# B 1-4 Non-university research organisations



## Pact for Research and Innovation

Germany has a highly developed system of research with several independent research organisations, each with a very distinctive mission.

In order to boost the international competitiveness of this system, in 2005 the Federal and Länder governments concluded the Pact for Research and Innovation (Pakt für Forschung und Innovation, PFI) with the four main organisations of non-university research – the Fraunhofer Society (FhG), the Helmholtz Association (HGF), the Max Planck Society (MPG) and the Leibniz Association (WGL) – as well as the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG); it was extended most recently

Fig. B 1-4-1

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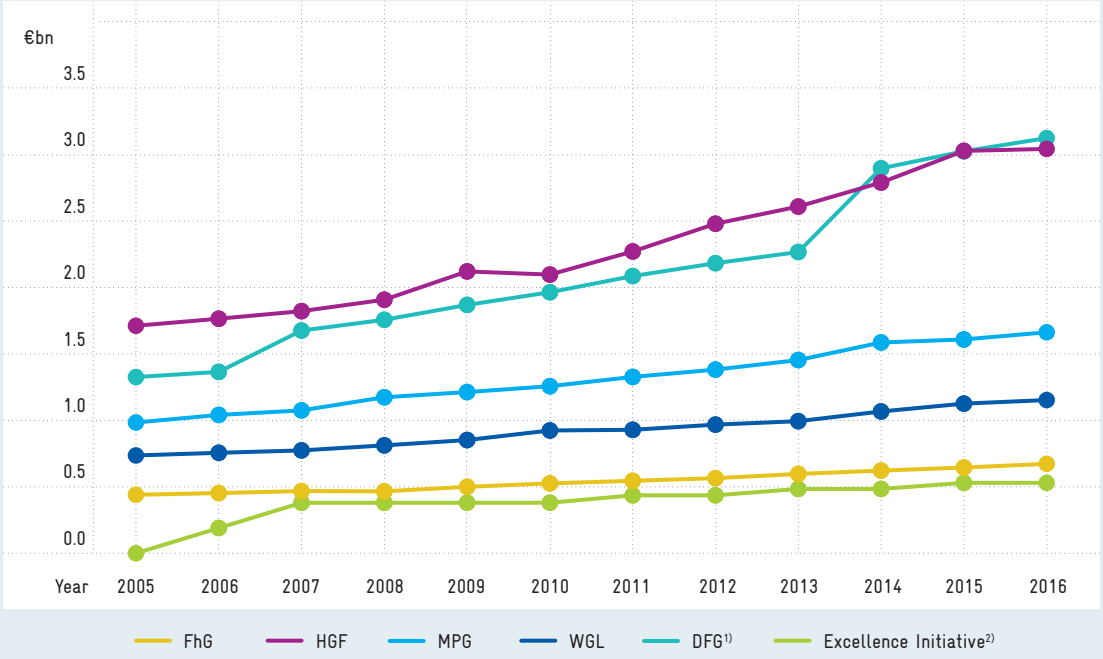
### Grants from the Federal Government and the Länder for non-university research organisations and the German Research Foundation (DFG), 2005 to 2016

Institutional grants to FhG, HGF, MPG, WGL and DFG, as well as grants to the DFG for the implementation of the Excellence Initiative in billions of euros.




1) Including Federal Government grants for programme allowances under the Higher Education Pact as well as Federal Government grants and complementary grants by the Länder for large appliances at tertiary education institutions according to implementation agreements, research buildings and large appliances.
2) Plus pro-rata administrative costs of the German Council of Science and Humanities (Wissenschaftsrat).
Source: GWK (2016c: 96).

Fig. B 1-4-2

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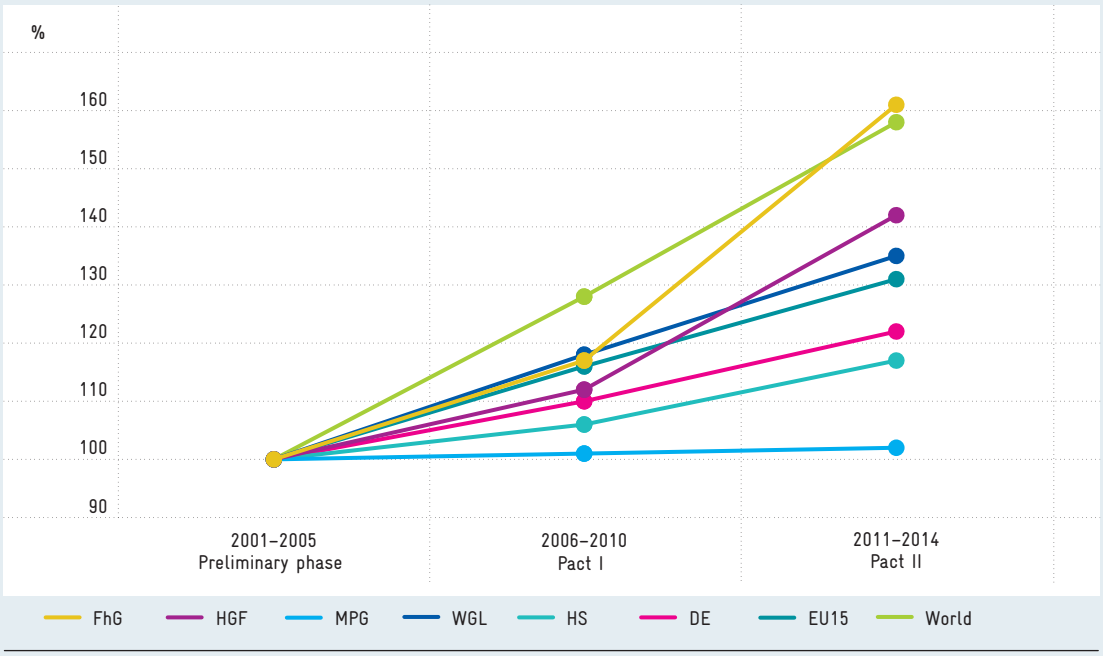
**Development of publications of non-university research organisations, tertiary education institutions, Germany, EU-15 and the world, 2001 to 2014 (as percentages)**




Index: 2001–2005 = 100
Fractional counting based on the number of institutions stated.
Source: ThomsonReuters – Web of Science in Frietsch et al. (2016).

in December 2014 to cover the years 2016 to 2020.[68] The Pact lays down the research-policy objectives to be implemented by the non-university research organisations. These aims include networking within the science system, intensified international and European cooperation, more exchanges between science on the one hand and the private sector and society on the other, and winning the best researchers for German science. In return, the science organisations received (and are still receiving) financial planning security through an annual budget increase of 3 percent between 2006 to 2010, 5 percent between 2011 and 2015, and 3 percent for the 2016 to 2020 period.[69] It has not yet been decided whether and how the PFI is to be continued after 2020.

Figure B 1-4-1 provides an overview of the growth in the funds allocated by the Federal and Länder governments to the non-university research organisations and the DFG, including the Excellence Initiative, in the period from 2005 to 2016.

## Publication activities of research organisations and tertiary education institutions

An analysis of the publication activities of non-university research organisations and tertiary education institutions has been conducted to compare the results from the first (2006–2010) and second (2011–2015) periods of the PFI with the initial figures before the pacts came into force (2001–2005).

In order to categorise the development of publication activities at German non-university research organisations and tertiary education institutions, they are compared with world-wide publication activities and with activities in the EU-15 countries. Worldwide, the number of scientific publications has risen considerably since the beginning of the new millennium. This increase was primarily caused by the increase in publications from Asia, especially China, India and South Korea.[70]

Figure B 1-4-2 shows that the number of publications from all non-university research organisations and tertiary education institutions rose during the study period. The MPG shows the lowest growth, the FhG has the highest. The increase in the number of publications can be mainly explained by the increase in scientific staff at these establishments during the study period.[71] By contrast, the scientists' publication intensity has fallen slightly. For example, the annual average number of journal articles per scientist[72] fell at MPG from 0.83 (2001-2005) to 0.62 (2011-2014), at HGF from 0.28 (2001-2005) to 0.25 (2011-2014) and at tertiary education institutions from 0.38 (2001-2005) to 0.33 (2011-2014).[73] One explanation for this decline is the trend towards co-publications. With research projects becoming ever larger and more complex, the average number of researchers involved is growing and with it the number of authors participating in a publication.[74] When calculating the level of publication intensity, the publications are attributed to the respective researchers pro-rata, which, when the number of co-authors is rising, tends to lead to a decrease in publication intensity, because the number of publications does not rise linearly with the number of co-authors when research projects become more complex.

However, the number of publications has not increased at the expense of quality. If we look at the development of excellence rates of publications by non-university research organisations and tertiary education institutions (cf. Figure B 1-4-3), we see a marked increase in the excellence rate of over 2 percentage points for the tertiary education institutions. Their excellence rate rose from 10.8 (2001-2005) to 12.9 percent (2011-2012). The non-university research organisations also showed a rising excellence rate for the study period. The only exception is the FhG, which is devoted primarily to applied research and technology transfer. This is reflected in a lower intensity of publishing activities compared to the other organisations surveyed. The FhG recorded a slight decline in the excellence rate during the study period from 11.2 (2001-2005) to 10.7 percent (2011-2012). However, the Commission of Experts does not regard this decline as a cause for concern. In order to

Fig. B 1-4-3

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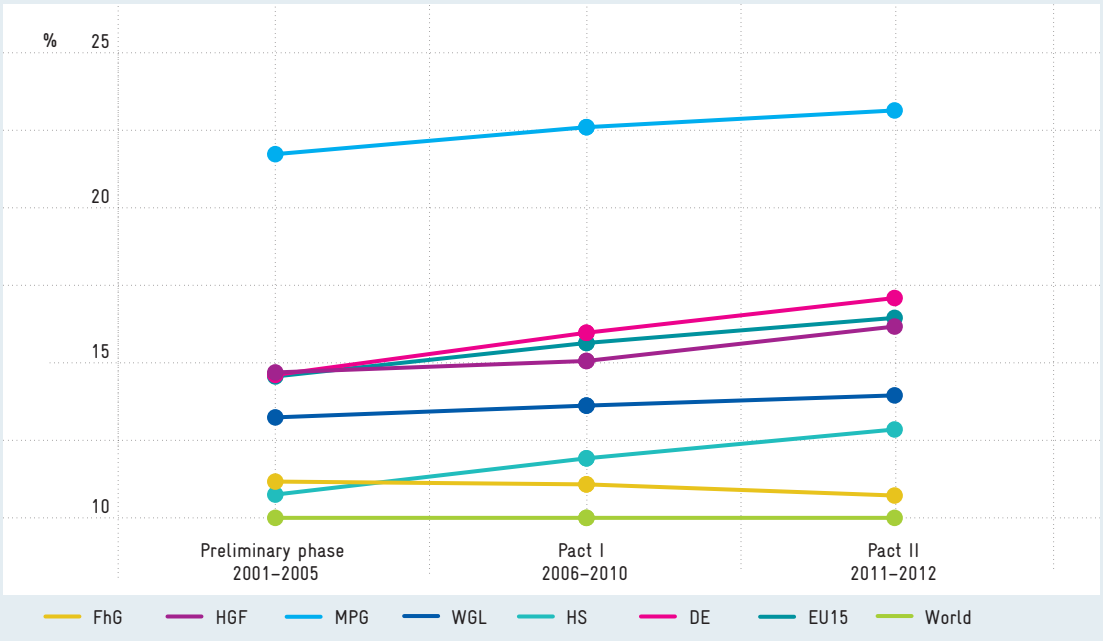
**Development of the excellence rate* of publications by non-university research organisations, tertiary education institutions, Germany, EU-15 and the world (as percentages)**




* Excellence rate: share of publications belonging to the top 10 percent of the most cited publications worldwide in the respective field. The excellence rate is calculated on the basis of citations. Since the chart is based on a citation period of three years (including the year of publication), it can only include publications with a corresponding time interval from the present.

Source: ThomsonReuters – Web of Science in Frietsch et al. (2016).

Fig. B 1-4-4

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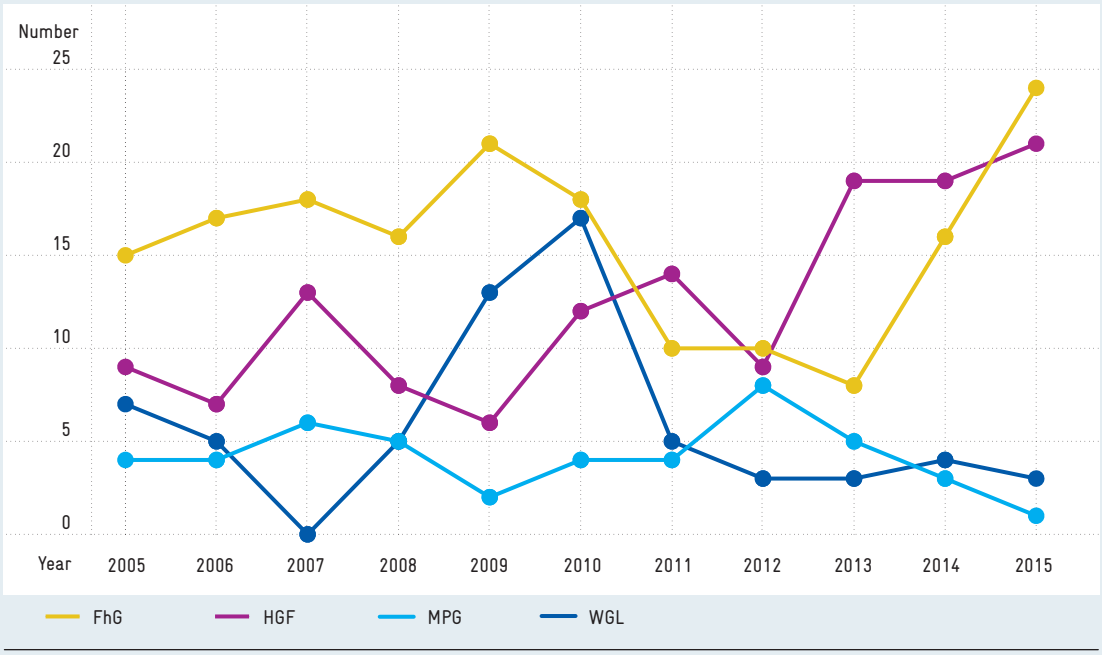
## Spin-offs from non-university research organisations, 2005 to 2015

Number of spin-offs founded in a calendar year to exploit the organisation's intellectual property rights or know-how under a formal agreement.




Source: GWK (2016c: 117), own diagram.

keep the FhG's focus on applied research and technology transfer, its work should in the future also not be evaluated primarily on the basis of the publication indices that are otherwise customary in science.

By contrast, the excellence rate is particularly high at the MPG; it rose from 21.7 (2001-2005) to 23.1 percent (2011-2012). The institutes of the Max Planck Society are primarily geared towards excellent basic research.

### Spin-offs from research organisations and tertiary education institutions

In addition to their scientific work, one of the tasks of non-university research organisations is to transfer research findings to market applications. One instrument used in this context is spin-offs, which are supported by all four non-university research organisations via their own funding programmes and service institutions.[75]

An analysis of the spin-offs between 2006 and 2015 shows that there was no systematic increase in start-up activities at non-university research organisations during this period (Figure B 1-4-4). The Commission of Experts believes that non-university research organisations still have potential to increase their start-up activity.

Compared to non-university research organisations, there are significantly more spin-offs at tertiary education institutions.[76] These differences can be explained by examining the heterogeneity of the spin-offs. For example, spin-offs in the field of social media, which are not very capital-intensive, take place primarily at universities and not at non-university research organisations.

An analysis of technically sophisticated start-ups financed by the High-Tech Gründerfonds (HTGF)[77] reveals that there is no difference concerning the likelihood of financial funding between spin-offs from tertiary education institutions and from non-university research organisations (cf. Table B 1-4-5).

Tab. B 1-4-5

Download data

## Spin-offs from tertiary education institutions and research institutions that are financed by the High-Tech Gründerfonds (HTGF), 2005 to 2015[78]

| Year of the query | Queries on spin-offs | of which tertiary education institutions | of which research institutions | HTGF-financed | of which tertiary education institutions | of which research institutions |
|---|---|---|---|---|---|---|
| 2005 | 41 | 33 | 8 | 20 | 16 | 4 |
| 2006 | 75 | 59 | 16 | 20 | 18 | 2 |
| 2007 | 89 | 72 | 17 | 19 | 14 | 5 |
| 2008 | 86 | 70 | 17 | 14 | 12 | 2 |
| 2009 | 105 | 74 | 31 | 16 | 14 | 2 |
| 2010 | 88 | 72 | 16 | 16 | 12 | 4 |
| 2011 | 136 | 113 | 24 | 24 | 19 | 5 |
| 2012 | 124 | 101 | 25 | 13 | 11 | 3 |
| 2013 | 134 | 112 | 23 | 18 | 15 | 3 |
| 2014 | 115 | 92 | 23 | 11 | 9 | 2 |
| 2015 | 92 | 76 | 22 | 7 | 5 | 2 |

Research institutions: research institutions of the four major non-university research organisations, federal department research institutions and other research institutions.
Source: High-Tech Gründerfonds Management GmbH.