



# Biotechnology

## Funding gap jeopardising competitiveness

April 9, 2015

**Author**

Christoph Laskawi  
+49 69 910-31924  
christoph.laskawi@db.com

**Editor**

Lars Slomka

Deutsche Bank AG  
Deutsche Bank Research  
Frankfurt am Main  
Germany  
E-mail: [marketing.dbr@db.com](mailto:marketing.dbr@db.com)  
Fax: +49 69 910-31877

[www.dbresearch.com](http://www.dbresearch.com)

**DB Research Management**  
Ralf Hoffmann

Publication of the German original:  
February 11, 2015

Biotechnology is one of the key technologies for securing Germany's position as a manufacturing location. While biotechnology research in Germany is being conducted at the leading edge and grants make it easier to set up a biotech firm, young companies often encounter funding bottlenecks when the start-up financing phase comes to an end. One indicator of how grave the funding situation is in Germany is that the average amount of venture capital available to a company is around four times as high in the US as it is in Germany. This funding gap could jeopardise Germany's high-tech strategy objective of beefing up key technologies in the domestic market.

**Companies focused on medical applications dominate the German biotechnology sector.** For 48% of Germany's total of 570 dedicated biotechnology companies the main area of activity in 2013 was healthcare/medicine. Industrial biotechnology, bioinformatics and agrobiotechnology are the operating areas of 10%, 5% and 4% of companies respectively. The dedicated biotechnology firms in Germany generated revenues of EUR 2.9 bn in 2013 and spent around EUR 0.9 bn on research and development activities; this corresponds to an above-average R&D ratio in excess of 31%.

**On an international comparison Germany remains one of the leaders in terms of patents filed and biopharmaceutical projects.** According to OECD figures, Germany ranked third for biotech patent filings in 2013 with a share of about 6% of the world's filings. In addition, Germany ranks fourth in terms of the number of dedicated biotech firms. The global leader is the US; it has fewer firms than the EU and generates nearly twice as many patents.

**Germany's competitiveness in research and manufacturing is threatened by a funding shortfall in cost-intensive business phases following on from the start-up financing that is sometimes provided by the government. This can inhibit the innovation process by causing projects to be cancelled.** Critical phases in the medical applications area for example are the clinical research phases for drug developers.

**New incentives for greater involvement of venture capital providers could give the sector a lasting boost.** The federal government has already implemented a recommendation made by the business and venture capital provider associations to offer targeted incentives for investments in fledgling companies. A tax break for equity funds for private and institutional investors that are allowed to only invest in fledgling high-tech firms could also give a boost to innovative companies and especially biotechnology firms. A similar programme which had a very positive impact in France should be assessed on its feasibility for Germany.



## Biotechnology: Funding gap jeopardising competitiveness

### Biotechnology is supposed to help ensure Germany's competitiveness as a manufacturing location

#### Defining biotechnology

1

The most commonly used definition of biotechnology comes from the OECD and is as follows:

"The application of science and technology to living organisms as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services."

Source: OECD

In November 2014 Germany's federal government unveiled a new high-tech strategy. The strategy stresses, among other things, the significance of biotechnology for Germany's status as a high-tech location, since as an enabling and key technology it impacts on numerous other business areas (e.g. biopharmaceuticals and biotechnological production processes) and is supposed to make a significant contribution to securing Germany's competitiveness as a manufacturing location. For example, industry associations expect that over the long term environmentally friendly production processes or more effective medicines can be developed using biotechnological processes. The basis for the successful development of the biotech sector is a high-calibre research environment that does basically exist in Germany. One major challenge that has to be surmounted for the new technologies to be successful is the financing of frequently very costly projects.<sup>1</sup>

#### Application areas for biotechnology

2

Within the biotechnology industry a distinction is made between three specific segments:

- **Green biotechnology:** Green biotechnology describes the use of biotech processes in agriculture or with plants in general.
- **Red biotechnology:** Red biotechnology describes the medical application of biotechnological processes to develop new therapeutic and diagnostic processes.
- **White biotechnology:** The industrial application of biotechnology, for example in production processes or as an element of goods is categorised as white biotechnology.

Source: biotechnologie.de

Start-up financing for biotechnology companies in Germany is based on a relatively broad foundation thanks to a variety of government funding programmes and the commitment of venture capital providers; it thus helps to translate the ambitious high-tech strategy into tangible measures. At the same time there is a growing clamour of complaints from young biotech firms about the lack of private and public domestic providers of capital for follow-up funding and/or research funding in later phases. Government incentives for providing venture capital to the biotech sector could act as a catalyst towards strengthening biotechnology in Germany over the long term. The relevant literature suggests that innovations in biotechnology generate positive indirect effects on improvements to products in other sectors (such as healthcare/pharma). The resulting positive macroeconomic effects may serve as "regulatory legitimization" for increased funding for biotechnology as an interdisciplinary sector.<sup>2</sup>

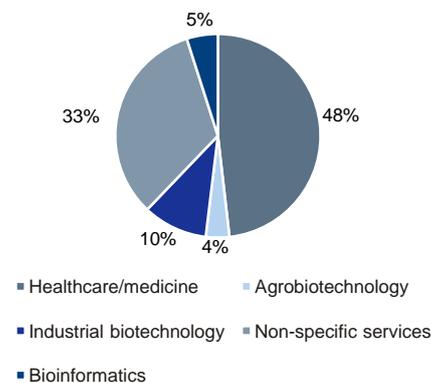
### Status quo of biotechnology sector in Germany

#### Firms are small or medium sized and research intensive

#### Medical focus dominant

3

Share of individual biotech applications in Germany, 2013



Sources: BMBF, BIOCOM

Biotechnology is generally subdivided into three segments or application areas: green, red and white biotechnology. In addition, the OECD differentiates between dedicated biotechnology firms and other biotechnologically active companies. At dedicated biotech firms the company's focus is mainly or exclusively biotechnology. The remarks below concern dedicated biotechnology companies only.

According to a survey by the Federal Ministry for Education and Research (BMBF) and BIOCOM there were roughly 700 companies operating in the biotechnology sector in Germany in 2013. Of these, there were 570 dedicated and 130 other biotech firms. The majority of biotech firms are also to be found in regional clusters with a respective overarching research focus. The majority of dedicated biotech companies are active in the field of red biotechnology (48%). In the white and green biotech fields, by contrast, only 10% and 4% respectively are dedicated biotechnology firms. The low proportion of green biotechnology is

<sup>1</sup> BMBF (2014). Die neue Hightech-Strategie – Innovationen für Deutschland.

<sup>2</sup> See Wydra/Nusser (2011). Diffusion and economic impacts of biotechnology – a case study for Germany.



## Biotechnology: Funding gap jeopardising competitiveness

a reflection of the fact that green genetic engineering and genetically modified crops – which are elements of green biotechnology – are viewed warily by sections of society and the political class in Germany. That is why there is now hardly any noteworthy research being conducted or even practical applications in this field in Germany. Another 5% of companies operate in the bioinformatics segment and 33% provide non-specific biotechnology services. According to the survey, the average biotechnology firm in Germany is now 11 years old, while some firms have actually been in existence for more than 30 years.<sup>3</sup>

### Biotechnology sector in Germany

4

	2007	2008	2009	2010	2011	2012	2013
Number of dedicated biotech firms	469	501	531	538	552	565	570
Number of other firms active in biotechnology	91	92	114	125	126	128	130
Number of employees (dedicated biotech firms)	14,360	14,450	14,950	15,480	16,300	17,430	16,950
<i>Per firm</i>	31	29	28	29	30	31	30
Number of employees (other biotech firms)	15,120	15,520	16,650	17,000	17,570	17,760	18,450
<i>Per firm</i>	166	169	146	136	139	139	142
Sales (dedicated biotech firms), EUR m	2,011	2,191	2,184	2,374	2,619	2,903	2,864
<i>Change yoy, %</i>		9.0%	-0.3%	8.7%	10.3%	10.8%	-1.3%
R&D spending (dedicated biotech firms), EUR m	1,049	1,061	1,046	1,015	975	934	899
<i>Change yoy, %</i>		1.1%	-1.4%	-3.0%	-3.9%	-4.2%	-3.7%
<i>R&amp;D spending as % of sales, EUR m</i>	52.2%	48.4%	47.9%	42.8%	37.2%	32.2%	31.4%

Sources: BMBF, BIOCOM

Between 2007 and 2013 the number of biotechnology companies increased by a hefty 101, or 22%. The growth has, however, slowed sharply over the last few years. In 2013, the number of companies rose by just five compared with 2012 (+1%). According to the above-mentioned report, a mere 11 dedicated biotechnology firms were founded in 2013 (2012: 20). The difference of six companies was due to takeovers, mergers or bankruptcies. Detailed data on this is not yet available.<sup>4</sup>

German biotechnology firms are predominantly quite small in terms of revenues; however, their research activities are extensive. In 2013 there was a total of just 16,950 persons working in the sector. According to the findings of the BMBF/BIOCOM survey each dedicated biotechnology company had an average of 30 employees in 2013. This figure fluctuated only slightly between 2007 and 2013. Nominal revenues of dedicated biotechnology companies grew between 2007 and 2012 by a resounding EUR 892 m in absolute terms or 44%, to EUR 2.903 bn. In 2013, however, sector revenues fell slightly compared with 2012 (-1.5%) to EUR 2.864 bn. In contrast to the sharp increase in revenues the expenditure on research and development (R&D) has fallen steadily since 2008. In 2013 R&D spending came to nearly EUR 900 m, which represented a 15% decline compared with 2008. Between 2007 and 2010 R&D spending exceeded EUR 1 bn every year. Nevertheless, R&D spending as a share of revenues remains remarkably high at around 31%. The R&D ratio for the entire German manufacturing sector is merely just under 4%.<sup>5</sup>

<sup>3</sup> See BMBF/BIOCOM (2014). Die deutsche Biotechnologie-Branche. BMBF (2010). Biotechnology in Germany: Deutsche Bank Research (2011). Germany's biotechnology regions.

<sup>4</sup> See BMBF/BIOCOM (2014). Die deutsche Biotechnologie-Branche.

<sup>5</sup> See Stifterverband für die Deutsche Wissenschaft. p. 2013. FuE-Datenreport 2013.

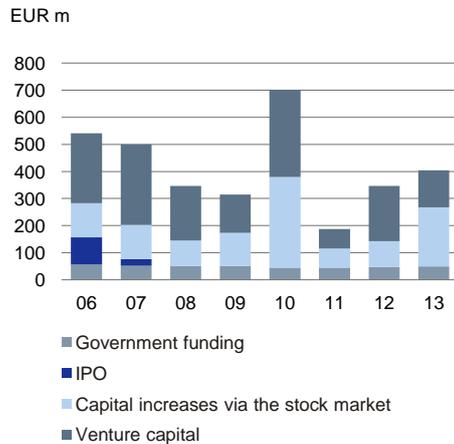


## Biotechnology: Funding gap jeopardising competitiveness

### Corporate financing is a challenging activity

Funding volumes of biotech firms vary considerably

5



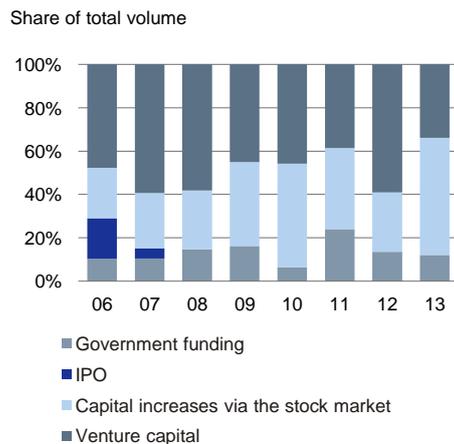
Sources: BMBF, BIOCOM

Biotechnology firms in Germany are primarily funded via the following sources: venture capital, the stock market (capital increases and/or flotations (IPOs)) and grants from federal and Länder governments. According to the BMBF and BIOCOM, capital increases via the stock market were the main source of funding in 2013 (54% of the funding volume). With a total volume of EUR 404 m this share is, however, heavily distorted by large individual transactions. In 2012, for instance, the capital increases' share was just 27%. While the absolute value of private sources of funding fluctuated during the stated period, annual funding from public-sector grants remained relatively stable in absolute terms. The survey also revealed that venture capital has regularly constituted the biggest share of funding over recent years. Chart 5 shows that as a result of the global recession of 2008/09 total volume fell markedly compared with the two preceding years. What is also striking is that since 2008 no biotech company in Germany has raised funds via an initial public offering. In 2014 three German biotech firms did go public – however none of them listed in Germany.<sup>6</sup>

In 2014 one company successfully utilised the new financing option of crowdfunding. The funding volume had originally been set at EUR 400,000, but during an extension of the funding phase it was successfully raised to EUR 1 m, in order to finance additional clinical trials.<sup>7</sup> It is, however, unclear whether this still new form of funding can regularly generate the large volume of capital required by companies for clinical trial phases. One planned regulation would cap the total raised by each crowdfunding venture at EUR 1 m, which would prevent major, cost-intensive projects from receiving sufficient funding under certain circumstances. Nevertheless, crowdfunding could represent a relevant alternative for smaller research projects in future.

Funding sources of biotech firms very volatile

6



Sources: BMBF, BIOCOM

### Funding programmes provide sufficient volume of start-up financing and project financing for SMEs

On examination, we find that there are distinct differences between the funding requirements for each individual company phase, and this is (not only) the case for biotech firms. In most cases sufficient start-up financing is available for biotech firms in Germany thanks to federal and Länder government funding programmes as well as investments from private financiers. In this phase much less capital is typically required than in subsequent rounds of funding. By contrast, obtaining the follow-up funding required some years later – for instance to implement cost-intensive research projects – poses a major challenge to many firms.

The public-sector funding programmes outlined below (in the explanatory note) show that the funding of firms in the start-up phase and of (subsequent) research projects by established companies is based on a relatively broad foundation. Between these company phases, by contrast, there is a funding gap. As the individual research and development phases saddle companies with huge costs and internal funding is often impossible due to a lack of operating activity and/or insufficient cashflow, this funding gap constitutes an existential threat to many firms.<sup>8</sup> A funding bottleneck for example in the clinical development phases can result in a high ratio of project cancellations, even

<sup>6</sup> See <https://www.boersen-zeitung.de/index.php?li=1&artid=2014239079>

<sup>7</sup> See <https://www.seedmatch.de/startups/riboxx>;

<http://www.biotechnologie.de/BIO/Navigation/DE/Aktuelles/wirtschaft,did=178532.html?listBild=74620&>

<sup>8</sup> A study by DiMasi and Grabowski found that an average of USD 226 m is spent on developing a biotechnological pharmaceutical product prior to the approval procedure. See DiMasi/Grabowski (2007). The cost of biopharmaceutical R&D: Is biotech different?



## Biotechnology: Funding gap jeopardising competitiveness

though the prospects for these projects are definitely lucrative. Ultimately this harms the sector's competitiveness.

Explanatory note: Selected funding programmes outlined

7

In the following we shall present a number of funding programmes that have been instigated by the German government and the EU to finance company start-ups or research. There are also other funding programmes at the Länder level, but we will not be including them in this note.

"GO-Bio", the latest start-up funding programme specially designed to promote biotechnology, is administered by the BMBF and was started in 2005. The funding recipients are university and non-university research institutes/start-ups that emerged as winners in a previous contest. The successful applicants receive their funding in two phases, each lasting a maximum of three years. While the first phase is funded entirely by the BMBF and its purpose is the technological validation and the researching into an idea, in the second phase private investors must be found to provide co-financing. The objective of the programme is to enable a company to be started up out of a research project and to generally enable the commercial exploitation of research findings.

Sources: BMBF (2010). *Biotechnologie in Deutschland*; BMBF (2013). *GO-Bio*.

Another funding programme that is not specifically targeted at biotechnology firms and whose key objective is to mobilise venture capital for start-ups, is the "INVEST – Zuschuss für Wagniskapital" programme. This programme pays back each investor 20% of the amount they have invested. The minimum investment required in order to qualify for funding is EUR 10,000. The maximum amount per investor to which the grant can be applied is EUR 250,000. The maximum grant per company per year is EUR 1 m. By mid-2014, however, only around EUR 7 m of the EUR 150 m set aside for the INVEST-Zuschuss programme in the federal budget had been drawn down.

Sources: BMBF (2014). *Richtlinie zur Bezuschussung von Wagniskapital privater Investoren für junge innovative Unternehmen – Neufassung*; BAND (2014). *Ein Jahr INVEST-Zuschuss für Wagniskapital*.

In 2007 the BMBF launched an R&D project funding initiative for small and medium-sized companies called "KMU-innovativ". It aims to promote technology-related research in the fields of biotechnology, medical equipment, information and communications technologies, nanotechnology, production technology and technology for resource and energy efficiency. Besides the financial support the programme also offers a liaison service that provides assistance with filling out the grant application. This application is then assessed and a response is issued after the twice-yearly assessment deadline. If a project is approved for funding, the companies/research institutions must provide at least 50% of the project costs themselves. The basic requisite for funding is among other things that the firm is already operationally active and able to afford its obligatory share of the financing without jeopardising the operating business. Projects usually run for three years.

Source: BMBF (2010). *Förderung kleiner und mittelständischer Unternehmen in der Biotechnologie*.

The EU research promotion programme "Horizont 2020" regards biotechnology as a key technology – as does Germany's high-tech strategy – and it is a recipient of funding. In contrast to the German strategy, however, at the European level international cooperation between research institutions or firms is a precondition for receiving funding from the programme.

Source: BMBF (2014). *Horizont 2020 im Blick*.

### Drug development in red biotechnology

Developing medicines in the red biotechnology field is a key element of the sector's innovative capability. Before being licensed, a drug undergoes several trial phases: preclinical trials, three phases of clinical trials and the approval process. Generally, the regulatory and ethical requirements become increasingly exacting as progress is made through the trial phases as drugs must be tested on humans from a certain stage.<sup>9</sup>

According to the BMBF/BIOCOM survey German companies possess a well stocked clinical product pipeline for red biotechnology compounds. Figures from Ernst & Young also show a high number of preclinical projects.<sup>10</sup> The start and finish dates of the phases for all projects were also analysed. A large proportion of the projects are already cancelled during or after the preclinical phase due to the lack of successful results. A project is rarely cancelled during this phase due to insolvency. The picture is similar in the initial clinical trial phase, with the

<sup>9</sup> See BPI (2004). *Pharma innovativ*; BMBF/BIOCOM (2014). *The German biotechnology sector*.

<sup>10</sup> Due to the differing definitions of biotechnology companies used by Ernst & Young and BMBF/BIOCOM in their data logging there are considerable discrepancies between the findings of the analyses.



## Biotechnology: Funding gap jeopardising competitiveness

### Phases of drug development

8

The drug development process essentially consists of five phases, which can be divided into a preclinical phase, three clinical phases and approval:

- **Preclinical phase:** In the preclinical phase biological targets are sought for the drug to act upon and potential effective agents. Furthermore, toxicological tests are conducted and a means of packaging the agent is sought.
- **Phase I:** During the first clinical trial phase the agent is tested on humans for the first time. The testing is carried out using very small doses and on a small group of persons with the objective of examining its tolerability.
- **Phase II:** In this phase patients are tested in order to determine the efficacy and optimum dosage of the agent. Testing is conducted on a larger sample of persons than in phase I and under certain circumstances in several countries.
- **Phase III:** In the final clinical phase an efficacy study is conducted on an even larger sample population and in a variety of countries. The efficacy study is conducted regularly in randomised double-blind trials with placebos or already licensed medicines.
- **Approval:** In the approval phase the data from the preceding phases is processed and passed on to the drugs authority for scrutiny and licensing.

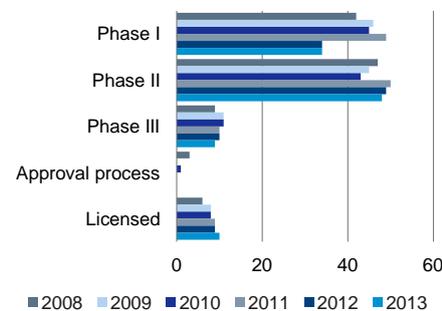
Sources: BPI, Bayer Pharma

absolute number of projects being much lower, as many projects do not even make it into the clinical trial phase. Even fewer projects then make it through to the second clinical trial phase. One striking feature of the Ernst & Young report is also that insolvency is far more often the reason for a project cancellation during this trial phase.<sup>11</sup> The reasons for this could be a lack of funds, which makes it impossible to continue with the projects. This state of affairs suggests there is a funding problem in subsequent company phases, which mainly applies to those firms with little or no access to internal funding. In the third and final phase of clinical trials simple project cancellations (e.g. because of insufficient efficacy of the drug) outnumber insolvencies.

### Only a few projects make it into the final trial phase prior to licensing

9

Number of pharmaceutical biotechnology projects by development phase

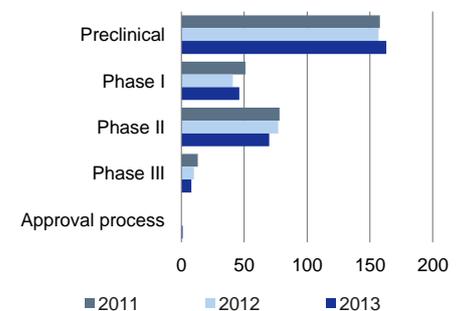


Sources: BMBF, BIOCOM

### Probability of biopharmaceutical projects gaining approval is minimal

10

Number of pharmaceutical biotechnology projects by development phase

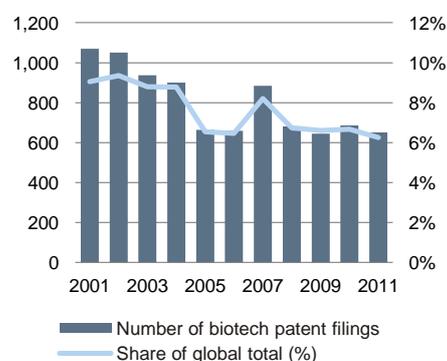


Sources: Ernst & Young, Medtrack

### PCT filings by German firms trending downwards

11

Number of PCT biotech patent filings



Source: OECD

The shortage of financial resources could in future prompt red biotechnology companies to shift their activities away from drug development in order to focus on developing technology platforms. Developing technology platforms for pharmaceutical research is far less cost intensive. Furthermore, technology platforms can swiftly generate financial returns via licensing. A corresponding development is already discernible to a small degree in the data collected by the BMBF and BIOCOM. This development would also explain the shrinking absolute total R&D spend as well as – besides the increased industry revenues – the sharp drop in the R&D share from around 52% in 2007 to about 31% in 2013.<sup>12</sup>

### Biotechnology patent filings are trending downwards

Patent filings are an indicator of the research activity and innovation capacity of a sector. The aim of the German government's high-tech strategy of boosting the pace of innovation in the economy with key technologies is thus also dependent on the innovative capacity of the biotechnology sector.

Between 2001 and 2011 the number of German biotech patent filings under Patent Cooperation Treaty (PCT) trended downwards. Whereas in 2001 there were no less than 1,069 patent applications filed, the number had dropped to 651 by 2011 (see chart 11). The German share of global biotechnology patent filings also followed a similar pattern, as shown by the OECD statistics, falling from 9.1% in 2001 to 6.3% by 2011. A look at the development of the funding volume of the biotechnology firms and of patent filings in this sector suggests

<sup>11</sup> See Ernst & Young (2014). Deutscher Biotechnologie-Report 2014.

<sup>12</sup> See BMBF/BIOCOM (2014). Die deutsche Biotechnologie-Branche.



## Biotechnology: Funding gap jeopardising competitiveness

there is a positive correlation between them. The higher the funding volumes, the higher the number of patent filings. Even though this correlation is economically plausible the limited data available renders it only a supposition.

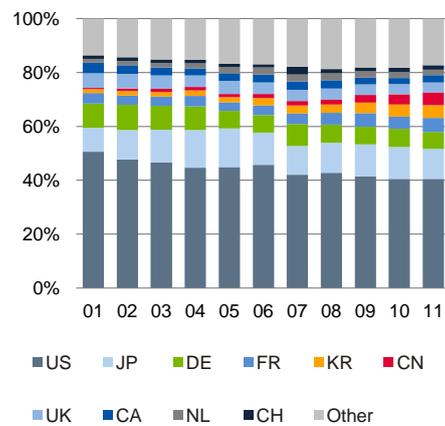
Overall, Germany has reached a high level in research and sector structure in the biotechnology field. In future the funding problems could, however, dampen the sector's innovative capacity. In addition, other countries are continually expanding their presence in biotechnology, as shown in the section below.

### International competition is intensifying

Established countries losing market share in patent filings

12

Number of PCT biotech patent filings



Source: OECD

Global competition in the biotechnology industry is growing steadily. In many fast-growing and technologically aspiring countries new firms are emerging that are battling for a share of the global market. Frequently research and product development in this sector receive public-sector funding from their respective governments.

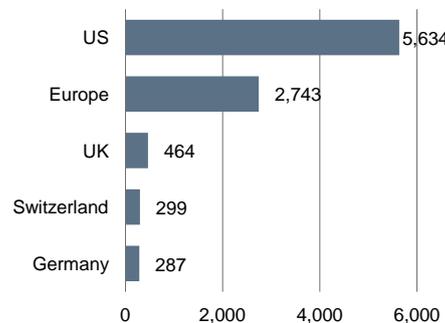
In international terms, Germany's roughly 8% share of the total number of dedicated biotechnology firms (according to the most recent data available) places it 4th in the OECD rankings (6th place, if other biotech firms are included; 4%). The rankings are topped by the US (31% share), France (18%) and Spain (9%). The above-mentioned research intensity of German biotechnology companies results in a significant share of global biotechnology patent filings (under PCT). This averaged 6.3% between 2010 and 2012, according to OECD data, which corresponds to third place behind the US (41%) and Japan (11%).

The global number of patent filings in the biotechnology field was volatile between 2001 and 2011, but it trended downwards significantly. The number of new patents decreased in the majority of those nations with the most patent filings in 2001. The higher number of patent applications filed by hitherto less active nations enabled them to boost their share of total patent filings. In this regard special mention should be made of China and South Korea, which both raised their number of patent filings considerably. Japan is one of the few countries with a longer tradition in biotechnology that has managed to grow its market share. As already explained, the number of patents filed during the stated period also declined in Germany. The decrease in patent filings was even more dramatic in the US. The OECD presumes that stricter rules for patent approvals for genetic innovations are the reason for the decline, and it fears that the revised criteria are stopping companies from conducting more intensive research.<sup>13</sup>

US by far the most active in biopharmaceutical research

13

Number of biopharmaceutical projects, 2013



Sources: Ernst & Young, Medtrack

One Ernst & Young report found that the US had by far the biggest pipeline of biopharmaceutical projects (in preclinical and clinical phases). In this report Germany took third place in Europe with 287 projects behind the UK (464) and Switzerland (299). The European countries surveyed were conducting a total of 2,743 projects. The striking aspect here is that in Germany far fewer projects are in the third clinical trial phase than in countries with a similar sector structure. The UK has by far the highest number of biopharmaceutical projects; this is also true if preclinical projects, which generally have a high failure rate, are not taken into account. However, compared with the US project pipeline, consisting of 5,634 projects, even the aggregate total for Europe is small – a mere 50% or so of the US figure despite the larger number of firms in this sector in Europe.<sup>14</sup>

<sup>13</sup> See OECD (2009). OECD Science, Technology and Industry Scoreboard.

<sup>14</sup> See Ernst & Young (2014). Biotechnology Industry Report 2014 – Beyond borders.



## Biotechnology: Funding gap jeopardising competitiveness

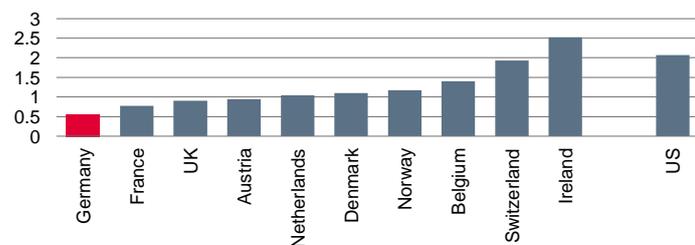
### Venture capital financing an important factor in international competition

The stated high venture capital share of total funding volume of biotechnology firms in Germany could obscure the fact that venture capital provided to biotech firms in Germany is somewhat weak by international standards. According to an Ernst & Young report, the average biotechnology firm in Germany has access to USD 550,000 of venture capital. The availability of capital to young German biotechnology companies thus lags a long way behind that of their European competitors and the US, where about USD 2.1 m of venture capital is available per biotech firm.<sup>15</sup> One reason for the discrepancy is probably that the venture capital market in the US is bigger overall and that this source of funding is more common than in Germany. Venture capital funding is required especially for rounds of financing following the start-up phase, for example to finance cost-intensive clinical research into drugs or the development costs of other biotechnological applications.

Germany lags a long way behind on venture capital

14

Venture capital per biotechnology firm, 2013, USD m

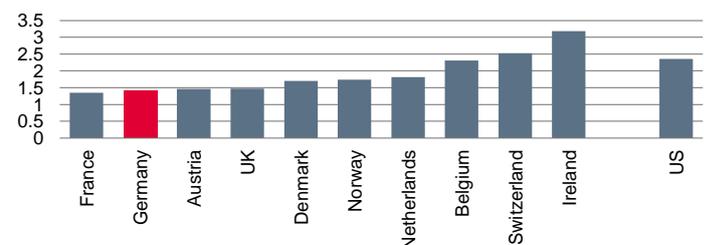


Sources: Ernst & Young, BioCentury, VentureSource

Difficult conditions for developers of therapeutics

15

Venture capital for therapeutic developers per firm, 2013, USD m



Sources: Ernst & Young, BioCentury, VentureSource

### IPOs regaining their international appeal – but not in Germany

The most recent IPOs by German biotech firms have only been conducted outside Germany. This is one indication that the German capital market for relatively young biotech companies is relatively unappealing compared to other European exchanges. The latest reports confirm this. As already mentioned, no biotech firm went public in Germany between 2009 and 2014. The German capital market is however comparatively attractive for established companies that are already listed, as relatively high volumes of capital can also be raised. Nevertheless, a mere 15 biotech firms are listed in Germany. While Deutsche Börse would enable comparatively easy access for companies via the “Entry Standard” the dearth of listed companies probably has more to do with investors' lack of risk appetite for young high-tech firms. An indication of this can be seen in the relatively low liquidity of biotech shares in the German stock market.<sup>16</sup>

<sup>15</sup> See Ernst & Young (2014). Deutscher Biotechnologie-Report 2014.

<sup>16</sup> See BIOCOM (2014). Comparative analysis of European biotech stock markets.



## Biotechnology: Funding gap jeopardising competitiveness

### Biotechnology IPOs and capital increases on European exchanges

16

Exchange location/Index membership, 2009-14	Number of IPO	Total volume (EUR m)	Number of listed biotech companies	Capital increases	Total volume (EUR m)
Euronext (London, Amsterdam, Brussels, Paris, Lisbon)	19	387.1	41	97	2,757.7
Nasdaq OMX (Copenhagen, Helsinki, Stockholm)	2	47.5	27	77	1,342.8
London Stock Exchange	3	388.9	29	83	1,171.5
Zurich	0	0.0	9	20	307.7
Frankfurt	0	0.0	15	63	1,344.0
Oslo	2	8.5	9	27	120.7
Warsaw	6	13.1	8	16	32.1

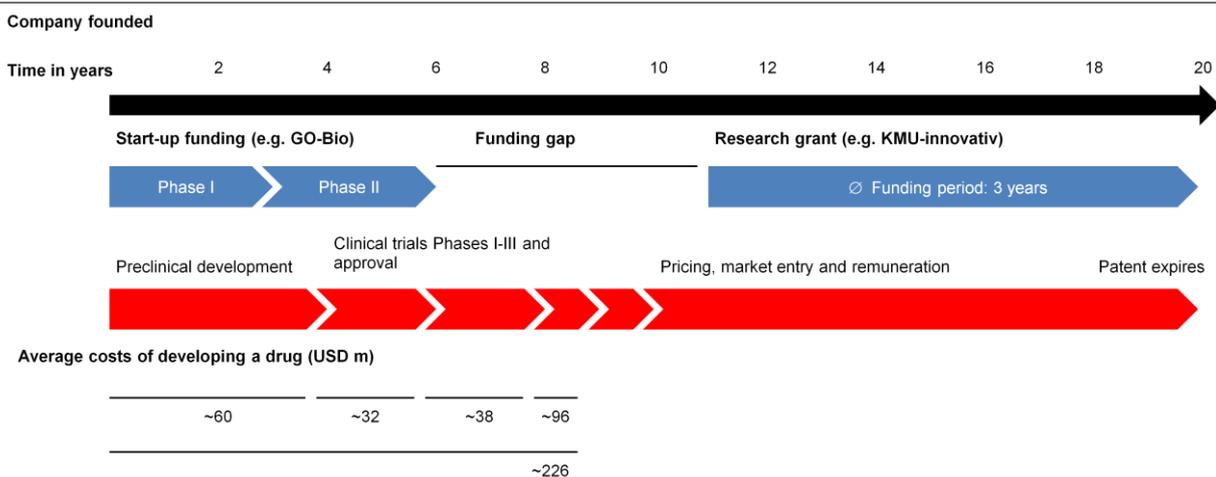
Source: BIOCUM

### Technology drain due to dearth of funding?

The funding gap in segments of the research phase jeopardises the aim of the high-tech strategy, of boosting key technologies in Germany and promoting Germany's competitiveness as a manufacturing location. The shortage of funding prompts innovative companies to seek investors outside Germany or even relocate their company there. As already detailed, the companies search for capital in more attractive markets and choose not to go public in Germany. Business associations and companies therefore propose a public-sector campaign to generally boost the appeal of venture capital investments in high-tech companies and cement innovative capability in Germany.

### Simplified depiction of the funding gap using the example of a biopharmaceuticals developer

17



Sources: EFPIA, DiMasi/Grabowski, BMWi, BMBF, biotechnologie.de, Deutsche Bank Research

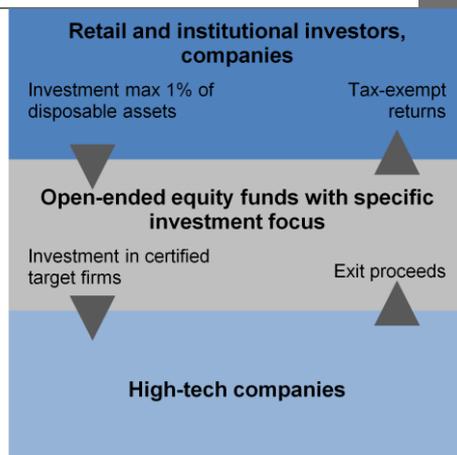
One major objective of the market participants is to integrate venture capital more firmly into company funding. The first step towards achieving this, however, is that attractive conditions for venture capital investments need to be created. As one example of a stronger incentive to make venture capital investments Ernst & Young propose exempting special investment funds from capital gains tax. A tax exemption could be tied to a holding period or be introduced with a specific duration. The tax-exempted funds should ideally be open-ended (tradable at all times) equity funds that can only invest in specific high-tech firms and are free to establish themselves in the market. Another



## Biotechnology: Funding gap jeopardising competitiveness

Equity fund portfolio model

18



Sources: Ernst & Young, Deutsche Bank Research

suggestion made by Ernst & Young is the certification of the target companies, for example by KfW, so that critical corporate criteria are guaranteed. In addition, a maximum ownership share of 1% of the net assets of private investors is to serve as a risk cap and constrain the speculation opportunities of institutional investors as well as limiting the costs for the public purse.<sup>17</sup>

“Bio-Deutschland”, the industry association of biotechnology companies, also discusses ways of improving the funding situation for biotechnology firms in a policy paper. The association outlines four proposals.

- An exemption from final withholding tax on investment returns should make biotechnology more appealing to private investors. This measure would only come into effect in the event of a successful investment, so the state would not be burdened by a continuous funding commitment. Furthermore, the final withholding tax exemption could be tied to conditions such as a minimum holding period or specific company criteria. This would ensure that only target companies receive funding.
- The second measure proposed by the association is to exempt repayments of the INVEST grant from taxation. By completely repaying the investment grant investors could tend to invest more than is currently the case. Companies could benefit correspondingly from higher inflows.
- In a similar fashion to Ernst & Young the industry association also advocates preferential tax treatment for investment funds for private and institutional investors in a “Deutscher Innovationsfonds” (German innovation fund). This proposal would, however, provide investors with an income tax exemption as a fixed percentage of the amount invested in addition to a tax exemption on their capital gains/final withholding tax in the case of a successful exit.<sup>18</sup> A limit on the amount invested relative to available assets would be retained in order to contain the costs incurred for funding.
- The fourth proposed measure is a tax credit for companies. This is to be granted to the company in the form of a payment of a specified percentage of the loss carryforwards for example. This payment would then be netted against the deductible loss carryforward so that the latter could then no longer be used for subsequent tax reduction.

Because of the complexity of the individual proposals especially regarding the need for amendments in tax legislation Bio-Deutschland recommends starting with the adjustment of the INVEST grant, which can be directly and swift implemented. In the long term, however, the association favours the implementation of the *Deutscher Innovationsfonds*.<sup>19</sup>

The federal cabinet has responded to the suggestions made by venture capitalists and industry associations and announced in September 2014 that the INVEST grants would be reimbursed tax free in future and also retroactively to 2013. Corresponding legislation has been in force since the start of 2015.<sup>20</sup> This is to be welcomed in our opinion as more extensive use of this funding programme can be expected. Accordingly, more firms are likely to receive funding and a higher average investment is likely to be attained.

<sup>17</sup> See Ernst & Young (2014). Deutscher Biotechnologie-Report 2014.

<sup>18</sup> Similar structures have been allowed in France since 1997 with great success by a law that provides for tax relief on certain types of funds (Fonds Commun de Placement dans l'innovation). In the UK corresponding measures are planned for 2015 (UK Citizens' Innovation Funds).

<sup>19</sup> Bio-Deutschland (2014). Policy paper on the topic of funding innovation in Germany (published in German).

<sup>20</sup> See Bundesgesetzblatt (2014). Law on the Adjustment of the Fiscal Code to the Customs Code of the European Union and on the amendment of other tax regulations.



## Biotechnology: Funding gap jeopardising competitiveness

---

Since the other measures also contain tax exemptions their implementation would first have to be scrutinised with respect to compliance with state aid regulations and with regard to potential discrimination. This would therefore probably entail a certain amount of administrative effort for the lawmakers at least at the start of such a process. Generally speaking, the recommendations from Ernst & Young and from Bio-Deutschland should have beneficial effects on young biotechnology firms. The costs of the individual alternatives cannot, however, be estimated precisely. In addition, there are differing levels of complexity involved in implementing the individual proposals. Discussion should be focused on easy-to-implement solutions with limited costs for the state, for example with the above-mentioned fund model. A tax exemption should not, however, be granted when an investment is made, in order to preclude purely tax-induced misguided incentives to invest.

### Conclusion: Utilise the advantages of fund-based venture capital funding in Germany too

While there are already sufficient state subsidies for biotechnology firms in the start-up phase and for research institutions, there is a shortage of venture capital for critical research and company phases. Additional exclusively public-sector subsidies are unnecessary in these cases. Rather, a means of prompting private-sector investors to make venture capital investments needs to be found.

An AFIC/OSEO report has shown that the high-tech firms (portfolio companies) funded via a French investment fund managed to achieve faster growth in sales, number of employees and exports and have better access to external capital than comparable firms that did not receive financing via such a fund (non-portfolio companies). In addition, several successful flotations have emerged from the portfolios of the investment funds.<sup>21</sup> Looking at the success of the tax-exempt investment funds established in France it makes sense to debate the pros and cons of introducing a similar arrangement in Germany. In so doing, the criteria for granting tax relief to a fund, as is the case in France, should not only be limited to investments in biotechnology companies, but should include innovative high-tech firms in general in order to enable positive effects.

In the EU there is already a legal basis for such action. That is why the EU should have no fundamental concerns regarding the admissibility of the subsidy. European competition should thus not be distorted since such an investment fund is structured like a traditional venture capital fund and is basically open to all firms that fulfil certain criteria. The positive effects would not be restricted to only the biotechnology sector with this instrument, but could positively impact all high-tech sectors depending on how it is structured. Germany's competitiveness as a research and ultimately also manufacturing location could receive a sustained boost. Also, such a measure would have a positive impact as firms would not have to submit applications for subsidies but could undergo the normal process for venture capital funding. There is no additional long-lasting administrative burden for the public sector. Actual monetary costs would only be incurred in the case of a successful investment; they would not, however, be outflows from the budget but "merely" lower tax revenues. It would make sense to debate the exact structure of such an incentive system with business angels and venture capital providers. Especially the additional public expenditure and a risk ceiling for small private investors should be taken into consideration.

---

<sup>21</sup> See AFIC/OSEO (2012). Performance des entreprises innovantes investies par les FCPI; UK BioIndustry Association (2013). Citizens' Innovation Funds; AFIC/OSEO (2010). Activité d'investissement des FCPI dans les entreprises innovantes 1997-2008; Citizens' Innovation Funds – The case for unlocking the patriotic potential of the public.



## Biotechnology: Funding gap jeopardising competitiveness

---

Such an incentive system could prevent Germany's biotechnology sector from experiencing a loss of international competitiveness. Also, the sector's innovative capability would be boosted sustainably and create the opportunity for biotechnology to generate positive indirect macroeconomic effects on a major scale. The tax exemption for high-tech investment funds outlined above would also ensure that the risk borne by the public sector is limited and that tax revenues are only reduced if the fund successfully divests a holding from its investment portfolio. Accordingly, the state does not bear the risk of failure of individual companies. On the other hand, the investors boost their potential return thanks to the tax exemption, which can markedly boost the incentive to invest. Accordingly, we prefer this solution for supporting the biotechnology sector.

Christoph Laskawi (+49 69 910-31924, christoph.laskawi@db.com)

© Copyright 2015. Deutsche Bank AG, Deutsche Bank Research, 60262 Frankfurt am Main, Germany. All rights reserved. When quoting please cite "Deutsche Bank Research".

The above information does not constitute the provision of investment, legal or tax advice. Any views expressed reflect the current views of the author, which do not necessarily correspond to the opinions of Deutsche Bank AG or its affiliates. Opinions expressed may change without notice. Opinions expressed may differ from views set out in other documents, including research, published by Deutsche Bank. The above information is provided for informational purposes only and without any obligation, whether contractual or otherwise. No warranty or representation is made as to the correctness, completeness and accuracy of the information given or the assessments made.

In Germany this information is approved and/or communicated by Deutsche Bank AG Frankfurt, licensed to carry on banking business and to provide financial services under the supervision of the European Central Bank (ECB) and the German Federal Financial Supervisory Authority (BaFin). In the United Kingdom this information is approved and/or communicated by Deutsche Bank AG, London Branch, a member of the London Stock Exchange, authorized by UK's Prudential Regulation Authority (PRA) and subject to limited regulation by the UK's Financial Conduct Authority (FCA) (under number 150018) and by the PRA. This information is distributed in Hong Kong by Deutsche Bank AG, Hong Kong Branch, in Korea by Deutsche Securities Korea Co. and in Singapore by Deutsche Bank AG, Singapore Branch. In Japan this information is approved and/or distributed by Deutsche Securities Limited, Tokyo Branch. In Australia, retail clients should obtain a copy of a Product Disclosure Statement (PDS) relating to any financial product referred to in this report and consider the PDS before making any decision about whether to acquire the product.

Printed by: HST Offsetdruck Schadt & Tetzlaff GbR, Dieburg

Print: ISSN 1612-314X / Internet/E-mail: ISSN 1612-3158