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Switzerland – a global pharma hub

If asked about the Swiss economy, people usually first think of banks, chocolate, tourism or watches. These industries are indeed of high importance for the national economy. Yet an industry that is often missing in this list, despite having emerged as one of the leading lights in the Swiss economy over the last century, is the pharmaceutical sector. This publication aims to show the importance of the pharmaceutical industry for the Swiss economy in general and for the region of Basel in particular.

The Swiss pharmaceutical sector is a major employer: More than 40,000 people work directly for the industry. If the indirect work created through ancillary industries is included, as many as 172,000 jobs are related to the pharmaceutical industry. Moreover, it accounts for up to a third of all Swiss exports, and the productivity of the industry is four times as high as that of the economy as a whole. Three big clusters – the Lake Geneva area, the Basel region and Zurich-Zug-Lucerne – account for the lion’s share of the gross value added of the Swiss pharmaceutical industry.

The Basel region is the pharma hub of Switzerland. Almost two thirds of all employees of the Swiss pharmaceutical industry work in this cluster, and the majority of value added in the pharmaceutical industry is generated in the Basel region. What is more, the industry reinvests much of its earnings in research and development (R&D). This is supported by the fact that R&D expenditure of the Basel region amounts to more than 14 percent of regional GDP – a number far higher than in any other pharma cluster of the world.

The high research intensity directly translates into the number of patent applications filed. In 2011, roughly 170 patents per one million inhabitants were registered by the regional pharmaceutical industry. Again, the Basel region stands out from all other regions in OECD countries. All this has led to a dynamic development of the regional economy. The region’s pharmaceutical industry accounts for four out of every five Swiss francs earned in exports today.

Although it has lost some of its pace in recent years, the Basel region still offers promising growth prospects in the medium and long term: The research institute BAK Basel Economics estimates the annual growth of value added in the regional pharmaceutical industry at about four percent up to 2020, which is twice as much as the expected growth for the regional economy as a whole. For this reason, the importance of the industry for the Basel region is expected to rise further in the near future, so that it may one day be mentioned along with the other flagship industries of the Swiss economy.
The pharmaceutical industry impacts the Swiss economy both directly and indirectly. The direct economic importance of the pharmaceutical industry can be measured for example by the number of employees, the value of exports or the gross value added (GVA). The latter is defined as the increase in the value of goods resulting from the production process and is calculated by deducting the value of intermediate goods and services from the total production value. The GVA of the pharmaceutical industry has grown on average by more than 9 percent annually over the last decade and is thus far higher than the GVA of other industries.

The indirect economic importance of the industry arises from its interdependencies with companies from other industries, from the wage earnings of its employees and from the tax revenue from the companies. All these factors create an additional demand for consumer goods and services, which in turn generate approximately 132,000 jobs in other industries.
Roughly **75%** percent of the gross value added (GVA) in the Swiss pharmaceutical industry in 2012 has been generated by the Basel region, Lake Geneva area and Zurich-Zug-Lucerne.

### Basel region
The pharmaceutical cluster Basel is home to the headquarters of pharmaceutical companies steeped in tradition, such as Bayer, Boehringer Ingelheim, Novartis and Roche, as well as the biopharmaceutical company Actelion.

### Lake Geneva area
The cantons of Bern, Fribourg, Geneva, Neuchâtel and Vaud constitute the Lake Geneva cluster and are home to the Swiss branches of Celgene, GlaxoSmithKline, Merck Serono, Sanofi and UCB.

### Zurich-Zug-Lucerne
The Zurich-Zug-Lucerne cluster has grown into an attractive centre for international life sciences companies and is home to the following companies: AbbVie, Alcon, Amgen, AstraZeneca, Bayer, Biogen, Bristol-Myers Squibb, Gilead, Janssen, Lundbeck, Merck, MSD (Merck Sharp & Dohme), Novartis, Pfizer, Roche and Vifor Pharma.

### Schaffhausen-Ticino-Valais
Besides the big pharma clusters, there are three smaller clusters in Switzerland: In Canton Schaffhausen, the pharmaceutical industry plays an important role for the local economy and is based on the activities of Cilag, a subsidiary of the pharmaceutical company Janssen that is part of the Johnson & Johnson group. In the Ticino cluster, the pharmaceutical industry has grown historically and now includes several medium-sized companies. Canton of Valais plays a strategic role as supplier of chemical inputs for the pharmaceutical production.
Established in the second half of the 19th century, the pharmaceutical industry quickly assumed an important place in the Swiss economy and remains one of the strongest growth industries to this day. This is due not only to the historical significance of the pharmaceutical industry in the region of Basel, but also to the attractive business environment of Switzerland as a whole.

For the fourth time in succession, Switzerland was ranked first in the Global Innovation Index of the World Intellectual Property Organization (WIPO) in 2014. Switzerland’s capacity for innovation is an essential precondition for a prosperous pharmaceutical industry. Other factors such as tax, accessibility and a large pool of highly trained employees are attracting leading companies in the fields of pharmaceuticals, biotechnology and other related industries to Switzerland.

Thanks to its innovation capacity, the pharmaceutical industry typically achieves an above-average level of productivity, and the productivity growth rate also usually outstrips that of industry as a whole.
Major importance of Swiss pharmaceutical industry

In an international comparison of the average value-added growth rate, the Swiss pharmaceutical industry came out top: between 2000 and 2012, the Swiss pharmaceutical industry showed an average annual growth of just over 9 percent, ahead of Germany and the Netherlands and more than twice as high as that of the UK and the USA.

The value added of the Swiss pharmaceutical industry is also impressive as a proportion of the overall economy, with the industry generating almost four percent of Switzerland’s total GVA. Even in second-placed Belgium, this proportion is below two percent. The contribution of the pharmaceutical industry to total value added has thus steadily grown over recent years. As a consequence, the importance of the industry for the Swiss economy as a whole has also grown.
Strong dynamism of the Swiss pharmaceutical industry

The nominal gross value added of the Swiss pharmaceutical industry has almost tripled in the past 15 years and stood at around 24 billion Swiss francs in 2012. When adjusted for inflation, the gross value added has actually quadrupled over the same period. And the number of employees has also steadily increased in the last two decades, reaching more than 40,000 for the first time in 2012.

While the number of employees working in Switzerland’s pharmaceutical industry accounts for about one percent of all employees in Switzerland, the corresponding value added constitutes almost four percent of the economy as a whole. This ratio reflects above-average productivity of the pharmaceutical industry relative to the overall economy.
Relevance of pharmaceutical exports
The value of pharmaceutical exports has tripled over the past decade and currently stands at 71 billion Swiss francs. At the same time, pharmaceutical exports also accounted for an increasing proportion of Swiss exports overall: in 2014, around one out of three Swiss francs earned through exports was generated by the pharmaceutical industry.

Since 2005, exports of pharmaceutical products have increasingly shifted towards the BRIC states – Brazil, Russia, India and China – and to the USA, while the proportion exported to Europe has fallen. The recent crisis in the Eurozone and the strong Swiss franc are likely to be the main reasons for this decrease. Nonetheless, Europe continues to be the most important export market for Swiss pharmaceuticals.

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**GROWTH DRIVER PHARMACEUTICALS**

**Relevance of pharmaceutical exports**

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**SWISS PHARMA EXPORTS**

Share of total exports (in %)

<table>
<thead>
<tr>
<th>Year</th>
<th>Pharmaceutical exports</th>
<th>Rest</th>
</tr>
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<tbody>
<tr>
<td>2000</td>
<td>82% 18%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>66% 34%</td>
<td></td>
</tr>
</tbody>
</table>

2014: Pharmaceutical exports 71 bn CHF
Rest: 22 bn CHF

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**SWISS PHARMA EXPORTS ACCORDING TO DESTINATIONS**

Share of destinations (in %)

<table>
<thead>
<tr>
<th>Year</th>
<th>Europe</th>
<th>USA</th>
<th>Japan</th>
<th>BRIC</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>67%</td>
<td>11%</td>
<td>5%</td>
<td>3%</td>
<td>14%</td>
</tr>
<tr>
<td>2014</td>
<td>54%</td>
<td>16%</td>
<td>4%</td>
<td>7%</td>
<td>19%</td>
</tr>
</tbody>
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Competitive thanks to high productivity

The pharmaceutical sector exhibits the highest productivity of all Swiss industries: on average, a worker generates goods worth 626,000 Swiss francs per year, which is about four times as high as the productivity in the overall economy. This high productivity is due to the research intensity and the highly specialized production processes of the pharmaceutical industry.

The productivity of Switzerland’s life sciences industry also holds up exceptionally well when compared with other countries. After correcting for purchasing power, it amounts to 286,000 US dollars, which puts Switzerland in first place. Only the three US clusters Boston, New York and San Francisco Bay Area and also Øresund can somewhat keep pace in terms of their labour productivity.

**LABOUR PRODUCTIVITY OF SWISS INDUSTRIES**
Nominal GVA per employee (FTE, in 1'000 CHF), 2012

<table>
<thead>
<tr>
<th>Industry</th>
<th>Productivity (1'000 CHF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharma</td>
<td>626</td>
</tr>
<tr>
<td>Energy</td>
<td>347</td>
</tr>
<tr>
<td>Financial sector</td>
<td>286</td>
</tr>
<tr>
<td>Chemicals</td>
<td>200</td>
</tr>
<tr>
<td>Information, communication</td>
<td>188</td>
</tr>
<tr>
<td>Investment goods</td>
<td>161</td>
</tr>
<tr>
<td>Food, tobacco</td>
<td>157</td>
</tr>
<tr>
<td>Total economy</td>
<td>156</td>
</tr>
<tr>
<td>Transport</td>
<td>131</td>
</tr>
</tbody>
</table>


**LABOUR PRODUCTIVITY OF LIFE SCIENCES INDUSTRY**
Nominal GVA per employee (in 1'000 USD PPP), 2012

<table>
<thead>
<tr>
<th>Location</th>
<th>Productivity (1'000 USD PPP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switzerland</td>
<td>626</td>
</tr>
<tr>
<td>Boston</td>
<td>347</td>
</tr>
<tr>
<td>Øresund</td>
<td>286</td>
</tr>
<tr>
<td>SF Bay Area</td>
<td>200</td>
</tr>
<tr>
<td>New York</td>
<td>188</td>
</tr>
<tr>
<td>Paris</td>
<td>161</td>
</tr>
<tr>
<td>Milan</td>
<td>157</td>
</tr>
<tr>
<td>London</td>
<td>156</td>
</tr>
<tr>
<td>Munich</td>
<td>131</td>
</tr>
</tbody>
</table>


* International data according to BAKBASEL database 2013, Swiss data according to ESA 2010.
The Basel region – Basel-Stadt, Basel-Landschaft and Fricktal – looks back on a long history of innovation-driven economic development. The second half of the 19th century saw the emergence of the chemical industry as an auxiliary supplier to the textile industry. At the turn of the century, the chemical industry started to produce the first pharmaceuticals in its search for high-value, patentable products and its efforts to circumvent the increasingly unfavourable conditions on the dyestuffs market.

In the 20th century, the pharmaceutical industry quickly developed into an important driver of growth and became the dominant line of business. After a period of diversification (e.g. agrochemicals) following World War II, the pharmaceutical industry began to refocus on its core business from the 1980s onwards. More recently, biotechnology has become one of the main hopes of the industry’s eternal quest for innovation.

Today, more than 25,000 employees work in the pharmaceutical industry of the Basel region, accounting to 64 percent of all employees of the Swiss pharmaceutical industry. The pharmaceutical industry of the Basel region also generates the lion’s share of value added, and thus contributes increasingly to the regional GDP.
Whereas the life sciences industry is generally important in Switzerland as whole, the Basel region is dominated by the pharmaceutical industry. In Basel-Stadt, 92 percent of all employees of the life sciences industry work for pharmaceutical companies. In Basel-Landschaft and Fricktal this ratio is 59 and 86 percent, respectively.

Moreover, the pharmaceutical industry is the region’s main source for exports. In 2014 the cantons of Basel exported goods and services on the order of 56 billion Swiss francs. Roughly 49 billion (or 87 percent) thereof has been generated by the pharmaceutical industry.

These figures, together with the industry’s share in total employment, underline the paramount importance of the pharmaceutical industry for the Basel region.
Innovation – the introduction of new things, ideas or ways of doing something – is one of the main factors contributing to growth in a modern economy. Especially in knowledge-intense sectors, competition is primarily driven by innovation rather than by price. Therefore, innovation is an essential factor for success in the pharmaceutical industry.

Innovation is also an important indicator for the choice of location made by firms. The greater a region’s potential to innovate, the more attractive it appears in international competition with other business locations.

The following section sheds light on factors affecting the Basel region’s innovation capacity. The indicators considered include research and development expenditure, patents and the research quality of the region’s universities.
High investment in research and development
Measuring research and development (R&D) spending as a proportion of GDP and comparing it internationally shows the Basel region to be an outlier: at 14 percent of GDP, the Basel region’s investment in R&D is more than double that of Boston and other US-based pharma clusters that are well-known internationally for their innovation capacity. Moreover, the Basel region’s figure of 14 percent is significantly higher than the Swiss average of just under 5 percent.

The lion’s share of R&D expenditure in the Basel region is financed by the private sector. This fact can be mostly explained by the extensive research activity of the pharmaceutical companies Actelion, Bayer, Novartis and Roche, which are based in the Basel region.

Basel region leading in patent registrations
The above-average investment in research and development in the Basel region is also reflected in a large number of patent registrations in the pharmaceutical domain. In the Basel region, about 170 patents per million inhabitants were registered in the pharmaceutical area in 2011. This figure is considerably higher than in other pharma clusters such as Boston, San Francisco or Munich, and five times as much as the Swiss average.

The indicator of patent registrations allows research output to be measured rather than research capacity, because it implies the realization of application-oriented and value-generating inventions. The registration process takes up to three years, which explains the time lag in the availability of the indicator.
High research quality of universities
The quantity and quality of academic research attracts specialists from all around the world and creates spillover effects.

According to the Shanghai Index, Switzerland’s universities have been assessed as high-quality institutions. The University of Basel competes with the top universities in Europe and overseas. In the specialized domain of life and agricultural sciences, the index ranks Basel top in Europe along with London and the Swiss average, the latter reflecting the academic strength of the two Federal Institutes of Technology in Lausanne and Zurich.

Shanghai Index:
The Academic Ranking of World Universities uses six indicators in four areas (quality of education and personnel, research achievement, size of institution) in order to evaluate more than 1,000 universities worldwide, of which the best 500 are published with their corresponding ranking.
In the course of globalization, companies are increasingly facing decisions on where best to locate. For this reason, it is essential for a business location to constantly monitor and compare its own inward investment factors with those of other regions.

While costs might play an important part, non-quantifiable factors are also important elements of such decisions. The latter include e.g. the availability of research facilities and international schools and are of great interest for potential employees. The employer, on the other hand, might be more interested in the regulatory framework, such as accessibility, taxation or labour and market regulation.

The innovation-intensive pharmaceutical industry faces a constant need for skilled manpower, such as engineers, IT professionals, marketing specialists and researchers. Today’s highly qualified workforce is increasingly mobile and also takes decisions concerning its living environment. Factors affecting the quality of life are thus becoming increasingly important.
BAKBASEL Attractiveness Index
Inward investment factors substantially influence the growth potential of a region. The Attractiveness Index was developed by BAKBASEL in order to quantify this growth potential and to make it internationally comparable. It includes four of the most important inward investment factors – accessibility, innovation, regulation and taxation – and indexes their scores for each region.

The Basel region compares favourably with other pharmaceutical industry locations: With a score of slightly more than 111 points, it ranks considerably higher than the average of Western Europe and is on a same level as the prestigious pharma clusters London, Munich and Oxford. The above-average score of the Basel region rests on its attractive taxation system, the liberal regulation of the Swiss market and the excellent innovation capacity of the Basel region.
Low levels of regulation
The intensity of market regulation affects the attractiveness and the growth perspectives of a business location.

An international comparison of the way labour and product markets are regulated shows that Switzerland has relatively low levels of regulation. Only the Anglo-Saxon countries have even lower levels of regulation, whereas France, Germany and Italy are subject to much stronger regulation in both markets.

Attractive taxation system
A region’s taxation system is an important factor not only for companies deciding where to locate their operations, but also with regard to the attractiveness for skilled labour.

Compared internationally, the Basel region’s taxation system proves to be very attractive: with respect to both taxation of companies and highly qualified manpower, the Basel region’s tax burden is markedly lower than that of pharma locations in other countries.

Measure of regulation (Regulation Index):
index created using regulation factors elaborated by the OECD and the Fraser Institute (0 = low level of regulation; 6 = high level of regulation).

Measure of taxation (Taxation Index):
effective average tax rate that considers all relevant tax rates and rules for an investment of a company or a highly qualified worker.
Good accessibility of Switzerland

With the advancing integration of global markets, the geographic location and the transportation system are becoming increasingly important in determining a region’s ability to participate in the economic growth process. Accessibility is thus becoming a crucial inward investment factor.

The accessibility of Switzerland comes third after London and Paris, with the Basel region ranking more than 8 percent above the Western European average.

High number of international schools

The availability of international schools is a critical factor in the global competition for highly qualified workers. In order to compare the availability of international schools between the pharma locations, the number of courses offered per million inhabitants has been counted. The Basel region shows the highest number of courses offered per million inhabitants – well above London, New York and marginally more than the Swiss average.

Availability of international schools:
number of courses offered by the International Baccalaureate Organization.

Accessibility Index:
indexed measure that quantifies the accessibility of a region. It takes into account the time spent travelling, the frequency of connections and the attractiveness of the destinations (regions are weighted by their GDP).
Long-term forecasts for the pharmaceutical industry by BAK Basel Economics estimate the annual growth of value added in the Basel region in the period 2015-2020 at 3.7 percent for Basel-Stadt and 4.6 percent for Basel-Landschaft. This growth rate is significantly higher than the estimated growth rate of the economy as a whole. The reasons for the higher growth potential of the pharmaceutical industry can be found in the growing world population, the increasing middle class and the ageing of the Western population. Last but not least, the high innovation capacity in the Basel region and the expansion projects of companies in the Basel region give cause for optimism about the future performance of the pharmaceutical industry in the Basel region.
Actelion
Actelion Ltd., with headquarters in Allschwil (BL), is a leading biopharmaceutical company focused on the discovery, development and marketing of innovative medicines for diseases where there is a high medical need. Actelion is a pioneer in the field of pulmonary arterial hypertension (PAH). Our PAH portfolio covers the disease spectrum of WHO function classes II to IV and includes medicines for oral, inhalable and intravenous therapy. Actelion also has treatments that are approved by the regulatory authorities but not available in all countries for a number of diseases that require specialist treatment. These include Gaucher’s disease type 1, Niemann-Pick disease type C, digital ulcerations in patients with systemic sclerosis and also cutaneous T cell lymphoma of the mycosis fungoides type.

www.actelion.com

Bayer in Basel
Bayer was founded in 1863 and is a leading, global life sciences company today, focusing on innovations in the field of healthcare and food security. Bayer HealthCare Basel (Bayer Consumer Care AG, Basel) is the European headquarters of the global Consumer Care division of the Bayer Group. Basel is home to global functions such as Marketing, Research & Development and Product Supply. In addition, the Pharmaceuticals Division and Diabetes Care are also located in Basel. The company employs around 600 people from more than 60 nations in Basel. Today, Bayer employs more than 1,000 people in Zurich, Basel, Muttenz and Zollikofen. We help patients by preventing, relieving and curing diseases as well as improving diagnostic methods. And we contribute to the adequate provision of high-quality food and animal feed, as well as renewable plant-based raw materials.

www.bayer.ch
**Boehringer Ingelheim**

Boehringer Ingelheim is a group that maintains global operations with 145 group companies in 50 countries and employs a total of 46,000 people. Boehringer Ingelheim employs around 100 people in Switzerland and is active in the fields of human pharmaceuticals and animal health. The main indications for the products of this family-owned business, which was founded in 1885, are in the areas of respiratory disorders, cardiovascular disease, central nervous system, oncology, metabolic syndrome and virology.

www.boehringer-ingelheim.ch

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**Novartis**

Novartis is the largest healthcare company in Switzerland and one of the biggest exporters. The company offers a diversified portfolio in order to meet the changing needs of patients and societies as well as possible with innovative medicines, products for eye care and low-cost generic medicines. Novartis is the only company with world leading positions in all these fields. The company was formed in 1996 by the merger of Ciba-Geigy and Sandoz. Novartis operates in more than 140 countries but is rooted in Switzerland. The company employs around 130,000 people. Of these, around 13,000 work in Switzerland – spread over a total of nine sites: Basel (BS), Schweizerhalle (BL), Fribourg (FR), Geneva (GE), Locarno (TI), Rotkreuz (ZG), Schaffhausen (SH), Schlieren (ZH) and Stein (AG).

www.novartis.ch
Roche
Roche is one of the leading companies in research-based healthcare. It combines the two business areas of Pharmaceuticals and Diagnostics and, as the world’s largest biotech company, it develops medicines in the fields of oncology, immunology, infectious diseases, ophthalmology and the neurosciences. Roche is the world’s most important supplier of products for in vitro diagnostics and tissue-based cancer tests and a pioneer in diabetes management. The Roche Group, with headquarters in Basel, employs more than 88,500 people worldwide. Basel/Kaiseraugst is one of the largest sites worldwide with around 9,400 employees from more than 90 nations. Roche Pharma (Schweiz) AG in Reinach employs around 130 people in the areas of marketing and sales, clinical research, regulatory affairs, scientific documentation and medical information.

www.roche.ch
GLOSSARY

ARWU  Academic Ranking of World Universities
ESA  European System of Accounts
FCA  Federal Customs Administration
FSO  Federal Statistical Office
FTE  Full-Time Equivalent
GDP  Gross Domestic Product
GVA  Gross Value Added
IBO  International Baccalaureate Organization
IVT  Institute for Transport Planning and Systems
OECD  Organisation for Economic Co-operation and Development
PPP  Purchasing Power Parity
ZEW  Centre for European Economic Research

Note: The source “BAKBASEL, 2014” refers to data from September 2014.

The content of this brochure can also be found on the website of Interpharma at www.interpharma.ch. Readers are free to download and use the charts in their latest version for their own purposes provided the sources are properly quoted.
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