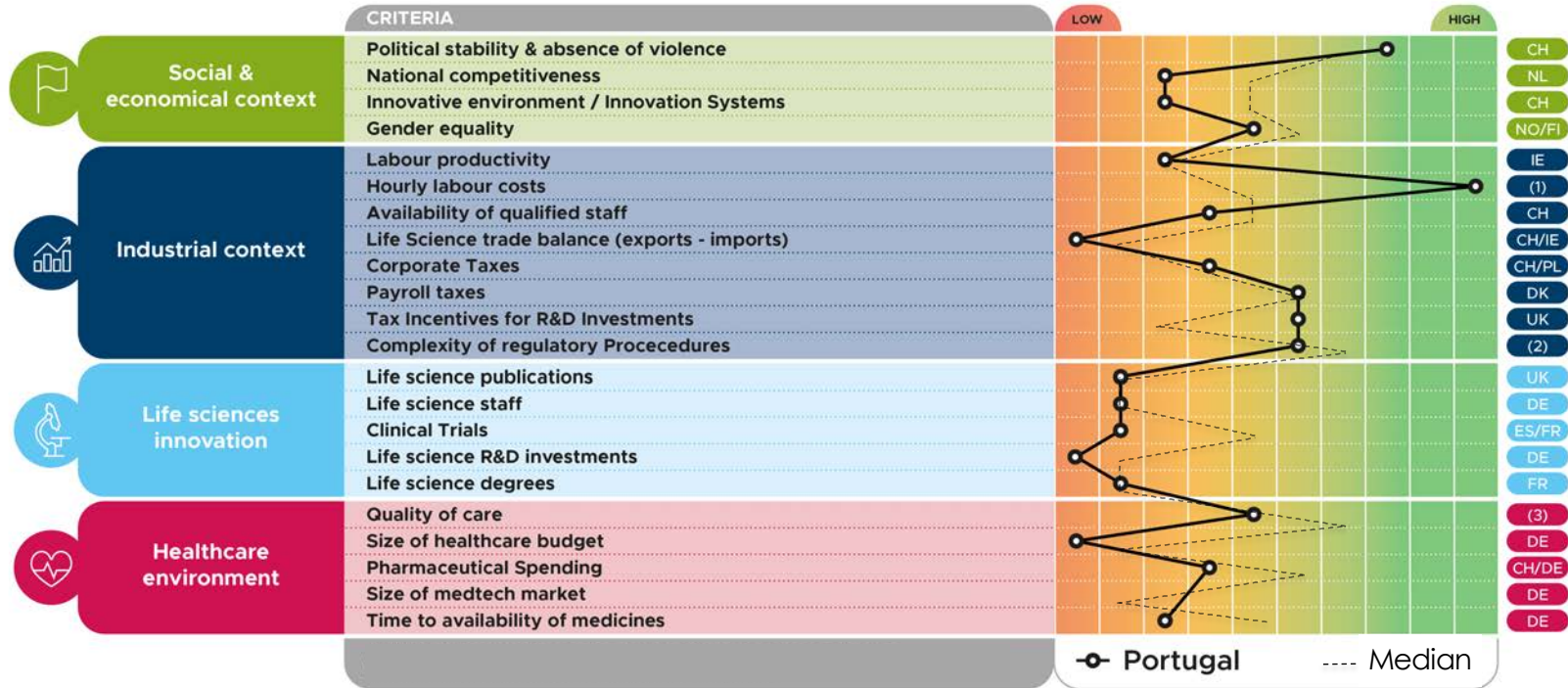
- Since 1 January 2019 Poland offers support instruments for investors conducting R&D activity: R&D tax relief, Innovation Box, governmental R&D grants as well as several programmes co-financed with EU funds.
- Poland's Innovation Box complements the existing tax preference system for innovative activities and introduces a preferential 5% tax rate of qualified income from qualifying intellectual property rights (instead of 19% tax rate); Polish intellectual property rights catalogue is one of the broadest worldwide and the reduced 5% tax rate is one of the lowest of all developed countries.

RECENT POLICY MEASURES

- The Act of the 10 May 2018 amended the establishment of the Special Economic Zones (SEZ), in order to adjust the provisions to the current market situation and entrepreneur's needs. The major difference introduced is that the tax exemption is now available across the entire territory of Poland, for companies carrying out new investments, on publicly as well as privately owned land.
- The currently binding Special Economic Zone (SEZ) permits shall remain in force until 2026.

PORTUGAL

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

PORTUGAL

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Portugal ranks on Top within the EU countries in number of PhDs per 1,000 inhabitants.
- 40% of students in tertiary education are enrolled in engineering, sciences and health.
- Portugal is cost competitive according to international recognized sources.
- Portugal is expected to grow at a faster pace than the Euro Area with a trend forecasted to be sustained until 2024.
- 2021 was a record year for Foreign Direct Investment (FDI) projects in Portugal, with a growth of almost 30% since 2020 (75% from Europe and 25% Rest of the World).
- Portugal's traditional factors of attractiveness are being sustained, but taxation and market access worries investors.
- Portugal wants to stand out for its quality of life, its telecommunications infrastructure, its corporate taxation, its domestic market and access to other regions, including good economic relations with Portuguese speaking countries (250 million people) and European Markets (500 million people)

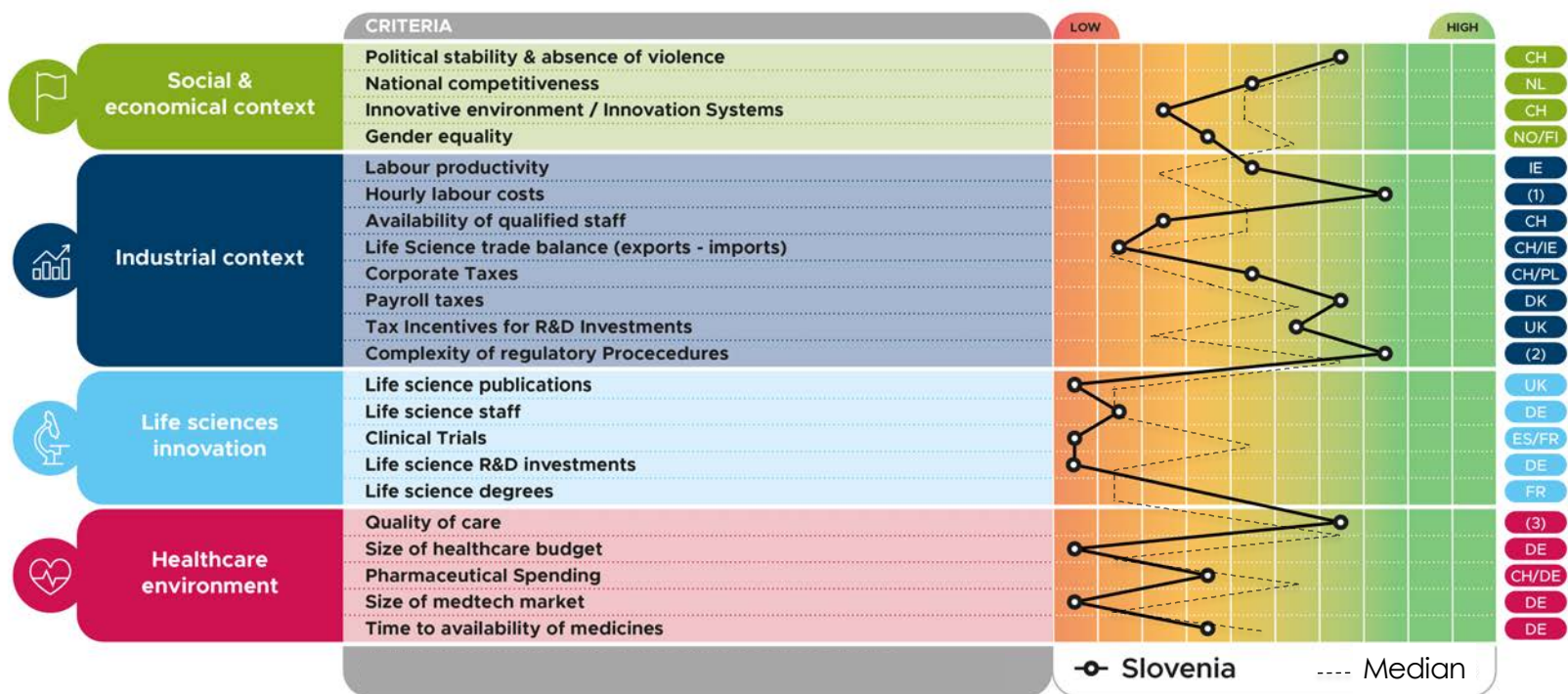
TAX MEASURES

- Research and development (R&D). Portuguese tax resident companies carrying out commercial, industrial, or agricultural activities, and non-resident companies with a "permanent establishment" in the Portuguese territory, are allowed to the value of eligible expenses incurred with R&D, in a double percentage as follows: a base rate of 32.5% of the R&D expenses incurred, and an incremental rate of 50% of the difference between the R&D expenses made in the tax year and the average amount of the R&D expenses made in the previous two years, up to the limit of €1.5 million.
- Patent box regime. The use or exploitation of copyright and industrial property rights and computer programs. The regime foresees an 85% tax exemption on income.
- Incentive to the Capitalisation of Companies An amount corresponding to the application of the rate of 4.5% (increased by 0.5% in the case of micro, small, or medium-sized companies or Small Mid Cap companies) of the net increase in eligible equity can be deducted against the taxable profit.

RECENT POLICY MEASURES

SLOVENIA

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

SLOVENIA

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

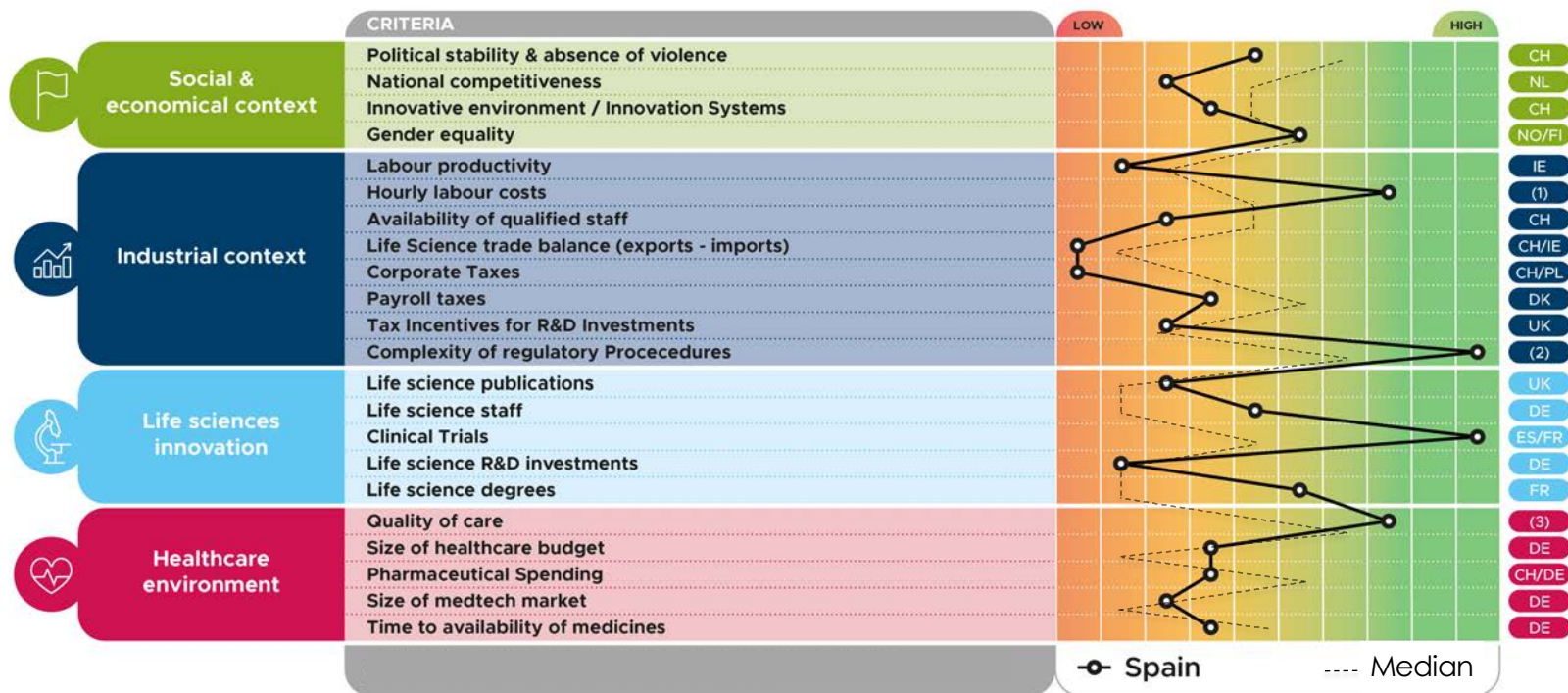
- Slovenian pharmaceutical industry remains to be one of the country's leading exporters. The main two pharmaceutical companies, Krka (Rank 5 on this year's edition of TOP300) and Lek (Rank 7), are among the largest and most profitable Slovenian companies.
- In relative terms (production per capita), Slovenia is one of the five largest drug manufacturing nations in Europe.
- Slovenian medical equipment producers were pioneers in the use of laser technologies and continue to keep the leading position in the field. Companies in Slovenia also produce high-end equipment for physiotherapy, rehabilitation, and aesthetic medicine and world's best laser medical devices.

TAX MEASURES

RECENT POLICY MEASURES

SPAIN

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

SPAIN

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- 5th largest pharmaceutical market in the European Union.
- Good hospital infrastructure and large population make the country attractive for clinical trials. In 2022 Spain registered more than 900 clinical trials.
- Wages are below EU average yet the country is attractive for young science graduates
- A pre-clinical pipeline of more than 200 projects and the R&D focus of the majority of companies (51%) shows potential and focus for innovative therapeutic companies.
- Spain has a strong local, mid-sized Pharma industry.

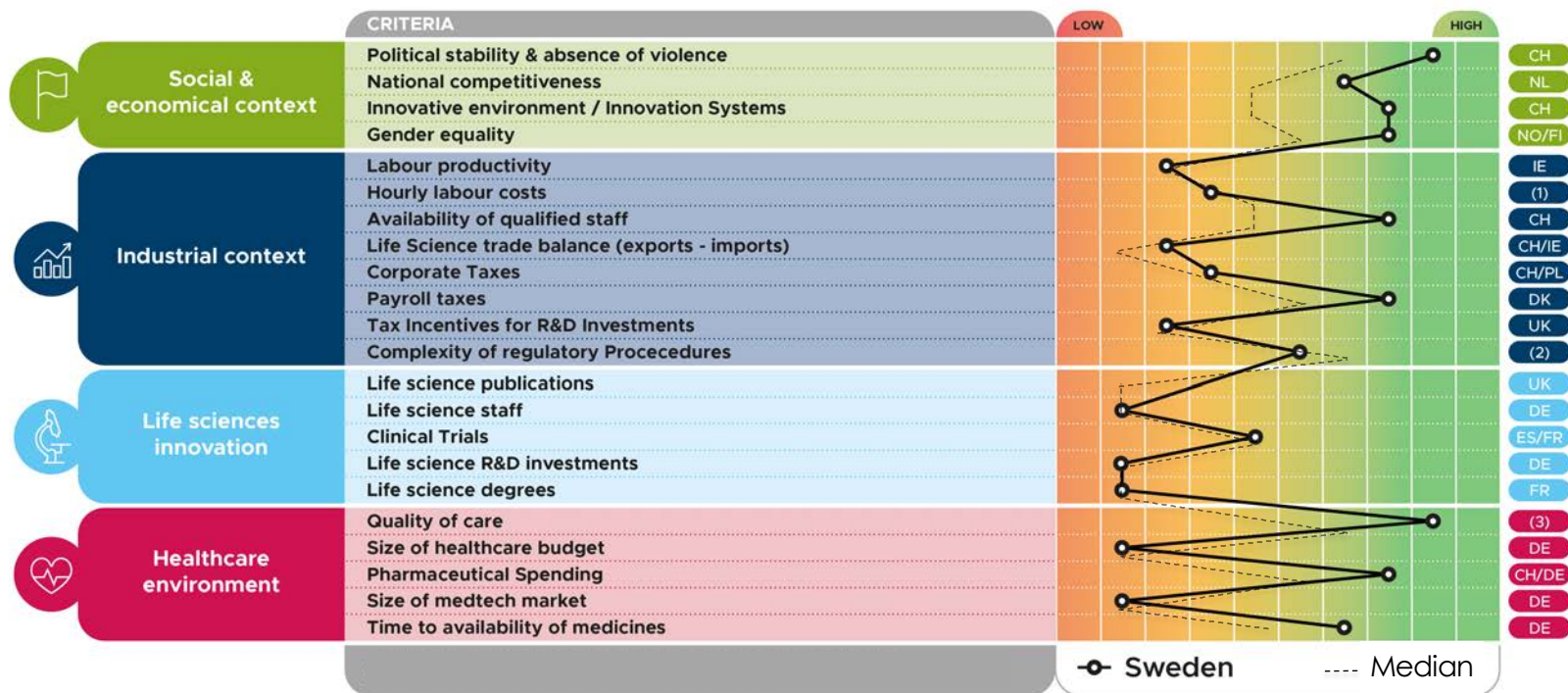
TAX MEASURES

- Corporate tax deductions of 25% as a general rule, and up to 42%, for R&D investments, and up to 12% for innovation.
- Corporate tax deductions of 8% of the fixed asset investments assigned exclusively to R&D.
- Corporate tax deductions of 17% of the personnel expenses for qualified researchers assigned exclusively to R&D activities.
- Along with incentives and tax deduction, the Spanish government offers funding and low interest loans during the startup and growth phases.

RECENT POLICY MEASURES

SWEDEN

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

SWEDEN

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- There are more than 250 manufacturing sites within the pharma and chemicals sector, of which almost 50% have foreign ultimate owners. This makes it the sector with the highest share of foreign owners.
- Sweden traditionally has adopted a liberal attitude toward inward foreign investment. Foreign investors generally are treated the same as Swedish investors. Subject to certain reporting requirements, foreign companies are free to make direct investments in Sweden and in Swedish property without prior approval from the central bank, and no approval is necessary from the Competition Authority to establish or acquire a subsidiary company in Sweden (Deloitte, 2017).
- Home of Medicon Valley, one of Europe's leading life science clusters, based in the South of Sweden and Denmark.
- Karolinska Institute: As one of the world's foremost medical universities, Karolinska Institute accounts for the single largest share of all academic medical research conducted in Sweden. It also offers the country's broadest range of education in medicine and health sciences.
- In 2022, Sweden exported medicines and pharmaceutical products (excluding basic pharmaceutical products) for SEK 132 billion. This corresponded to 6.6 % of exports from all product groups. In 2022, pharmaceuticals were the third largest export item from Sweden, second only to motor vehicles and refined petroleum products.

TAX MEASURES

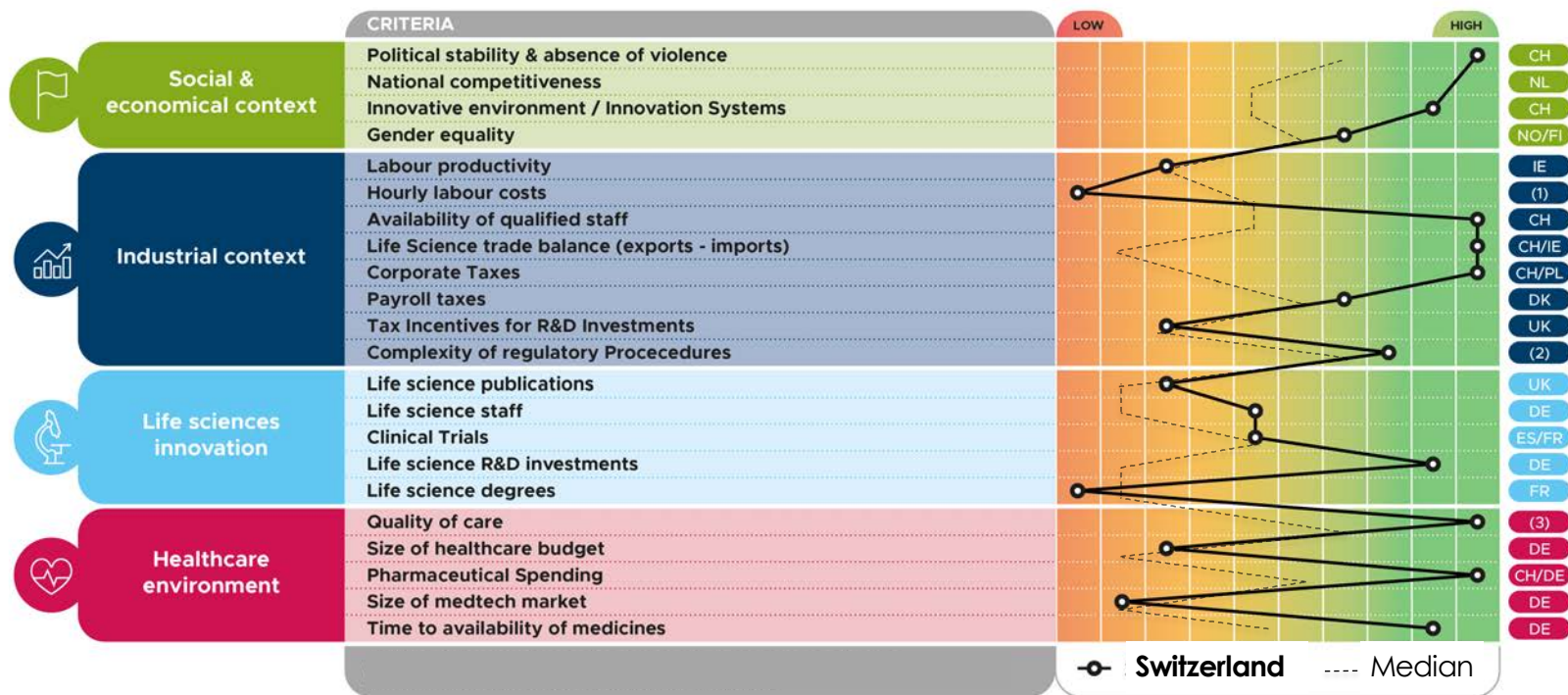
- The corporate income tax in Sweden is at 22%. The effective rate can be lower, as companies have the option to make deductible annual appropriations to a tax allocation reserve of up to 25% of their profits.
- Sweden offers a limited range of financial incentives to help companies set up a business and expand in Sweden. This support is primarily regional in nature and comprises regional investment grants, support for establishment costs, regional transportation contributions, and special tax reliefs related to key staff and R&D personnel.

RECENT POLICY MEASURES

- The government has earmarked funds in next year's budget to extend the tax relief for foreign experts working in Sweden. The expansion of the so-called expert tax is necessary to secure the world-leading cutting-edge research and innovation required for the growth of the Life Science industry.

SWITZERLAND

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

SWITZERLAND

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Chemistry, pharmaceuticals and life science represent 48% of Swiss exports in 2022.
- With over 140,000 employees, the chemical-pharmaceutical and medtech industries are a major employer in Switzerland.
- In twenty years from 2002 to 2022 the Swiss life science sector's contribution to export expanded by 255% compared to all sectors together which grew by 61%.
- Strong entrepreneurial environment in life sciences fueled by the two pharmaceutical giants Novartis and Roche, Switzerland has a keen focus on innovative therapeutic biotech companies but also a strong medtech sector.
- For over a decade Switzerland leads the WIPO's Global Innovation Index.
- Switzerland has a large and very well educated talent pool in the country also due to its top universities.
- Switzerland is a global research and development location. The innovative pharmaceutical companies in Switzerland invest 190% of their sales on the Swiss market into R&D in Switzerland.
- Switzerland remains on top in terms of the number of patent applications per million inhabitants in 2022, ahead of Sweden, Denmark, the Netherlands and Finland.
- Switzerland is one of Europe's leading medtech hubs with a continued growth of employee numbers.
- Strong intellectual property (IP) system in Switzerland.
- Health takes a high priority in Switzerland, total health spending in 2020 was the third highest in the world with 7,179 dollars/capita.

TAX MEASURES

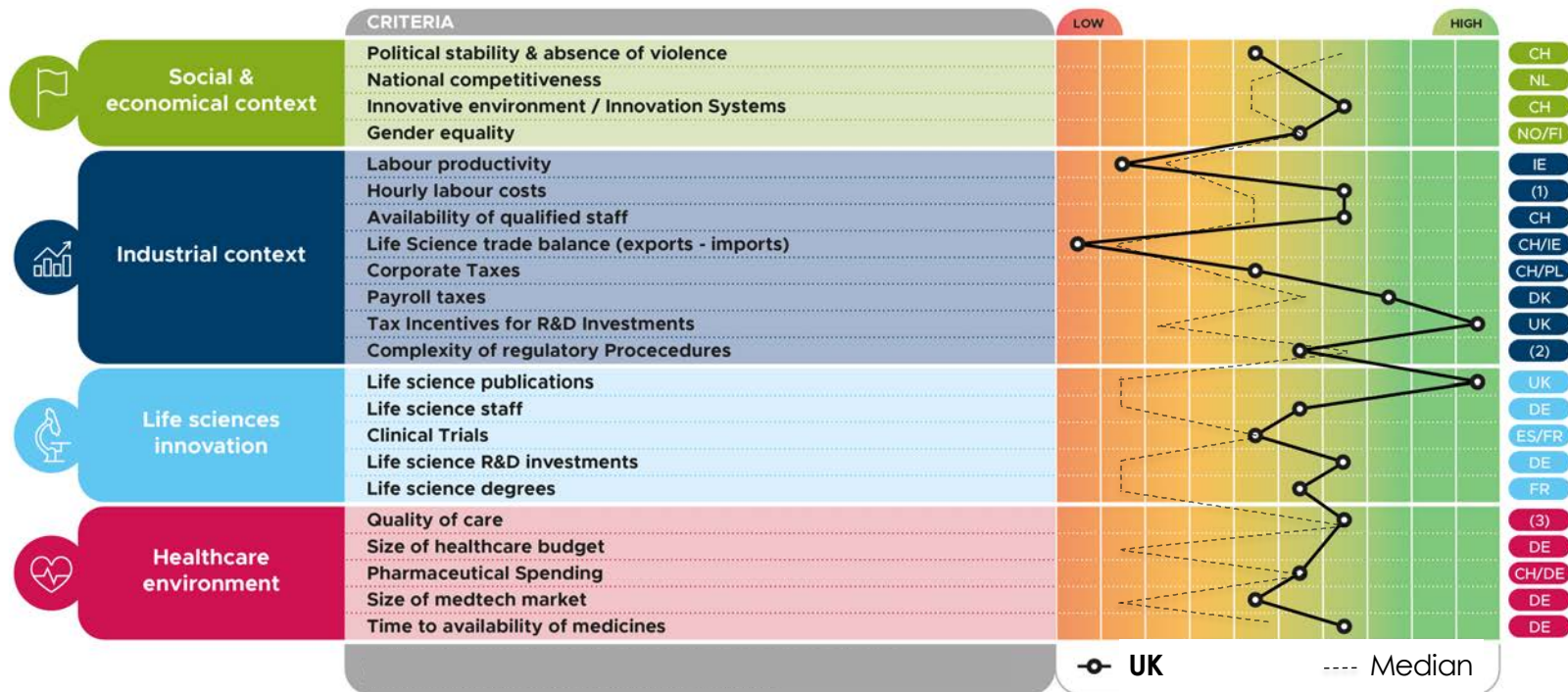
- Attractive income taxes in various Swiss cantons. In Zug, for example, they amount to 11.9%. However, please see bullet point 3 below which will likely impact the income tax rate from 2024 onwards.
- The Patent Box and R&D super deduction are in force as of 1 January 2020 and have been introduced in the context of the Swiss Tax Reform ("TRAF"). Patent Box provides for a tax reduction up to 90% on income deriving from Patents (IP). The R&D super deduction provides for an extraordinary extension of R&D expenses to up to 150%. These measures fully comply with the OECD guidelines. However, please see bullet point 3 below which will likely limit the benefit of these incentives from 2024 onwards.
- As part of the OECD minimum taxation project Switzerland (and other countries) will introduce a minimum tax rate of 15% as of 2024. The minimum taxation follows the jurisdictional blending approach, meaning that the 15% income tax rate will be calculated based on the total income of all legal entities within the same jurisdiction, here Switzerland.
- Thus, TRAF measures do not reduce the income tax rate below 15%, and represent a well-balanced and internationally competitive environment.
- Moreover, high planning and legal certainty including a well established ruling process and business-friendly approach on the part of the authorities.

RECENT POLICY MEASURES

- In June 2023, Swiss voters have massively backed the country's implementation of a global minimum tax rate for multinational companies. This strengthens the stable framework conditions and the position of Switzerland as an attractive business and investment location.
- Regulatory Reliance: Switzerland also recognises non-European regulatory systems with comparably strict requirements – in particular medical devices approved for use in the USA by the FDA. This shows a clear will of the parliament to strengthen Switzerland and position it as competitive business hub.
- In 2022, Switzerland and the United States signed a Mutual Recognition Agreement on Good Manufacturing Practice inspection for pharmaceuticals. The agreement is entering into force in 2023 and will mean a reduction of non-tariff trade barriers.
- Industrial tariffs will be abolished in Switzerland from 1 January 2024. This decision was made by the Federal Council at its meeting on 2 February 2022, after the necessary amendment to the Customs Tariff Act was passed by Parliament on 1 October 2021.

THE UNITED KINGDOM

Overview of the selected criteria



(1) EE/CZ/PT/GR/LT/PL/LV - (2) LV/CZ/NL/ES - (3) FI/NL/CH/NO

THE UNITED KINGDOM

Overview of structural advantages per country, with addition of specific tax measure and recent policy measures to encourage investments in life science and healthcare



STRUCTURAL

- Post EU exit, UK flexibility to reform regulations on clinical trials and medical devices.
- Department of Science, Innovation & Technology established in 2023 to position the UK at the forefront of scientific and technological advancements.
- Dedicated Government bodies for research- National Institute for Health Research (NIHR) - UK Research and Innovation (UKRI), Innovate UK and HDRUK, however, UK's share of global pharmaceutical R&D fell from 7.7% in 2012 to 4.2% in 2020 and Phase I clinical trials fell by 13% from 2015 to 2019, falling a further 7% in 2020.
- MHRA new recognition routes to facilitate safe access to new medicines with seven international partners - Australia, Canada, the European Union, Japan, Switzerland, Singapore and the United States.
- Clinical Practice Research Datalink (CPRD) provides researchers with access to patient data for clinical trials recruitment and observational studies. NHS Digital further supports patient recruitment into trials.
- Ranked 9th globally for estimated life sciences Foreign Direct Investment capital expenditure, down from 2nd in 2021.
- Fourth in the Global Innovation Index, with excellent academic research in the London/Oxford/Cambridge cluster.
- 2nd highest number of life science companies in Europe
- Highest number of innovative companies in Biotech therapeutics.
- World leading Genomics capability with UK Biobank, Genomics England Ltd.
- Our Future Health, building the UK's largest health research programme.
- Strongest pipeline in Europe for products in development, with emphasis on pre-clinical.
- Manufacturing production volumes fell by 29 % since 2009.

TAX MEASURES

- The Voluntary Pricing Agreement (VPAS) is a rebate mechanism that has increased to an unsustainable rate, from 5.1% (2021) to 26.5% (2023). Negotiations on the 2024 VPAS scheme are underway, but challenging.
- NHS zero inflation policy impact on pricing of medical technologies.
- Corporation tax increased from 19% to 25% in April 2023.
- Full capital expensing for next three years – every pound invested in capital can be deducted in full and immediately from taxable profits.
- Patent Box can reduce corporation tax on patents profits to 10% R&D tax credits.
- R&D Expenditure Credit (20% rate) for large companies and R&D tax credit (186% deduction) for SMEs. Enhanced R&D tax credit of 27% available for loss-making "R&D intensive" SMEs that spend 40% of total expenditure on qualifying R&D.
- 12 investment zones benefitting from tax relief and grant funding to drive growth in sectors such as life sciences.

RECENT POLICY MEASURES

- 2021 Life Sciences Vision set the ambition for the UK to become a life sciences 'superpower' with focused Missions in cancer, obesity, mental health, and neurodegeneration.
- May 2023 'Life Science for Growth' package announced: £650m investment to boost life sciences, including £121m to improve commercial clinical trials, speed MHRA and up to £250m to enable investment in science and technology firms.
- UK R&D Roadmap target to raise investment on R&D to 2.4% of GDP by 2027.
- UK Research and Innovation budget to increase by 14% by 2025. Innovate UK programmes allocated £2.6bn to support innovative companies.
- Catapult Programme helps UK industry and academics accelerate key innovation: access laboratory facilities, knowledge, data, technologies, and networks for their programmes. 2023 - £1.6bn investment into the Catapults.
- Healthcare UK created to help healthcare companies with overseas activities, investments, and exports.
- Academic researchers evaluated by their collaboration with industry and impact on social and economic level.
- Negotiations on the 2024 VPAS successor scheme are underway.



Sources & References

1 **Political stability**
World Bank Index

2021 Data (2022 report)

Source: the world bank – Worldwide Governance Indicators
<http://info.worldbank.org/governance/wgi/#reports>

Construction of the political stability index:

The index is a composite measure as it is based on several other indexes from multiple sources including the Economist Intelligence Unit, the World Economic Forum, and the Political Risk Services, among others. The underlying indexes reflect the likelihood of a disorderly transfer of government power, armed conflict, violent demonstrations, social unrest, international tensions, terrorism, as well as ethnic, religious or regional conflicts.

Countries score between -2.5 (weak) & + 2.5 (Strong).

2 **National Competitiveness**
The European Commission

National competitiveness. EU Regional Competitiveness Index (RCI) 2.0.

https://ec.europa.eu/regional_policy/assets/regional-competitiveness/index.html#/

Since 2010, the EU Regional Competitiveness Index (RCI) has been measuring the major factors of competitiveness for all the NUTS-2 level regions across the European Union. The Index measures, with a rich set of indicators, the ability of a region to offer an attractive environment for firms and residents to live and work. The 2022 edition of the index builds on an updated methodology and therefore it is referred to as RCI 2.0. The publication of RCI 2.0 is accompanied by a set on interactive tools. **Revised, May 2023.**

3 **Innovative environment / Innovation Systems**
The Global Economy Innovation Index 2022

Innovative environment / Innovation Systems . The Global Economy Innovation Index 2022

https://www.theglobaleconomy.com/rankings/gii_index/

Innovations index (0-100), 2022 - Country rankings:

The average for 2022 based on 128 countries was 32.09 points. The highest value was in Switzerland: 64.6 points and the lowest value was in Guinea: 11.6 points. The indicator is available from 2011 to 2022. Below is a chart for all countries where data are available.

- 4 **Gender equality** 2022 Data
Index World Economic Forum
Source: World Economic Forum: Global Gender Gap Index 2020
https://www3.weforum.org/docs/WEF_GGGR_2022.pdf?_gl=1*csz5m3*_up*MQ..&gclid=Cj0KCQjwla-hBhD7ARIsAM9tQKtjvFQwVBkt5z0plBDc5QmsfmqZD5kAf987ZSAZAOnizeNcici4aAnZ3EALw_wcB (page 9)
The Global Gender Gap Index examines the gap between men and women in four fundamental categories (subindexes): Economic Participation and Opportunity, Educational Attainment, Health and Survival and Political Empowerment. Countries score between 0 and 1.
-
- 5 **Labour productivity - GDP per hour worked** 2022 Data or latest available.
OECD Data
OECD: GDP per hour worked in USD
Source: <https://data.oecd.org/lprdy/gdp-per-hour-worked.htm>
GDP per hour worked is a measure of labour productivity. It measures how efficiently labour input is combined with other factors of production and used in the production process. Labour input is defined as total hours worked of all persons engaged in production. Labour productivity only partially reflects the productivity of labour in terms of the personal capacities of workers or the intensity of their effort. The ratio between the output measure and the labour input depends to a large degree on the presence and/or use of other inputs (e.g. capital, intermediate inputs, technical, organisational and efficiency change, economies of scale).
This indicator is measured in USD.
-
- 6 **Hourly wages per hour** 2022 data. Hourly wages per hour per country.
Eurostat
https://ec.europa.eu/eurostat/databrowser/view/lc_lci_lev/default/table?lang=en
Total labour cost consists of: employee compensation (including wages, salaries in cash and in kind, employers' social security contributions); vocational training costs; other expenditure such as recruitment costs, spending on working clothes and employment taxes regarded as labour costs; minus any subsidies received.

- 7 **Availability of qualified staff**
INSEAD Index
- 2022 Data
- Source: INSEAD Global Talent Competitiveness Index 2022 <https://www.insead.edu/sites/default/files/assets/dept/fr/gtci/GTCL-2022-report.pdf> (page 28)
- Construction of the index:
The global Talent Competitiveness Index measures how countries' policies and practices enable them to attract, develop and retain human capital that contributes to productivity. In the context of the GTCI, talent competitiveness refers to the set of policies and practices that enable a country to develop, attract, and optimise the human capital that contributes to productivity and prosperity. The GTCI is an Input-Output model in the sense that it combines an assessment of what countries do to produce and acquire talents (Input) and the kind of skills that are available to them as a result (Output).
- Countries score between 12,32 & 78,2 out of maximum 100.
-
- 8 **Life science trade balance**
EFPIA
Pharmaceutical Industry in Figures
- 2022 data
EFPIA Pharmaceutical Industry in Figures 2020: <https://www.efpia.eu/media/637143/the-pharmaceutical-industry-in-figures-2022.pdf>
Exports-imports - Pharmaceutical Trade Balance In € million.
-
- 9 **Corporate Tax Level**
Deloitte
- Deloitte Corporate Tax Rates 2022 in %
<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-corporate-tax-rates.pdf>
Includes information on statutory national and local corporate income tax rates applicable to companies and branches, as well as any applicable branch tax imposed in addition to the corporate income tax (e.g., branch profits tax or branch remittance tax).
-
- 10 **Payroll tax level**
PWC
- PWC Study 2020
<https://www.pwc.com/gx/en/services/tax/publications/paying-taxes-2020/explorer-tool.html>
Labour Total Tax and Contribution Rate in %.

11 **Complexity of Regulatory Procedures**
The World Bank

Complexity of Regulatory Procedures.
The World Bank Index, 1998-2018 data.

https://tcdata360.worldbank.org/indicators/gim.complex.proc?country=BRA&indicator=3323&viz=bar_chart&years=2018

An aggregate indicator, calculated from indicators representing the licenses and permits system, and communication and simplification of rules and procedures.

12 **Tax Incentives for R&D Investments**
OECD

Tax Incentives for R&D Investments.
OECD R&D tax incentives database, 2021 edition

<https://www.oecd.org/sti/rd-tax-stats-database.pdf> (Figure 18A), page 36

Total support and tax as % of GDP.

This report presents the latest OECD indicators and policy design information for expenditure-based R&D tax incentives in 38 OECD countries and 11 partner economies (central and subnational government level), drawing on data collected through the 2021 OECD-NESTI R&D tax incentives survey. It highlights the latest changes in the availability and design of R&D tax incentives and brings together two complementary sets of indicators on R&D tax incentives that facilitate a better and integrated view of government support for business R&D across countries and over time: OECD indicators of implied R&D tax subsidy rates and government tax relief for R&D expenditure (GTARD).

13 **Life science publications**
Leiden Ranking

2022 Leiden ranking. Field of Biomedical & health sciences.
Number of publications by top-20 universities in top-10% scientific journals for 2017-2020
Source: <http://www.leidenranking.com/>

The Leiden Ranking takes a multidimensional perspective on University Ranking: universities are ranked for performance according to a combination of parameters. Rankings may vary per the view selected. Universities are by default ordered based on the size of their publication output. Rankings based on an impact or collaboration indicator are also available. Also, size-dependent and size-independent indicators (e.g., the number and the percentage of highly cited publications) are consistently presented together in the Leiden Ranking, highlighting that both types of indicators are considered.

For this analysis criteria were: the number of life science articles published in top 5% journals by the top-20 life science institutes in each country.

- 14 **Life science staff**
EFPIA
EFPIA Pharmaceutical Industry in Figures 2022.
Employment in the pharma industry in Units.
Source: EFPIA: "The Pharmaceutical Industry in Figures, Key data 2022": <https://www.efpia.eu/media/637143/the-pharmaceutical-industry-in-figures-2022.pdf>
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- 15 **Number of Clinical trials**
Clinical Trials.gov data
Clinical Trials.gov
Source: Clinical Trials.gov <https://www.clinicaltrials.gov/ct2/search/map/click?map.x=453&map.y=112&mapw=883>
Trials included:
 - Only trials currently recruiting, trials enrolling by invitation or active trials that are not recruiting anymore
 - Only Interventional studies
 - Only trials funded by Industry.
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- 16 **Life science R&D investments**
EFPIA
2022 Data
Total R&D figures per country in absolute figures € million
Source: EFPIA: "The Pharmaceutical Industry in Figures, EFPIA data 2022": <https://www.efpia.eu/media/637143/the-pharmaceutical-industry-in-figures-2022.pdf> (page 7).
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- 17 **Life science degrees**
OECD
OECD Stats - graduates by degree. Sum of all "Biological and related sciences" and "Health" Masters and PHD degrees in 2020.
Source: https://stats.oecd.org/Index.aspx?DataSetCode=EDU_GRAD_FIELD
-
- 18 **Quality of care**
The Lancet
The Lancet 2018 Healthcare Access and Quality Index Article.
[Source: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)30994-2/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)30994-2/fulltext)
Ranking 0-100
Study uses the Global Burden of Diseases, Injuries, and Risk Factors Study 2016 (GBD 2016) to assess personal health-care access and quality with the Healthcare Access and Quality (HAQ) Index for 195 countries and territories, as well as subnational locations in seven countries, from 1990 to 2016.

- 19 **Size of healthcare budget**
Eurostat
- Eurostat. Healthcare expenditure 2012: https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthcare_expenditure_statistics#Healthcare_expenditure
- USA. Health Affairs. 2018 figure.
- Absolute figures in million Euro.
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- 20 **Pharmaceutical spending**
OECD Data
- OECD Statistics
- Total US dollars per capita, 2022 or latest available
Source: [OECD Pharmaceutical spending: https://data.oecd.org/healthres/pharmaceutical-spending.htm](https://data.oecd.org/healthres/pharmaceutical-spending.htm)
Pharmaceutical spending covers expenditure on prescription medicines and self-medication, often referred to as over-the-counter products. In some countries, other medical non-durable goods are also included. Pharmaceuticals consumed in hospitals and other health care settings are excluded. Final expenditure on pharmaceuticals includes wholesale and retail margins and value-added tax.
-
- 21 **Size of MedTech Market**
Medtech Europe
- Medtech Europe. The European Medical Technology Industry in Figures 2022.
Source: <https://www.medtecheurope.org/wp-content/uploads/2022/09/the-european-medical-technology-industry-in-figures-2022.pdf> (graph 6)
Size Medtech Market in billion €.
-
- 22 **Time to availability of medicines**
EFPIA
- EFPIA Patients W.A.I.T. Indicator 2021 Survey
- Number of days from EMA authorisation to patient access
Source: https://www.efpia.eu/media/s4gf1ego/efpia_patient_wait_indicator_final_report.pdf
The time to availability is the days between marketing authorisation and the date of availability to patients in European countries (for most this is the point at which products gain access to the reimbursement list†). The marketing authorisation date is the date of central EU authorisation in most countries, except for countries shown in italics where local authorisation dates have been used. Data is correct to 5th January 2023.
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SEBOIO

Health Policy Consulting

This report was written by Seboio Health Policy Consulting, an independent consultancy specialised in the development of life science and health policies, and specifically in organising multi-stakeholder events and workshops, writing consensus statements or the production of reports offering a broad and fact-based perspective on the subject matter. Reports were published on Global Health, on Life Science Investments in Europe, on Back-to-Work Strategies after Disease, on Breast Cancer, on Lung Cancer, on Digestive Cancers and on Cystic Fibrosis. Clients include patient organisations, health foundations, public health authorities, industry and industry associations.

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