Which Countries are Attractive for **Life Science Investments in Europe?**

Comparative Analysis

COMMISSIONED BY **JOHNSON & JOHNSON –** OCTOBER 2019

SEBOIO
Public Affairs & Reputation Management

Introduction

- The objective of this slide deck is to compare the attractiveness of countries for life science investments, whether in research, manufacturing or logistic services.
- This slide deck 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 other stakeholders and policy-makers interested to attract life science investments in their country. Between the collection of the data, and the publication of this analysis, many decisions have been made by politicians that already changed some results or might generate change in the near future. We live in a changing environment, that can also be influenced by having the right insights.
- The use of the slide deck is multiple
  - to provide government affairs staff at national level with a comprehensive benchmark for the investment attractiveness of the country they work in, for use with politicians, policy-makers and opinion-leaders.
  - to create a "best possible" country, based on the aggregation of the best results of all the countries participating in the analysis
- None of the material in the current slide deck is confidential and it can be used with external audiences as long as the credits for the varous information sources are respected.
- The criteria were determined based on the ones most frequently used in "inward investment" publications, and further selected with specialists from Johnson & Johnson and Janssen.
- Most of the metrics come from existing analyses and surveys, conducted by international organisations such as WHO, OECD, Eurostat, the European Commission, or by consulting firms such as KMPG, Ernst & Young, PWC, Deloitte and others.
- Some of the data are proprietary to Janssen and were provided by several departments.

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

- We started with about thirty criteria in four main buckets :
  - **socio-economic**
  - **industrial**
  - **life science innovation**
  - **healthcare**
- Within each bucket, we identified the most important ones, and those were further selected down based on discussions with Janssen and J&J experts. Some criteria were dropped because there were no data available or insufficiently available for all countries to make a meaningful comparison possible.
- The metrics were selected based on their potential relevance. For instance: we use absolute numbers to qualify the importance of the pharmaceutical market instead of the pharmaceutical expenditure per capita, in the assumption that the overall size of the market is more relevant to investors than the expenditure per person.
- **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 were used when this was deemed the most relevant figure. For instance, the pharmaceutical expenditure as a percentage of the total healthcare expenditure gives an indication of the value given by political decision-makers to pharmaceuticals in any given market.
- **Choice of countries:**
  - Nine countries were selected for this overview: Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain, Switzerland and the United Kingdom. This selection was made based on the size of the countries and their role in life science, both academic and industrial.
- **Choice of scale values in metrics chart:**
  - Left and right values on the "country scoreboards" were chosen by Seboio. The choice of values on the left and right determine the relative position of the individual countries. The values were chosen to make a meaningful distinction between the selected countries of this overview possible.
  - The graphic representation shows relative data. This represents how each individual country scores vi-à-vis the other selected countries. For instance, when Germany has a relatively low score on the "Quality of Care" indicator, this does not mean that that "Quality of Care" in Germany is bad, it just demonstrates that it has the lowest score compared to the other countries in this study.
- **Deal-breakers** - we have identified five critical topics that are essential to any life science investment decisions. The selection of these criteria was made by J&J EMEA government affairs staff.
- **The "best possible country"**
  - The "best possible country" is an aggregation of the selected countries. For some criteria, other markets than the ones selected have better scores, which explains that in our analysis the best possible country does not always have the upper score.

Methodology

Indicators have only indicative value

All the indicators are almost by definition a simplification of a complex underlying reality. For instance, when we give the "reputation" figures by country, this simple statistic may hide the fact that in some markets, the reputation of industry is excellent among key stakeholders such as politicians, but less so among the general public (the statistic used here).

The figures offer a snap-shot based of a number of criteria based on data from one time period. Between the international analysis and the publication of this report, many decisions have been made by governments that may potentially change the landscapce too. The Brexit decision in the UK is possibly the most significant one, especially with relation to the "political stability" criterion. The World Bank data used to measure political stability date from 2015 (latest available figures), and are of course pre-Brexit. The current situation in the UK, with its uncertainty about future developments, does not provide the stable environment that investors would like to see.

The example of taxation : 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 change significantly by disease area. The graph on the right shows the differences for oncology drugs in eight EU Member States.

So, as for any indicator, this high level picture gives exactly that : a high level 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.

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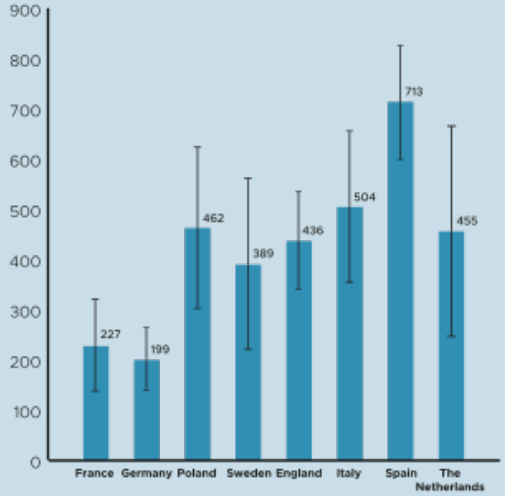
Mean length of time from EMA authorization to HTA decision for oncology products.



Mean length of time from EMA authorization to HTA decision for oncology products. Dates are taken from the product decision/publication date on the relevant country agency Web pages. For Germany, the time is from EMA authorization to IQWiG recommendation. Error bars: SD. EMA, European Medicines Agency; HTA, health technology assessment; IQWiG, Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen.
(Source : Akehurst et alii : "Variation in Health Technology Assessment and Reimbursement Processes in Europe" in: Value In Health, 20, 2017)

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 indeces 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. Because of the time-sensitity, the current situation in the United Kingdom and the United States may have changed since this study.

Performance of innovation systems is measured by average performance on 27 indicators of the European Innovation Scoreboard

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 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.

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Methodology

Political, Social & Economic criteria

In order to compile the "Best Possible Country", we selected "political stability", "competitiveness of the economy", "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 "gender diversity" as a criteria, which is unusual in an investment context, but considering Johnson & Johnson's policies on the subject one we thought was relevant to add.

The Industrial Investment Environment

The metrics in this group are the ones that are most common in investment reports. Availability of qualitied 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.

The Life Science Investment Environment

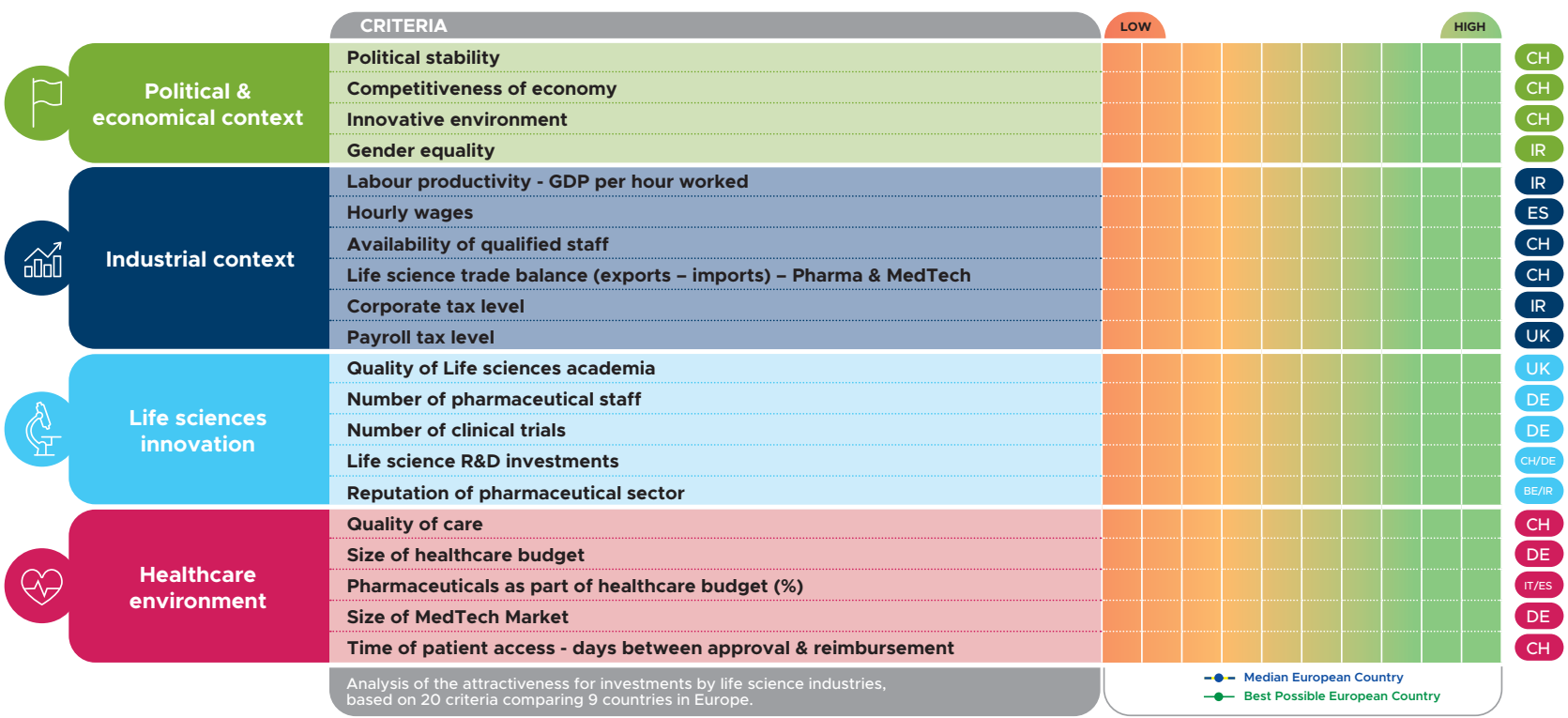
Specifically for life science investments, the quality of education, and the availbility of staff is an important factor. To get a feel of the opportunities for research, we added the local life science R&D investments by industry and the number of clinical trials, both of which give a good indication of the life science ecosystem in the country. We added the reputation of the pharmaceutical industry because it adds to the overall attractiveness of the public landscape. Countries with low pharma reputation will have less willingness at the political level to have policy measure that encourage industry to invest, and if the reputation is bad, they will ask for more stringent regulation.

The Healthcare Investment Environment

We selected the "quality of care" index as a general metric that covers access, innovativeness and outcomes data. We added the overall size of the healthcare budget as a percentage of GDP and the percentage of pharmaceuticals in that budget, as an indicator of the importance the political world gives to new technological innovations. We also add the time between formal approval of new technologies and the availability in the market. We would have wanted to add the status of e-health or RWE, and even if data can be found, the metrics are not reliable for comparison among countries.

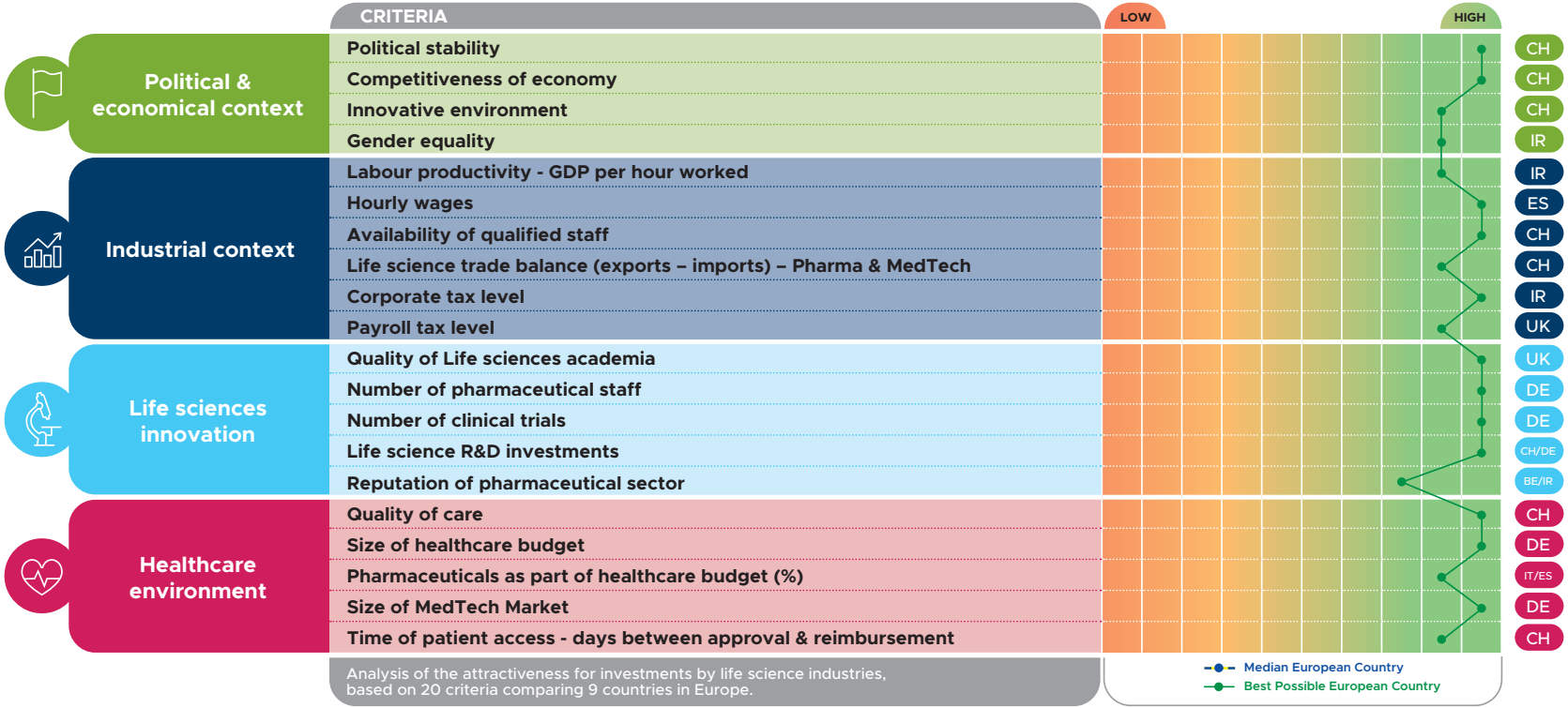
EUROPE

Overview of the selected criteria



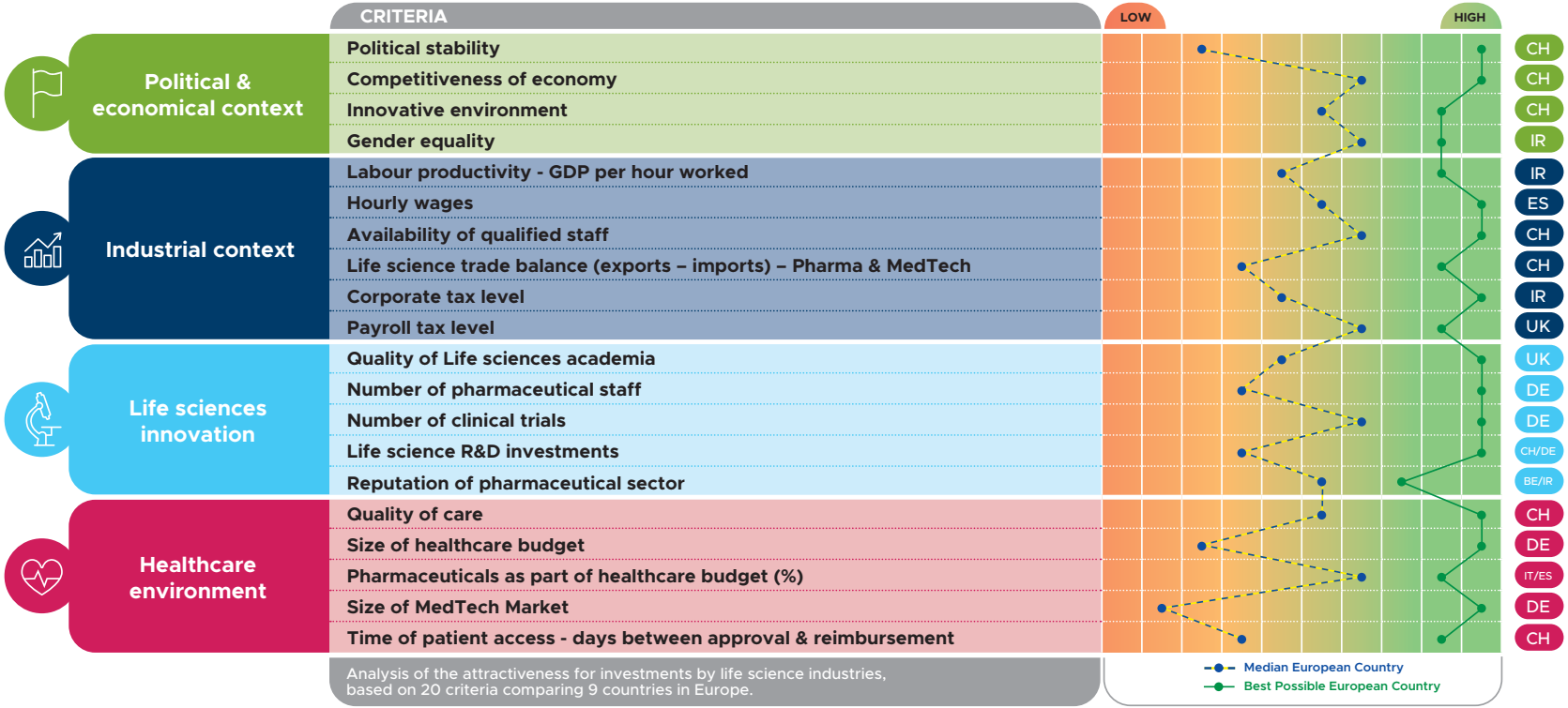
EUROPE

Overview of the selected criteria



EUROPE

Overview of the selected criteria



Potential deal breakers

We asked the Johnson & Johnson contributors to this report to identify the five most important topics that would stop any investment decision, the so-called "deal-breakers".

In order of importance the following five topics were identified :

1. **Corporate taxes**
2. **Availabiility of qualified staff**
3. **Political stability**
4. **Innovative environment**
5. **Size of the healthcare budget**

The Best Possible Country

THE EXPECTATIONS OF THE INVESTOR

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, and that commitments made by the authorities are also met. That there is a minimum rule of law, including intellectual property protection.

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). In Europe, the three biggest markets, Germany, France and the UK attract 51% of all foreign direct investments(1) (FDI) across all industries.

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, will be 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

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.

WHAT POLICY-MAKERS CAN DO

STABILITY

Europe has strenghts 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

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.

QUALITY

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.

COST

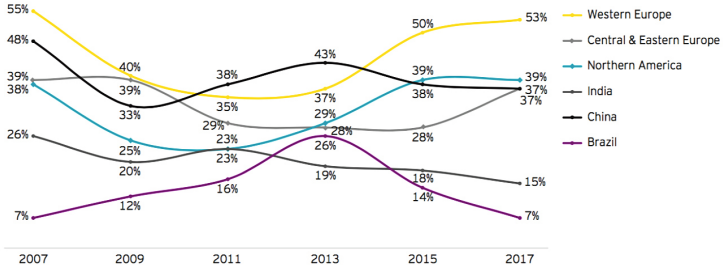
Countries can work on the cost aspects of doing business, by reducing taxes on people and profits. Many countries have set up specific tax schemes, either for innovation or for manufacturing. These incentives can also include direct subsidies, either at national or subregional level, in the form of financial support or cheap access to land.

(1) Ernst&Young - Attractiveness Survey Europe, May 2017

The Best Possible Country

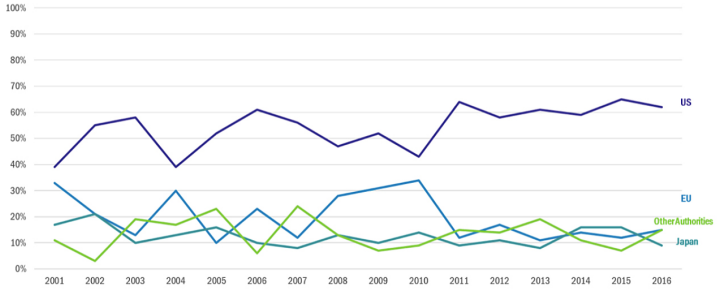
- The overall attractiveness of Europe across all industries increases over the last years.
- With regard to life science investments, Europe is still banking on the historic presence of life science companies in a number of countries, but it fails to position itself as the leader in life science innovation. The fastest growing companies in the world's top 50 of pharmaceutical companies are all coming from the US (Gilead, Amgen, Celgene, Biogen, Valeant, …) or Japan (Astellas, Esai, Daiichi Sankyo, Otsuka, …).
- This is also visible in the number of product launches. More than 60% of all new drugs originate from the United States, compared to 15% from European companies and 10% from Japan.
- One important factor in this respect, is the amount of public research investments made by the United States in health research, which represents 31.5 billion USD, as compared to 11.7 billion euro annually in the European Union. A second aspect related to this, is the fact that all health research in the US is centralised in the National Institutes of Health (NIH). Research is not only centralised, but the money is also concentrated in a in a number of key research institutes and universities, whereas in Europe, research money is not centralised and diluted among many parties involved.
- In the United States, the Johns Hopkins University has a research budget of 2.3 billion USD, and all top-10 research universities in the US have research budgets in excess of 1 billion USD per year. By comparison, Europe's "most innovative" university, KULeuven in Belgium, has a research budget of 454 million euro (2).

Attractiveness by region (2007-2017): China losing ground



Source: EY Attractiveness Survey Europe May 2017, EY, 2017 (total respondents: 505).

USA Share of New Active Substances Launched on World Market Remains High

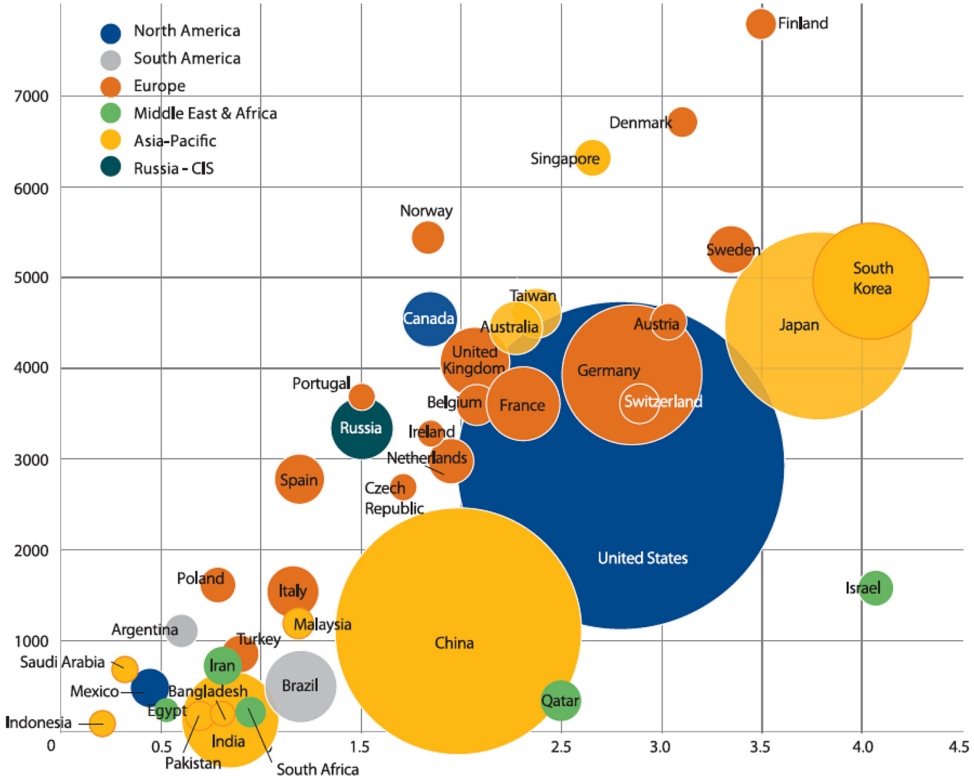


Source: Scrip Magazine (1982 - 2006), Pharmaprojects/Citeline Pharma R&D Annual Review (2007 – 2016)

(2) Reuters' Ranking of Europe's Most Innovative Universities, 2017

The Best Possible Country

The R&D investment graph shows the importance of size in the global market. If Europe wants to play a role of significance in the future, it should have a more concerted R&D approach, less fragmentation and focus on quality and breakthrough innovation and high tech manufacturing.



Source: IRI, *R&D Magazine*, International Monetary Fund, World Bank, CIA Fact Book, OECD

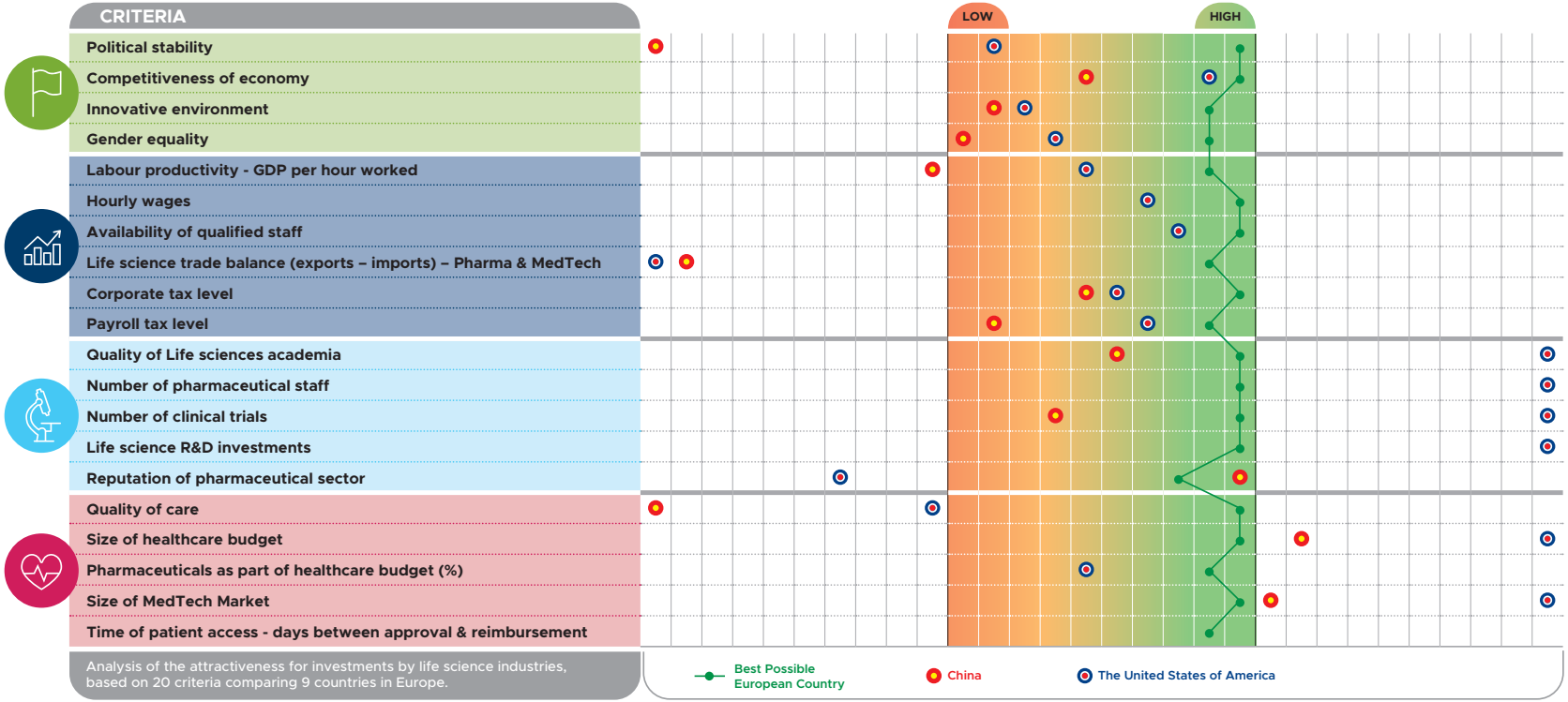
The size of the circles reflects the relative amount of annual R&D spending by the indicated country.

Note the regioal grouping of countries by the color of the balls.

Source: Global R&D Funding Forecast, R&D Magazine, Winter 2017

INTERNATIONAL COMPARISON

EUROPE - CHINA - THE UNITED STATES



The Best Possible Country

- Switzerland comes out as the best country with eight criteria in the leading position: political stability, most innovative environment and most competitive economy, availability of qualified staff, life science trade balance, the largest investor in pharmaceutical R&D, quality of care and fast patient access to innovative medicines.
- Within Europe, Switzerland is closely followed by the United Kingdom,
- Ireland scores best for manufacturing, with highest labour productivity and lowest taxes. It's also the country with the best gender equality.
- Germany is the most attractive market because of its size: the best trade balance for pharmaceuticals and medtech products combined, and the largest market for both technologies. Not surprisingly, it also hosts the largest number of life science staff and the largest number of clinical trials. As said before, size matters.
- In Belgium and Ireland, the pharmaceutical industry has the best reputation in Europe.
- The UK offers the lowest payroll taxes with 10.9%.
- Within the European Union, Italy and Spain have the highest percentagef of pharmaceuticals in the healthcare budget.
- The metrics and the way the analysis was made up, makes it clear that it is almost impossible to be the best on every single criteria. 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.

- **Qualitatively, it is possible to**
  - have a long term country vision on the development of life science industry (Germany, Switzerland, UK, China)
  - have clinical trials approved in two weeks (Belgium)
  - have an innovation tax percentage of 6.8% (Belgium)
  - a temporal market authorisation for drugs that are not yet approved but for which there is a high medical need (France)
  - one-stop shopping for investors (Germany, Ireland)
  - policy concertation with policy-makers and key stakeholders (Belgium, Germany,
  - government sponsored training programmes for life science manufacturing jobs (Ireland)
  - high level of venture capital to make start-ups grow (UK, Switzerland)
  - a national body responsible for health research (UK, United States)
  - have tax incentives for investments in 'Industry 4.0 technologies' (eg: pharmaceutical manufacturing processes) (Italy)

The Best Possible Country

The best possible country for life science investments is first and foremost characterised by a willingness to become an attractive environment for life science investments. There is **a long term policy vision** about the importance of life science research and healthcare. There is coherent policy framework that looks at all the different criteria for investment : political stability, an innovative ecosystem, good education in science, significant public investments in academic and company research, industrial infrastructure, and an understanding of the value of medical innovation.

The best possible country understands that it operates in a very competitive environment. It keeps track of what's happening in other countries and identifies how it can become or remain attractive for investments or what it can do to generate local value by collaborating with other countries.

In order to achieve this, the best possible country has **an open and constructive dialogue** with the different stakeholders, including industry, to identify the policy measures that can be made to advance innovation, investments and quality care.

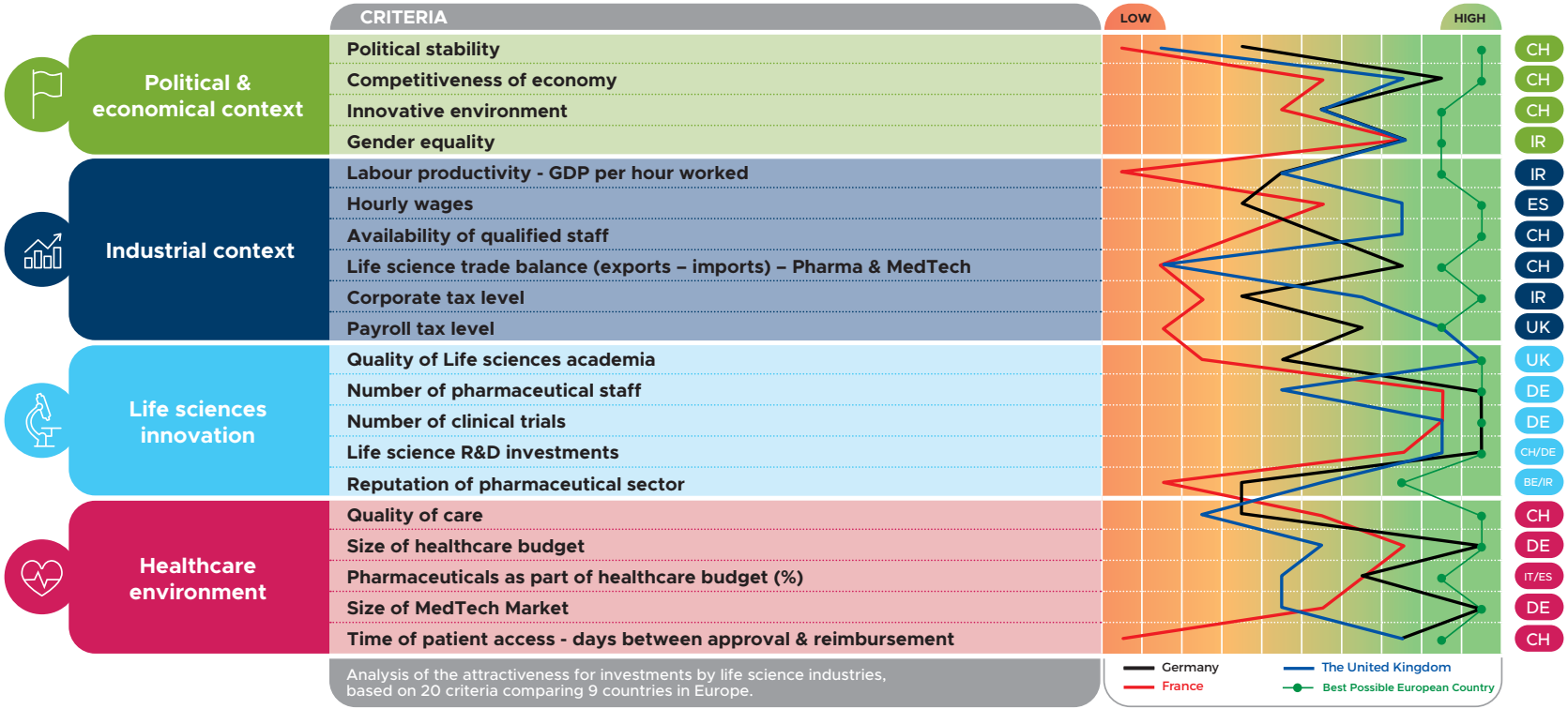
In the best possible country, policies are designed to have a **positive balance between high quality and costs**. Relative higher costs for staff or taxes can be acceptable if there is proportionally higher level of quality aspects : high education levels, an innovative and open economy, limited bureaucracy,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

The ideal country takes pro-active decisions and invests: it has **a long term investment plan** for funding research, but it also has specific training programmes for life science industry staff in order to keep abreast of the latest technological evolutions.

The best possible country understands that the ultimate measure of success are high quality jobs and high quality healthcare. Its policy-makers understand that the **investments made will generate even more revenue** in terms of job creation and a healthy population.

COUNTRY COMPARISON

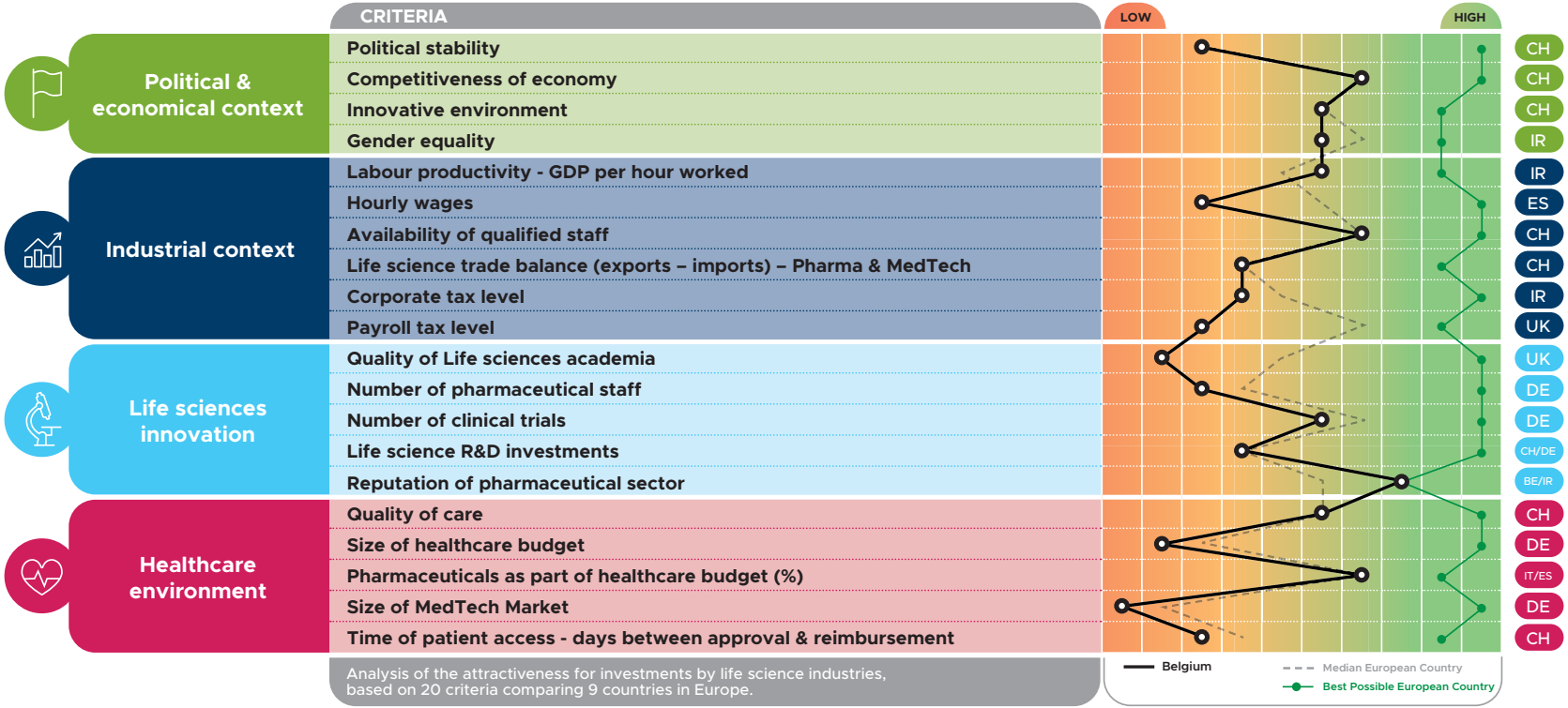
FRANCE - GERMANY - THE UNITED KINGDOM



Country Dashboards

BELGIUM

Overview of the selected criteria



Analysis of the attractiveness for investments by life science industries, based on 20 criteria comparing 9 countries in Europe.

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

- fastest clinical approval in EU - 15 days
- #1 in Europe **for** number of trials per capita
- 18% of EU biotech market cap was generated in Belgium in 2016
- Formal quarterly concertation between the government and the pharmaceutical industry to improve the investment context
- The creation of an "observatory" to benchmark how Belgian scores vis-à-vis other countries in terms of investment attractiveness.

TAX MEASURES

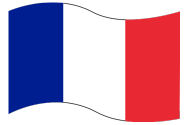
- Investment deduction for R&D – 13.5% of acquisition value/qualifying asset or 20.5% of the depreciated amount;
- Exemption of payment of 80% – of the personal income withholding tax of researchers in certain scientific fields;
- Innovation income deduction – up to 85% of a firm's net earnings from innovation is tax exempt

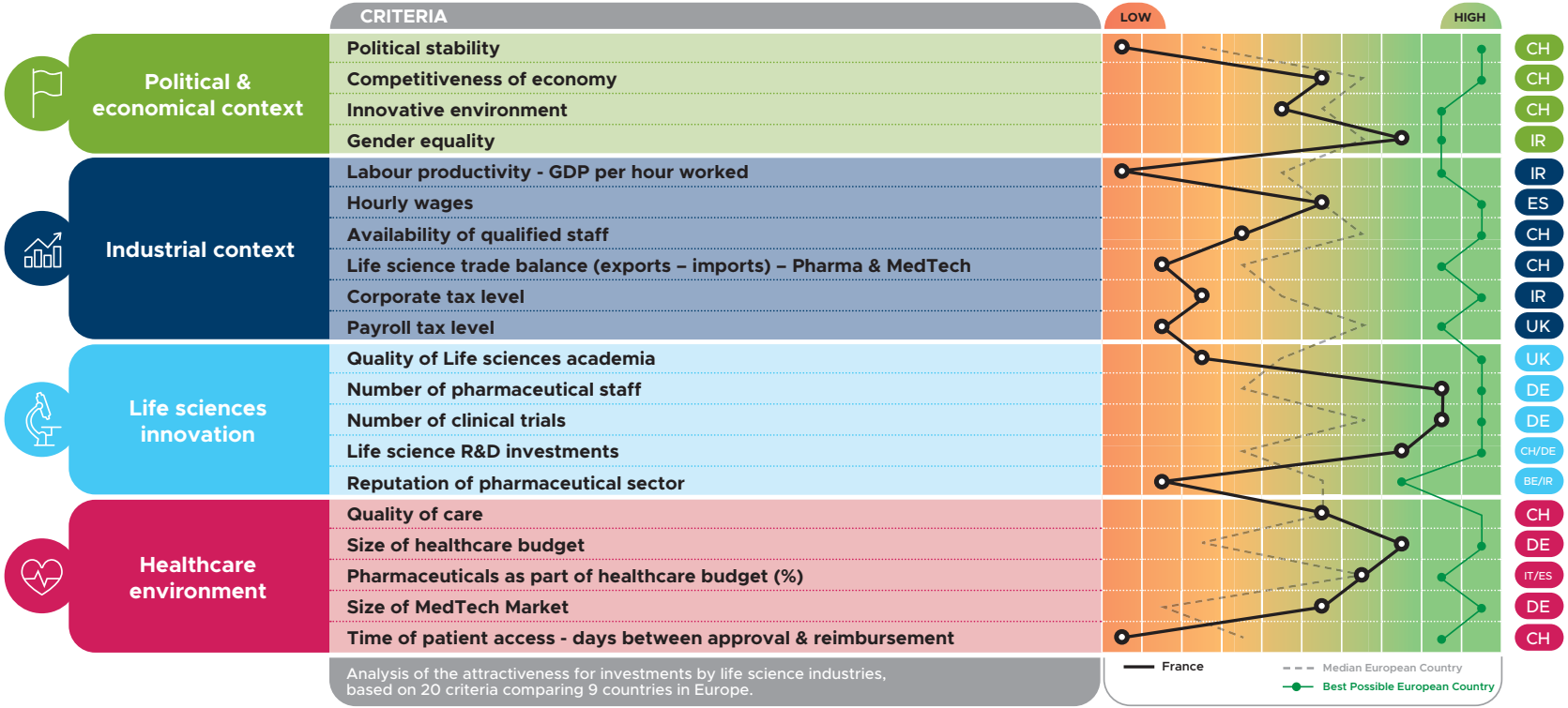
RECENT POLICY MEASURES

- Reduction of corporate taxes from the current 33.9% to 29% in 2018 and 20% in 2020.

FRANCE

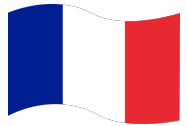
Overview of the selected criteria





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

With seven healthcare sector innovation clusters, France's ecosystem fosters synergies and partnerships that lead to the emergence of innovations, products and services offering high-quality personalized healthcare.

With more than €1.6 billion of funds raised (all forms of venture capital), including €600 million through 14 stock market flotations in 2015, Euronext (Paris) is the leading stock market in Europe for biotechs and in the world for medtechs.

France is ranked fourth in the world and second in Europe for medical devices and technologies. There are more than 1,340 companies in the French medical device sector, generating revenues of €28 billion.

France is the fifth largest market in the world for human medicines, and the second largest in Europe.

France has the third largest number of products in development, with a heavy focus on early stage products,

Pharmaceutical specialties whose efficacy and safe use can be assumed, but which have not yet obtained market approval or been tested in clinical trials, may nevertheless be granted temporary authorization for use (Autorisation temporaire d'utilisation – ATU) in exceptional circumstances as a last resort.

In 2016, France - Europe's third-most attractive country for international investors - saw a significant increase in the number of foreign investment projects, up from 598 in 2015 to 779 in 2016

TAX MEASURES

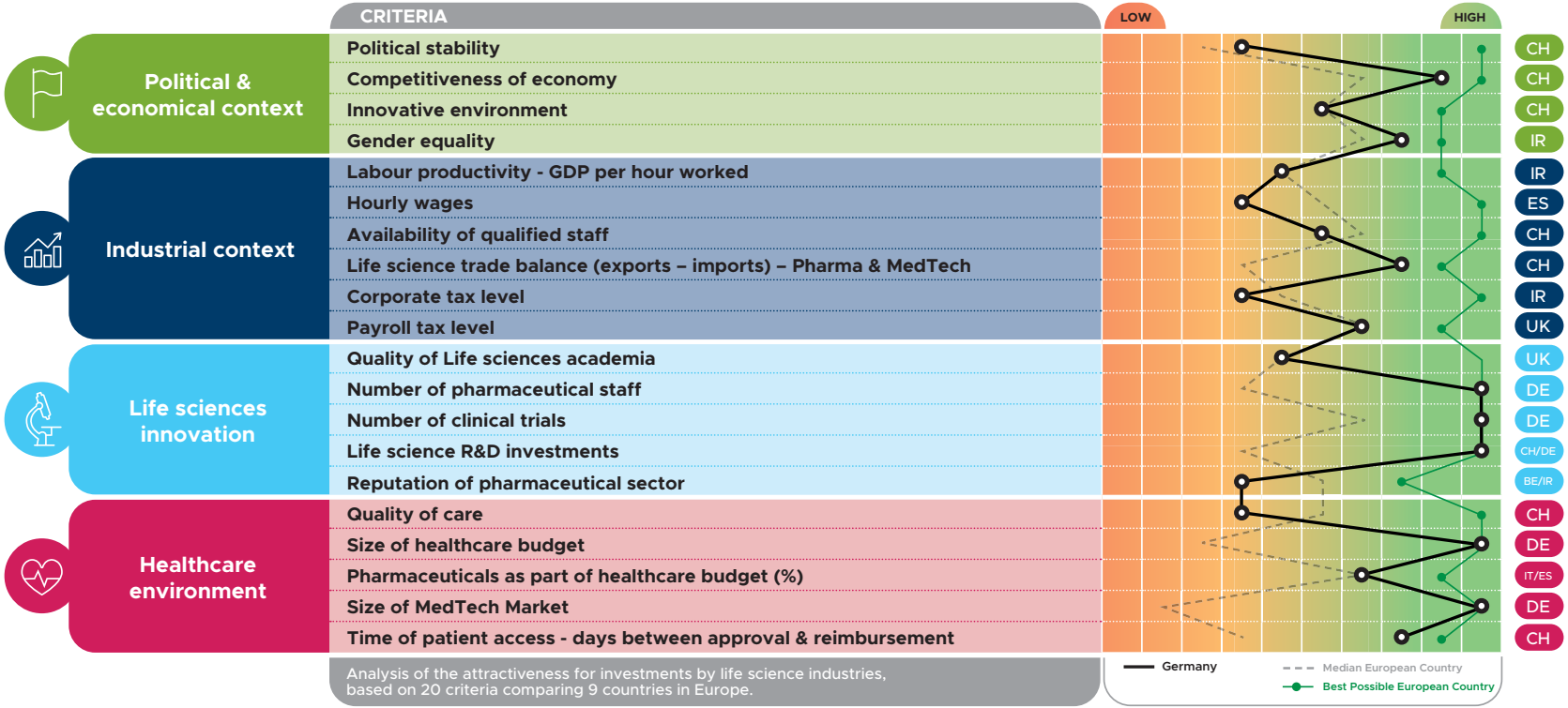
- Tax on income from IP at 15%
- R&D tax credit of 30% is available for the portion of R&D expenses below EUR 100 million, reduced to 5% for the portion exceeding that amount. France's research tax credit is specifically designed to take into account 200% of the cost of subcontracting to public-sector organizations (INSERM, hospitals, etc.). 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.
- Basic CIT rate step-by-step decrease, from 33.33% to 25% (2022)
- 50% decrease of the late penalties applied in case tax reassessment (from yearly 4.8% to 2.4%)
- Additional deductible tax depreciation (40% above the initial 100%) for investments made in industrial/R&D areas before April 2017

RECENT POLICY MEASURES

- R&D tax credit maintained as it has been since 2008 (new government has confirmed its strong willingness to maintain it)
- New labor law that should provide more flexibility to the French job market
- French government has decided to dedicate a €10 billion fund to innovation.

GERMANY

Overview of the selected criteria



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 offers the largest market for Healthcare and Life Sciences products.
- A highly attractive R&D location, the country ranks first and second in clinical trial terms in Europe and the world respectively. Having established itself as the "world's pharmacy" as part of a tradition of medical innovation, Germany is also the world's leading medical biopharmaceuticals producer – second only to the USA.
- In 2014, healthcare spending in Germany totaled EUR 328 billion
- Largest number of biotech and pharmaceutical companies
- The world's leading exporter of pharmaceuticals
- 30 BioRegions - with facilities dedicated to biotech research
- the pharmaceutical industry consists of more than 640 companies, employing a workforce of 112,500, which is the second highest in the world
- 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.
- Highest percentage of global HQs with manufacturing in-country.

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 percent. 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 percent in some cases.

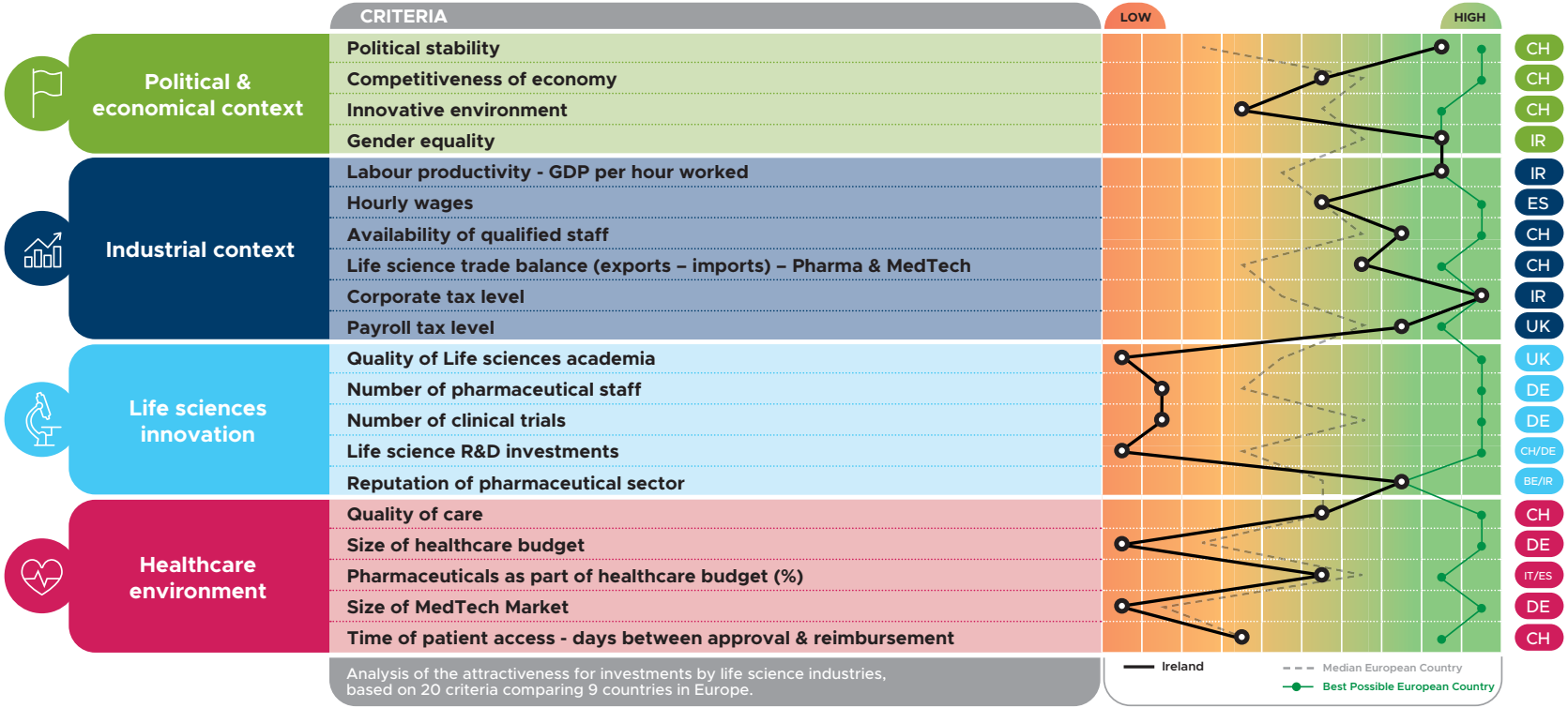
Germany does not offer R&D tax incentives. State grants in cash for eligible R&D projects are applicable instead

RECENT POLICY MEASURES

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

IRELAND

Overview of the selected criteria



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 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 directly employs 25,000 people.

The biopharmaceutical industry has made a capital investment of approximately $8 billion in new facilities in Ireland, most of which has come in the last 10 years. This represents close to the biggest wave of investment in new BioTech facilities anywhere in the world.

An attractive hub for overseas groups. There is rather little in terms of SME Biotech activity.

Strong tailor-made approach for investors through the Industrial Development Authority.

TAX MEASURES

- Tax credit of 25% on capital and revenue expenditure on qualifying R&D expenditure. It is possible to claim excess R&D credits as a cash refund
- Effective zero tax rate for foreign dividends.
- 12.5% corporate tax rate

RECENT POLICY MEASURES

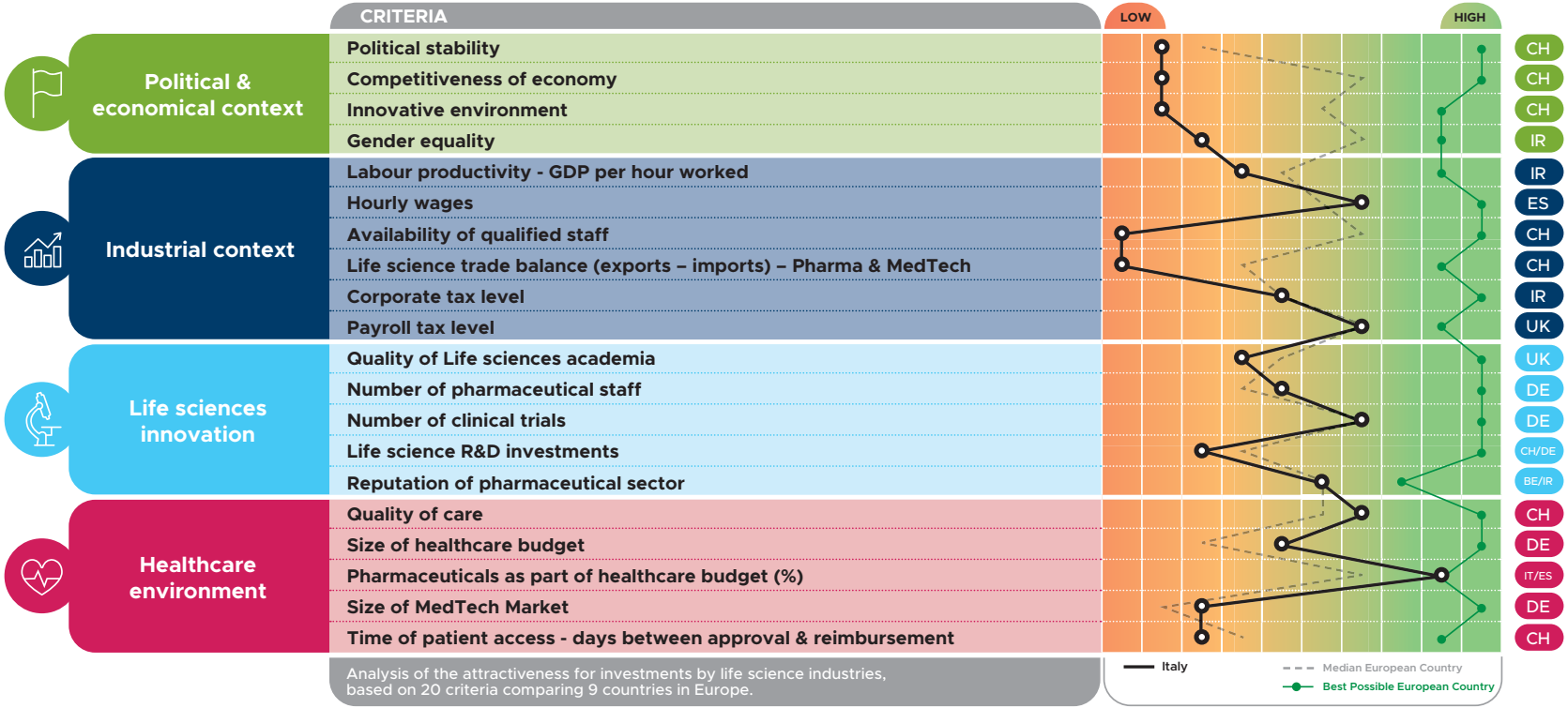
The government has committed €8 billion to research funding to further bolster Ireland's reputation as a growing hub for research and development.

The National Institute for Bioprocess Research and Training (NIBRT), created from a €60million 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.

The Stability and Investment Compact Law reduces labour costs for investors and for jobs for young people.

ITALY

Overview of the selected criteria



Analysis of the attractiveness for investments by life science industries, based on 20 criteria comparing 9 countries in Europe.

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, with a GDP of more than 2.1 trillion dollars
- On a world scale, the Italian pharmaceuticals market ranks seventh for total sales
- 45,000 graduates every year in Biotechnology, Pharmacy and Medicine
- In 2017, healthcare spending in Italy totaled 112 billion€ (2018: 113 B€; 2019 114 B€).
- The Italian pharmaceutical industry consist of more than 200 companies, employing a workforce of 130,000 (direct and in the upstream sector).
- With 30 billion of manufacturing value, of which 73% in exports.
- Italian pharmaceutical sector leads the European markets in terms of production value (second only to Germany).
- Each year 2.7 billion are invested in R&D (€ 1.5) and in hi-tech plants and machinery (€ 1.2).
- Starting from 2017, the Government has allocated on a yearly basis, 1B€ to fund innovative drugs.
- Pharmaceutical research in Italy is focused on biotechnologies with more than 300 biotech products in development and an European leadership in advanced therapy medicinal products.
- Italy become an hub for clinical trials: in 2016 pharma companies invested in Italy € 700 million in clinical trials.
- The Medical Devices sector in Italy consists of more than 4.100 companies (including 300 start-ups), employing a workforce of more than 75.000.
- 51% manufacturing companies - 3605 manufacturing sites
- Mirandola (emilia romagna) represents the most important medical devices district in Italia and in Europe. At third ranking in the world after Minneapolis and Los Angeles. It's called the Italian Silicon Valley of Medical Devices.
- 11.4 billions euros turnover, 4.9 billions euros export

TAX MEASURES

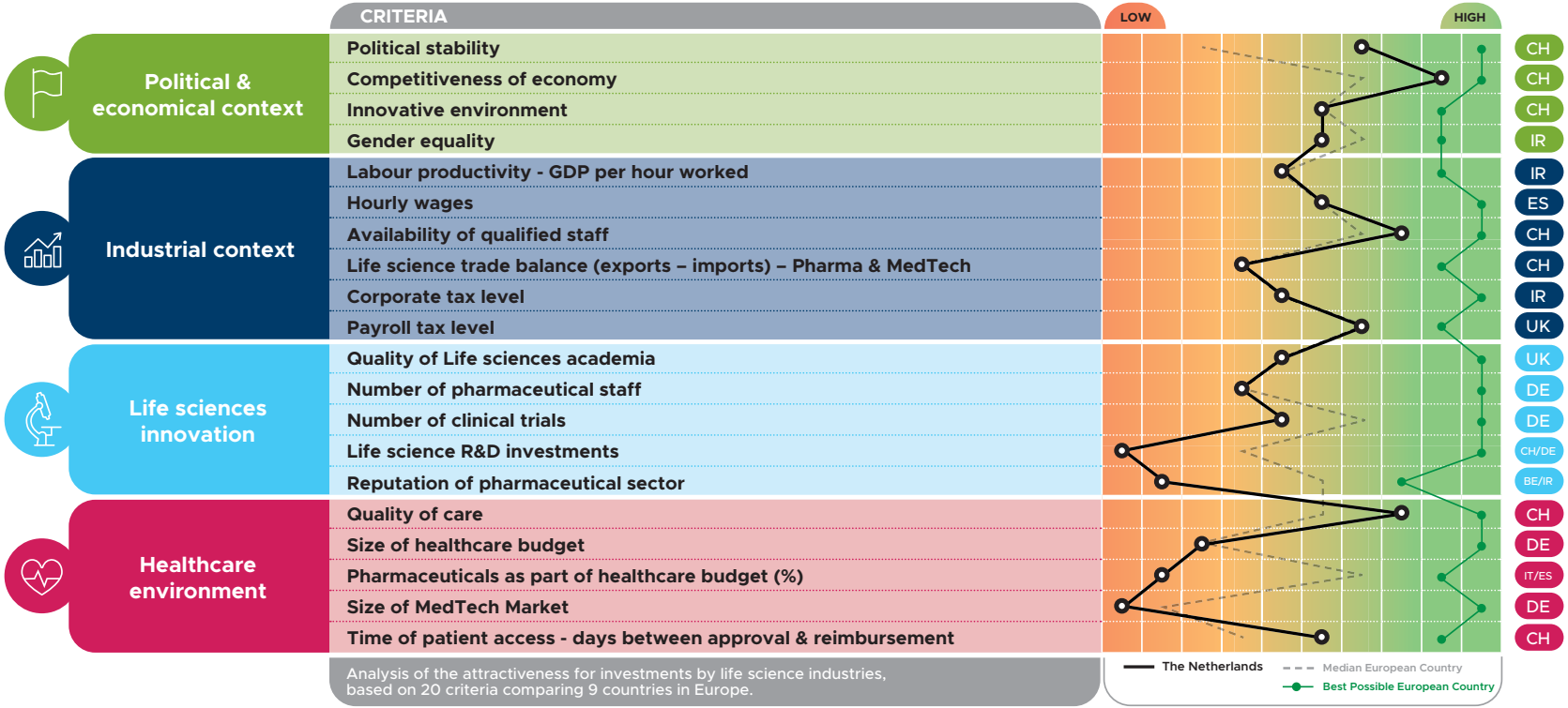
- Patent Box (2015), allows the tax reduction of 50% of the revenues originated from direct/indirect use IP rights.
- Tax credit scheme, available for 2015-2019, to support companies to improve their competitiveness which allows a 25% tax credit for private investments in R&D (50% if R&D is carried out in cooperation with public bodies, eg: universities or research centres) up to a maximum annual amount of € 5 million for each beneficiary. The stability law approved in December 2016 extended the R&D tax credit scheme to 2020, increased support to 50% of incremental R&D investments and set a maximum amount of € 20 million for each beneficiary. Relating to R&D, the Italian Ministry of Education, University and Research (MIUR) introduces a merit-based funding arrangements for universities based on research evaluation increasing from 20% in 2016 to 24% in 2018.
- PONREC (National Programme on Research and Innovation) to support research and innovation in in the Southern region of Italy. The programme aims will focus on strengthening research, technological development and innovation (74% of the total resources) and on investing in education by investing in training infrastructure.

RECENT POLICY MEASURES

- Industry 4.0 (2017-2020) to boost private innovative investments in the manufacturing sector. The plan was introduced with the Stability Law 2017; some measures and tax incentives were re-newed and re-confirmed by the Stability Law 2018. The main measures are:
- Tax credit of 40% for training cost in "activity 4.0" (eg: robotics, internet of things, digital integration of processes, big data). The tax credit is recognised up to a maximum annual amount of € 300 for each beneficiary.
- Hyper-depreciation, at 250% and super-depreciation, at 130%, for investments in I4.0 technologies.

THE NETHERLANDS

Overview of the selected criteria



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

- Excellent academic infrastucture in life science
- Creation of collaborative initiatives such as Lygature. an independent third party to help preserve Dutch R&D expertise and to support new initiatives, including any arising from the Netherlands government, to drive the development of new medical solutions. Another initiative is the Innovative Medical Device Initiative.

TAX MEASURES

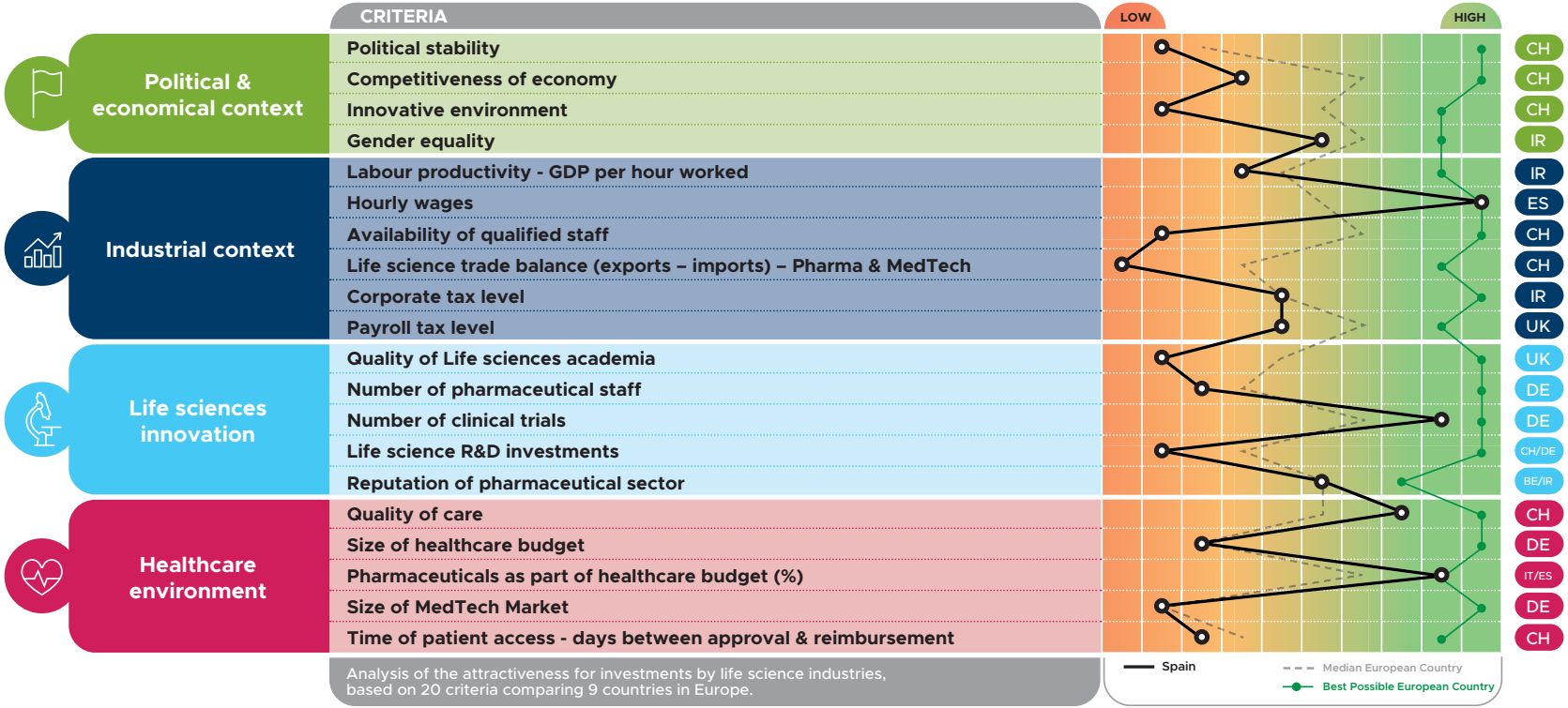
- Tax on income from IP at 5% is among the lowest in Europe
- Companies deriving income from qualifying R&D activities are entitled to an additional 60% deduction of the costs and expenses relating to these activities.

RECENT POLICY MEASURES

Recent re-location of the European Medicines Agency to Amsterdam

SPAIN

Overview of the selected criteria



Analysis of the attractiveness for investments by life science industries, based on 20 criteria comparing 9 countries in Europe.

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
- 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.

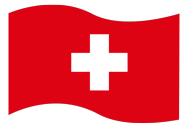
TAX MEASURES

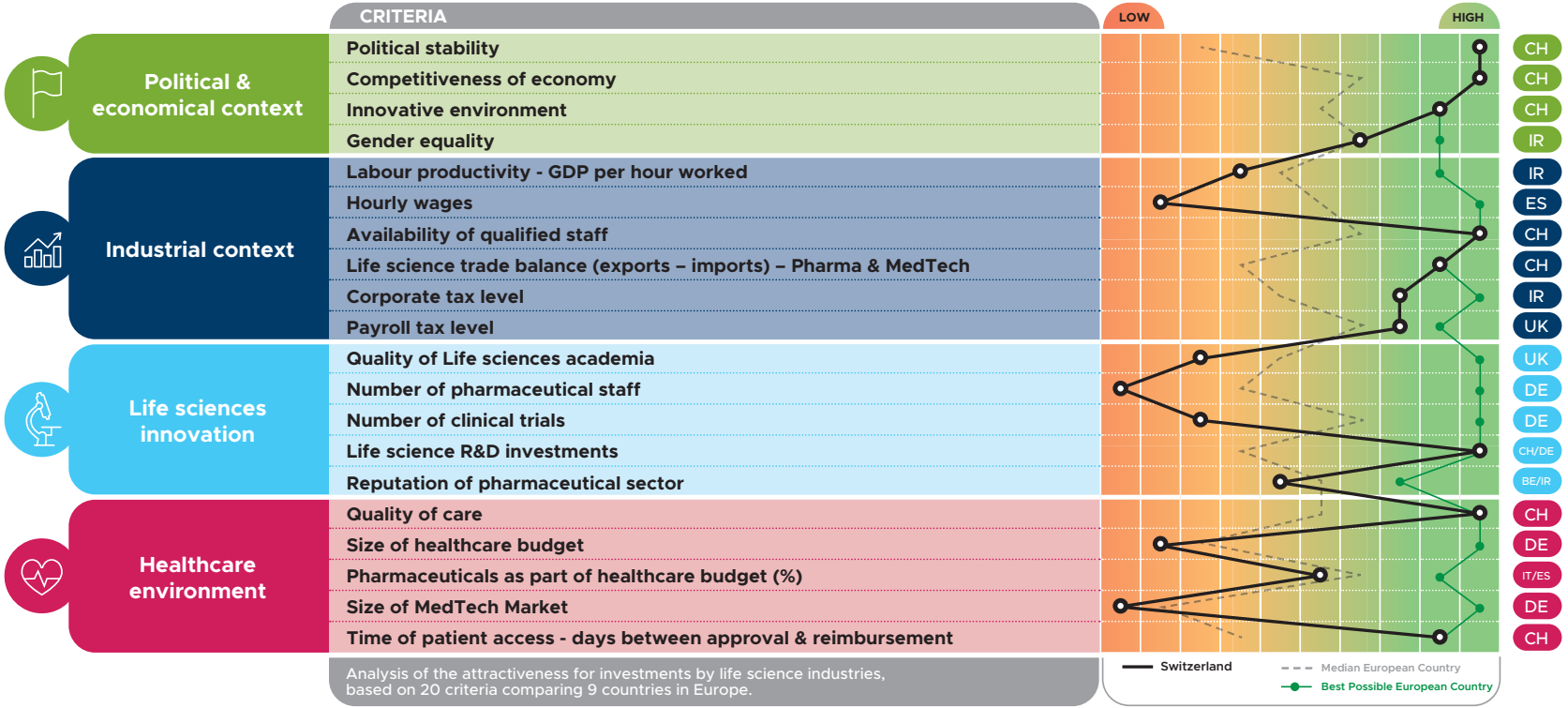
- Corporate tax deductions up to 42% for R&D investments and up to 12% for innovation
- Companies can deduct up to 40% of the social security contributions of R&D workers
- The general applicable fixed percentage rate for R&D tax credit is 25%

RECENT POLICY MEASURES

SWITZERLAND

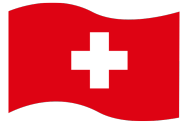
Overview of the selected criteria





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

- Life science represents 45% of Swiss Exports
- Very strong biotech venture capital environment - Switzerland performs strongly when it comes to financing private companies, raising the second highest amounts in 2014 and 2015 behind the UK.
- Strong political backing of life science investments
- Switzerland is one of the countries offering the best conditions for Life Sciences companies to maintain and increase their agility due to flexible labor regulations, strong opportunities to enhance collaboration with peers and universities, and the ability to increase the company's value through tax models which are compliant with new OECD regulations on Base Erosion and Profit Shifting (BEPS).
- Compared to the size of the population, Switzerland's Life Sciences Industry in the "core activities" such as Biotech Therapeutics, Medtech Manufacturing and Pharma by far outnumbers the other six countries covered in this report (Belgium, France, Germany, Netherlands, Ireland and the UK).
- Traditionally strong in life science and fueled by the two Pharma giants Novartis and Roche, Switzerland has a keen focus on innovative therapeutic Biotech companies but also a strong Medtech sector.

TAX MEASURES

- Tax on income from IP at 8.5%
- Moreover, many tax incentives are offered by cantons (states), in order to attract companies to establish operations and invest in their jurisdictions. Some cantons go as far as to waive taxes for new firms for a period that can go up to ten years.
- Swizterland is currently reforming its tax legislation with the so-called Tax Reform Proposal 17. The proposal represents a well-balanced and internationally competitive solution that ensures that Switzerland stays an attractive location for multinationals and domestic companies alike, while at the same time providing an internationally aligned tax system that is in conformity with international standards.

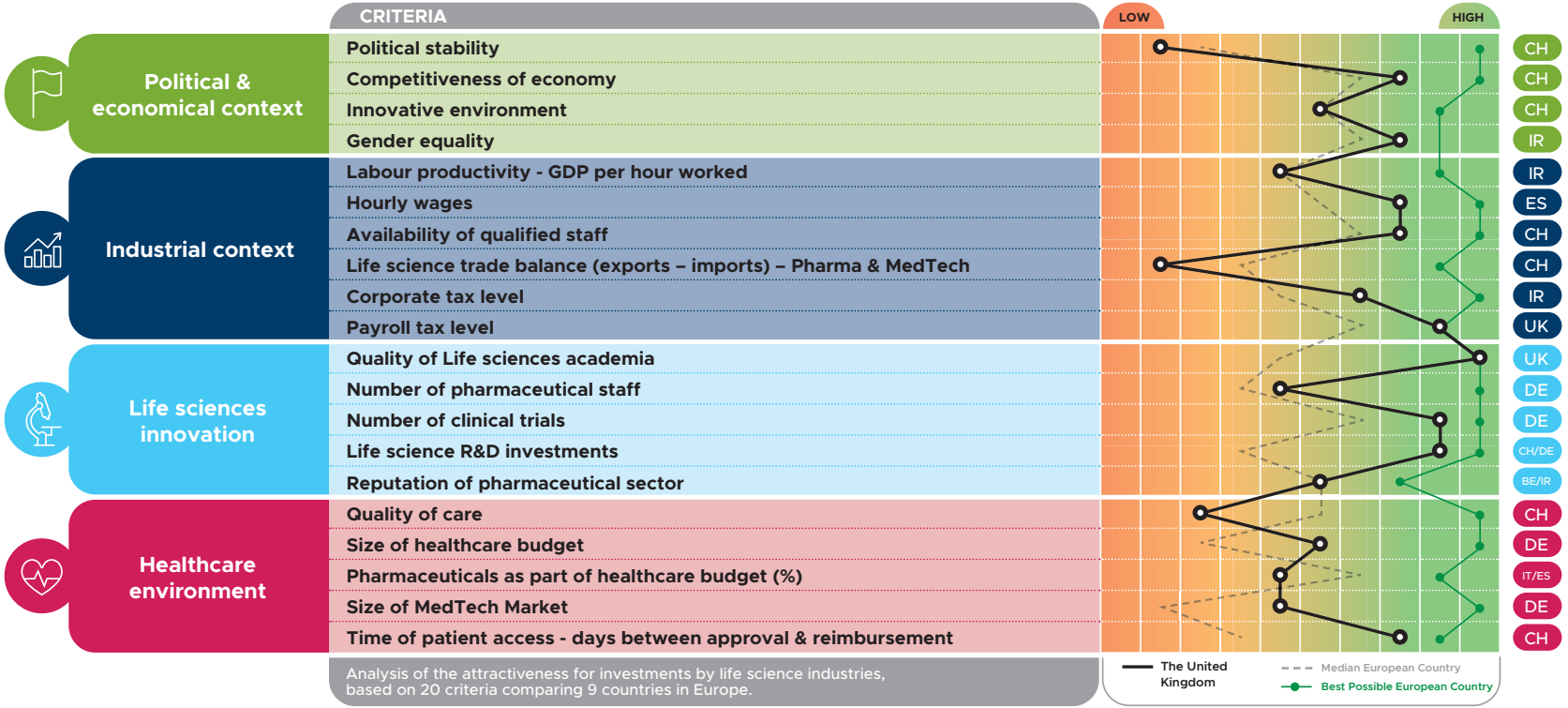
RECENT POLICY MEASURES

Masterplan of the Federal Council and the Federal Office of Public Health to boost Switzerland as a biomedical research and technology centre with an ongoing roadmap

Launch of the "Switzerland Innovation Park" in 2016, uniting all life science stakeholders including education in order to create 5 life science parks.

THE UNITED KINGDOM

Overview of the selected criteria



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

- Leading investor in public and non-profit life science research, with over 3 billion euro
- Excellent academic research in the London/Oxford/Cambridge cluster
- High level of biotech venture capital - UK companies received nearly £700m in venture capital in 2016, more than a third of the total venture capital raised in Europe and more than any other European country.
- National Institute for Health Research is a dedicated government body
- Clinical Practice Research Datalink (CPRD) to provide researchers with access to patient data for clinical trials recruitment and observational studies.
- The UK has the second highest number of life science companies in Europe, but the highest number of innovative companies in Biotech therapeutics. The UK also leads in Pharma companies.
- For products in development, the UK has the strongest pipeline in Europe, with an emphasis on pre-clinical and a strong showing in clinical (primarily oncology).

TAX MEASURES

- Patent Box in 2013, to reduce the corporation tax on profits from patents to 10%
  R&D tax credits
- Tax incentives for R&D expenditure are available, with an enhanced deduction of 130% for large companies and of 230% for small and mid-sized enterprises.

Note: the "political stability" criterion for the UK was taken out because the international comparison by the World Bank pre-dated the Brexit vote.

RECENT POLICY MEASURES

- Academic researchers are also evaluated by their collaboration with industry and the impact of their work on social and economic level
- Creation of the Catapult Porgramme to help UK SME biotechs, academics and innovators to have access to the laboratory facilities, knowledge, data, technologies and networks they need to be able to progress their programmes of medicines research and development.
- Creation of Healthcare UK to help healthcare companies with their overseas activities, investments and exports.
- Establishment of "Strategy for UK Life Sciences" to support life science industry.
- Recently updated: Pharmaceutical Price Regulation Scheme (PPRS) is a voluntary agreement between the Government and the pharmaceutical industry with the dual aim of seeking to create an environment that ensures safe and effective medicines are available on reasonable terms to the NHS, and that maintains a strong, efficient and profitable pharmaceutical industry

Sources & References

1 **Political stability**
World Bank Index

2015 Data
Source: the world bank - globaleconomy.com
http://info.worldbank.org/governance/wgi/index.aspx#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 indeces 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 **Competitiveness of economy**
Index World Economic Forum

2017 Data
Source: World Economic Forum - The Global Competitiveness Report 2017-2018.
http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017%E2%80%932018.pdf
page 13

Construction of the index:
Competitiveness is defined as the set of institutions, policies, and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be reached by an economy. The productivity level also determines the rates of return obtained by investments in an economy, which in turn are the fundamental drivers of its growth rates. In other words, a more competitive economy is one that is likely to grow faster over time. This open-endedness is captured within the GCI by including a weighted average of many different components, each measuring a different aspect of competitiveness. The components are grouped into 12 categories, the pillars of competitiveness.

Countries score on a scale from 1 to 7

3 **Innovative environment**
EU Innovation Scoreboard – performance index

2016 Data
Source EU Innovation Scoreboard 2017
http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_nl

Construction of index:
Performance of innovation systems is measured by average performance on 27 indicators
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. Investments capture public and private investment in research and innovation and cover two dimensions: Finance and support and Firm investments. Innovation activities capture the innovation efforts at the level of the firm, grouped n three innovation dimensions: Innovators, Linkages, and Intellectual assets. Impacts cover the effects of firms' innovation activities in two innovation dimensions: Employment impacts and Sales effects.

Measurement: EU average in 2010 represents '100' value, countries score above or below

4 **Gender equality**
Index World Economic Forum

2015 Data
Source: World EconomicForum: Global Gender Gap Index 2016
http://reports.weforum.org/global-gender-gap-report-2016/rankings/

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.
http://reports.weforum.org/global-gender-gap-report-2016/measuring-the-global-gender-gap/

Countries score between 0 and 1

5 **Labour productivity - GDP per hour worked**
OECD Data

2016 Data
OECD: GDP per hour worked in USD

Source: https://data.oecd.org/

Definition
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**
The Conference Board

2014 Data

Hourly wages in USD/hour)
Source: The Conference Board 2014 Hourly compensation costs. https://www.conference-board.org/ilcprogram/
Compensation costs include direct pay, social insurance expenditures and labour-related taxes;

7 **Availability of qualified staff**
INSEAD Index

2016 Data

Source: INSEAD Global Talent Competitiveness Index 2016 http://www.gtci2017.com/documents/GTCI_2017_web_r3.pdf

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 25 & 75 out of maximum 100

8	**Life science trade balance** (exports - imports) - Pharma & MedTech	2015 data Absolute figures in Million€ Sum of Pharma & MedTech Trade Pharma figures: "EFPIA The Pharmaceutical Industry in Figures Key Data 2017, p 20" Med Tech Figures: "The European Medical Technology Industry in figures" http://www.medtecheurope.org/sites/default/files/resource_items/files/Trade%20in%20Europe.pdf
9	**Corporate Tax Level**	2017 Data % of profit Source: KPMG online tool https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html
10	**Payroll tax level**	2017 Data % of payroll costs Source: "Paying Taxes 2018", World Bank Group, PWC Labour taxes = "taxes and mandatory social contributions borne by companies."
11	**Quality of Life sciences academia** Leiden Ranking	2017 Data 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. Metric = number of publications by top-20 life science universities

12	**Number of pharmaceutical staff**	2015 Data Number of people employed by the Pharmaceutical Industry Source: EFPIA: "The Pharmaceutical Industry in Figures, Key data 2017"
13	**Number of Clinical trials** Clinical Trials.gov data	2017 Data (Update June 2017) Number of clinical trials per country Source: Clinical Trials.gov https://clinicaltrials.gov/ct2/search/map 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
14	**Life science R&D investments**	2015 Data Investment in million € Source: EFPIA: "The Pharmaceutical Industry in Figures, Key data 2017"
15	**Reputation of pharmaceutical sector**	1000 respondents per country, educated audiences, conducted in 2017, favourable opinions minus unfavourable opinions, ignoring neutral respondents. Propietary survey, unpublished
16	**Quality of care** WHO Ranking	Healthcare Access and Quality Index based on mortality from causes amenable to personal health care in 195 countries and territories, 1990–2015: a novel analysis from the Global Burden of Disease Study 2015. Source : The Lancet, 2017

17	**Size of healthcare budget** EMERGO Data	2014 Data Absolute worth in Billion$ Source: EMERGO consultancy 2014 https://www.emergogroup.com/resources/worldwide-health-expenditures European countries also available in € : EUROSTAT 2014 http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Current_healthcare_expenditure,_2014_YB17.png
18	**Pharmaceuticals as part of healthcare budget (%)** OECD Data	2015 Data Pharmaceutical spending as part of total healthcare spending per country. Source OECD Statistics "Pharmaceutical spending as % of total health spending" https://data.oecd.org/
19	**Size of MedTech Market**	2015 Data Source MedTech Europe: "The European Medical Technology Industry – In figures" - 2016
20	**Time of patient access** - days between EMA approval & launch	2014-2016 Data Source : EFPIA "Market Access Delays 2017 - Patient W.A.I.T. Indicator" February 2018