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Research and Innovation Observatory Country Report 2016 Austria

The 2016 series of the RIO Country Report analyses and assesses the development and performance of the national research and innovation system of the EU-28 Member States and related policies. It aims at monitoring and evaluating the EU policy implementation as well as facilitating policy learning in the Member States.

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Foreword

This report offers an analysis of the R&I system in Austria for 2016, including relevant policies and funding, with a particular focus on topics of critical importance for EU policies. The report identifies the main challenges of the Austrian research and innovation system and assesses the policy responses implemented. It was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative data are, whenever possible, comparable across all EU Member State reports. Unless specifically referenced all data used in this report are based on Eurostat statistics available in January 2017. The report contents are partly based on the RIO Country Report 2015 (Schuch and Gampfer 2016).

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HIGHLIGHTS

- GDP growth in Austria picked up in 2016 but remains below the EU average.
- R&D intensity increased further to 3.07% of GDP in 2015. Nevertheless, Austria's very ambitious EU2020 target of 3.76% will be very difficult to reach.
- Public funding for both universities and private R&D increased significantly in 2015 and 2016. The latter benefitted in particular from the raise of the "Research Premium" tax incentive.
- Austria's BERD is among the highest in the EU and continues to grow. The R&D intensity of both the manufacturing and service sectors is positioned in top ranks within the EU.

MAIN R&I POLICY CHALLENGES

- **Streamline the support policy mix for private R&I.** Austrian BERD is high and an array of public support instruments for private R&I is in place. However, funding agencies and instruments for private R&I are fragmented and overlaps or potential synergies between them have mostly been left unexplored, particularly at *Länder* level. Despite some streamlining efforts, the funding landscape still appears too complex to maximise its contribution to reaching strategic R&I policy goals.
- **Increase funding of excellent basic research.** Funding for basic research in Austria is low compared to both EU and international innovation leaders. The relatively low amounts of competitive funding for basic research channelled through the Austrian Science Fund (FWF) limit the potential for the emergence of a critical mass in specific scientific fields. Since excellence in basic research strongly correlates with universities' commercialisation capabilities, this may also hold back knowledge transfer and innovation. Public funding for universities will be increased by over €1b in the period 2016-2018, but its impact cannot be assessed yet.
- **Further increase supply of equity capital for start-ups and scale-ups.** Supply of equity finance for companies in the scale-up stage in Austria is improving but still scarce. Cumbersome regulatory framework conditions for equity investment and IPOs further hamper young innovative firms' access to finance. The implementation of an ambitious strategy to improve such conditions has started with concrete regulatory reforms in 2016. Public venture capital funds are starting to create a nascent entrepreneurial ecosystem.

MAIN R&I POLICY DEVELOPMENTS IN 2016

- [Start-up package](#)
- [Open Innovation Strategy](#)
- [ERA Roadmap](#)
- [Theses paper on FP9](#)
- Research billion

1. Main R&I policy developments in 2016

<p><u>Start-up package</u> (07/2016)</p>	<p>Includes a risk capital premium to support private venture capital investments, improved tax regulations for venture and risk capital investments, an increase in AWS guarantees for risky investments, reduced ancillary wage costs for innovative start-ups for the first three employees for the first three years, and the establishment of the enterprise service portal as a one-stop-shop for business start-ups.</p>
<p><u>Open Innovation Strategy</u> (11/2016)</p>	<p>Consists of three core areas of action: development of a culture of open innovation and provision of open innovation skills training to all age groups; formation of heterogeneous open innovation networks and partnerships; mobilisation of resources and the creation of framework conditions for open innovation.</p>
<p><u>ERA Roadmap</u> (04/2016)</p>	<p>Sets out objectives, measures and instruments for the implementation of all ERA action priorities, as well as timescales and indicators for measuring progress towards achieving these objectives. Many of the measures stipulated in the Austrian ERA Roadmap are already in the implementation pipeline, or at least agreed on at the political level.</p>
<p><u>Theses paper of Austrian FP9 Think Tank</u> (10/2016)</p>	<p>In 2016, the BMWFW called together a number of renowned Austrian experts in the field of European RTI policy to discuss the future of this type of policy and, in particular, ways to better adapt the Framework Programme to future challenges and opportunities. The theses paper proposes a continuation of the three pillar concept employed under Horizon 2020, to develop a common RTI policy for Europe, to concentrate on a limited number of priority areas for the FP, and to foster strategic intelligence and strategic programme management. It furthermore advocates an enhanced mission orientation for the societal challenges part and a focus on transformative innovation for the competitiveness part.</p>
<p>Research billion (11/2016)</p>	<p>On November 8, the Austrian government adopted a package of R&I support measures totalling €700m of public and €500m of private funding between 2017 and 2021. Funds are intended to flow into research infrastructures, highly uncertain frontier research, a growth fund for high-tech scale-ups, and the "Silicon Austria" project aimed at establishing a top microelectronics ecosystem in Austria.</p>

1.1 Focus on National and Regional Smart Specialisation Strategies

Description and timing: The country met the ex-ante conditionality for ERDF investment at national level in 2013 with a strategic framework around the federal government's

R&I strategy and regional investment priorities.¹ The operational programme for ERDF priority 1 includes 22 measures and thus displays a high degree of thematic differentiation to meet differing regional conditions. At regional level, Austria has R&I strategies in place in all nine federal states ("Bundesländer"), and an increasing number of regional R&I strategies (2015: Lower Austria, Vorarlberg, Vienna; 2016: Salzburg) are being drafted according to the S3 model.

New developments: The extent to which Monitoring and Evaluation Mechanisms have been developed and are operational varies from region to region. Burgenland, Upper Austria, Tyrol and Vorarlberg have developed a monitoring concept which is currently being employed and tested. Vienna has no monitoring concept, but relies on thematic studies and evaluations. Carinthia and Salzburg are currently preparing a monitoring concept. Lower Austria has a concept in place which is already operational and is considered to be a frontrunner in employing a balanced scorecard approach.²

Outstanding issues: External peer reviews for exchange and learning have been proposed, but not yet carried out (Leitner et al., 2015). Austrian experts from both the national (BMFWF) and regional governments (e.g. Lower Austria) have been repeatedly active in S3 peer reviews abroad, but a European peer-review has not yet taken place in any of the Austrian Bundesländer.³

2. Economic Context

GDP in Austria amounts to €340b and thus accounted for 2.3% of the EU's total GDP in 2015. With a GDP per capita of €39,400 in 2015 the country is well above the EU-28 average of €28,700.⁴ After the fast recovery from the financial crisis experienced in the years 2010 and 2011, GDP growth slowed down to a level below the EU average in 2015 (EU: +2%; Austria: +1%). This relatively tepid economic progress is also the major reason for the rising unemployment rate, which increased from 4.9% in 2012 to 5.7% in 2015. The European Commission forecasts a GDP growth rate of 1.5% in 2016 and 1.6% in 2017 (DG ECFIN Autumn 2016 forecast). Among the domestic drivers of this improved outlook are government expenditures for refugees and rising private consumption due to the 2015 tax reform which entered into effect in 2016.

2.1 Structure of the economy

Austria has a comparatively broad manufacturing base, reflected in a value added of 18.5% in 2014 (which is above the EU-28 average of 15.5%). In general this sector is more oriented towards medium-tech and medium-high tech manufacturing, with only few very large high-tech enterprises but several specialised medium-sized and larger companies operating in niche markets or as second-tier suppliers. Ongoing trends do not reveal radical structural changes but rather incremental modernisation by existing businesses. Among them is a slow but steady shift towards employment and added value in the service sector, especially in knowledge-intensive services; and an increasing productivity in the manufacturing sector, which is above the EU average in terms of value added per hour worked. Nevertheless, employment in this sector, as is the case in the EU as a whole, continues to shrink.

Despite an overall firm birth rate below EU average (8.3% vs. 10.1%), it should be noted that in high-tech manufacturing Austria has a considerably higher firm birth rate than the average across innovation leader and strong innovator Member States in the

¹ Schuch, K. and Gampfer, R., 2016.

² Presentation by S. Philipp at the "Bundesländerdialog" event on 11 October 2016.

³ Ibid.

⁴ In PPS terms in 2013: €33,200 (Austria) compared to €25,700 (EU-28 average)

European Innovation Scoreboard. However, the opposite is true in medium- and low-tech manufacturing and knowledge-intensive services.

2.2 Business environment

In the World Bank's 2017 Doing Business Index, Austria ranks 19th (9th among EU Member States), two positions higher than in 2016. The country's position in several sub-indices has however worsened since 2015, notably from 16 to 20 in resolving insolvency, from 52 to 62 in access to credit, and from 101 to 111 in starting a business. However, it remained strong, at the 10th place, in terms of the ease of enforcing contracts (World Bank, 2016). The low rank on starting a business seems to be driven by the relatively long time it can take to be issued a business premises permit ("Betriebsanlagengenehmigung"), which is however mandatory only for certain business facilities that could negatively impact the surrounding neighbours, environment, etc. There are plans to simplify and speed up this application process.

Whereas bankruptcy legislation in general is not very encouraging for entrepreneurship and risky innovation, there have been some improvements: the "company startup support law" was amended to reduce the waiting time to qualify for support for new start-up activities from 15 to 5 years after a failed entrepreneurial project. Moreover, previous business failures will not be considered anymore as a formal exclusion criterion to approve funding.⁵

In 2016 Austria received a Country-Specific Recommendation to reduce administrative and regulatory barriers for investments in services, such as restrictive authorisation requirements and restrictions on legal form (CEU, 2016). Furthermore, financing options for SMEs and young innovative companies are limited. Although an emerging availability of venture capital is improving this situation, access to finance continues to remain a restraining factor for start-ups and scale-ups (see Section 4.3). Business creation is hampered by excessively regulated market access and administrative burdens, which have been recognised as a barrier to growth and innovation but not addressed yet by regulatory reform (EU, 2016).

In November 2016, a political compromise was achieved resulting in a liberalization of 19 out of 21 partly-regulated businesses. The 80 fully regulated businesses, however, remained untouched and are now numbering 81. Business registration fees were removed, resulting in expected savings of €10m at the side of the entrepreneurs. The extent of the so called ancillary rights ("Nebenrechte") was widened. Most important, however, is the simplification of the regulatory approval for operational facilities, which has been requested by entrepreneurs since very long⁶. Approvals should be granted much faster than previously for operations which dispose a limited potential of danger. The government expects an increase of such simplified regulatory approval processes from 2,500 to 6,000, which means, that in future 50% instead of 20% of the approval processes will be based on a simplified (and therefore quicker) procedure. The duration for issuing a verdict should be reduced from maximum 6 months to 4 months and in case of simplified procedures from 3 months to 2 months maximum. The regulatory approval for operational facilities should also be organised in the future as a one-stop procedure integrating under just one procedure issues of building law, laws pertaining to water and waterways, environmental protection and trade law. Also publication requirements and the number of documents which need to be submitted for approval processes will be reduced⁷.

⁵ Rat für FTE 2015.

⁶ <http://www.noen.at/niederoesterreich/politik/liberalisierung-tauziehen-um-gewerbeordnung/21.939.895#>; accessed on 30 August 2016.

⁷ <http://diepresse.com/home/wirtschaft/economist/5111477/Regierung-einigt-sich-auf-Gewerbeordnung>; accessed on 7 November 2016.

2.3 Supply of human resources

13.8% of the population aged 25-65 has completed tertiary education (BMWFW 2016). Human resources in Science and Technology (HRST) account for 46.8% of the Austrian working population in 2015, a higher share compared to the EU28's average of 43.3%. 36.4% of total employment was in knowledge-intensive activities, slightly above the EU28 average of 36%, but below innovation leaders and other strong innovators such as Sweden (44.4%) or Belgium (42.2%). R&D labour market is one of the most dynamic in the country. In 2014 70.1% of full-time R&D workers were employed in the business sector, 25.4% in the higher education sector, and 3.8% in the government sector, including public research organisations.

The number of graduates from Higher Education Institutes (HEI) continuously increased from 38,979 in 2008/2009 to 54,310 in 2012/2013, albeit the trend was recently reversed as this number dropped to 52,281 in 2013/2014 (BMWFW 2015a). 34.3% of the 34,300 graduates from universities in 2013/2014 graduated in social sciences and law, 16.2% in humanities, 9.7% in pedagogics, 5.6% in medicine and social services, 15.2% in natural sciences, mathematics and informatics, and 14.7% in engineering, which indicates a shift towards natural sciences and engineering compared to 2012/2013.⁸

The inflow of persons who fled to Austria from the crisis zones in the Middle East and North Africa was extra-ordinarily high in 2015 and continued to be high in 2016. Most of these refugees, however, have low formal education levels, although this varies considerably according to country of origin. Formal integration of researchers among refugees into the Austrian system was so far very weak, due, first, to lengthy procedures to validate both their residence status and their formal education, and, second, to reluctance from employers, partly because of language skills.

3. Main R&I actors

R&I policy is relatively centralised at national level. The regions' R&I policies focus mainly on direct funding of applied R&D to foster science-industry relations, technology transfer and innovation support measures for regional economies. The main policy actors are the Federal Ministry of Science, Research and Economy (BMWFW), and the Federal Ministry of Transport, Innovation and Technology (BMVIT). BMWFW is responsible for tertiary education and for basic research, and to a lesser degree for innovation support, technology transfer and the promotion of entrepreneurship. The BMVIT is mainly in charge of applied research. The Austrian Council for Research and Technological Development advises the government in all matters related to research, technology and innovation and regularly monitors progress of the Austrian RTI strategy's implementation. The Austrian Science Council provides advice on the general progress of the science system, in particular the higher education sector (HES). The ERA Observatory Austria coordinates Austrian RTI activities with European policies, with an emphasis on the European Research Area and Horizon 2020.

At the operational level, most of the funding for R&D&I is managed by three agencies: the Austrian Science Fund (FWF) funds basic research, the Research Promotion Agency (FFG) funds applied R&D, and the national promotional bank AWS is specialised in funding start-ups and business innovation projects.

Within the HES, 22 public universities play the largest role as research performers, with private and semi-private HEI carrying out comparatively little research. In addition, the Austrian Academy of Sciences (ÖAW) complements universities' basic research. The Austrian Institute of Technology (AIT) is the largest Public Research Organisation (PRO)

⁸ Own calculations based on BMWFW 2015a: Statistisches Taschenbuch

in applied research. Moreover, there is a small group of regional institutes that mostly focus on applied research and technology development. Some of them belong to Austrian Cooperative Research, a network of non-university applied research institutes organised mostly as limited companies which perform industry-oriented R&D and provide R&D services for industry.

Although 3,326 enterprises were systematically involved in R&D in 2013, business R&D expenditure is highly concentrated in a few large companies, as is the case in most of the EU. The manufacturing sector accounted for 62% of all internal corporate R&D expenditures in 2013, of which 55.6% were made by foreign-controlled enterprises. This high share indicates that Austria is a preferred location in Europe for multinational companies' R&D activities (see also Section 3.2). The service sector accounted for 37% of total R&D expenditure in 2013, of which 43.5% was made by foreign-controlled enterprises. R&I activities of the private non-profit sector in Austria are of negligible size.

4. R&I trends

Austria's Europe 2020 R&D headline target is to reach an R&D intensity of 3.76% of GDP, based on a public versus private split of 1-to-2. With 2.99% in 2014 and an estimated 3.07% in 2015 the country is moving in the right direction. However, moderate growth prospects and recent budgetary reforms may limit the availability of public funds in the coming years, making it very difficult to achieve the target.

Total GERD in Austria was €10,444m in 2015, from which the business sector funded €4,914m (47%), the government for €3,822m (36.6%), and foreign investors €1,661m (15.9%).

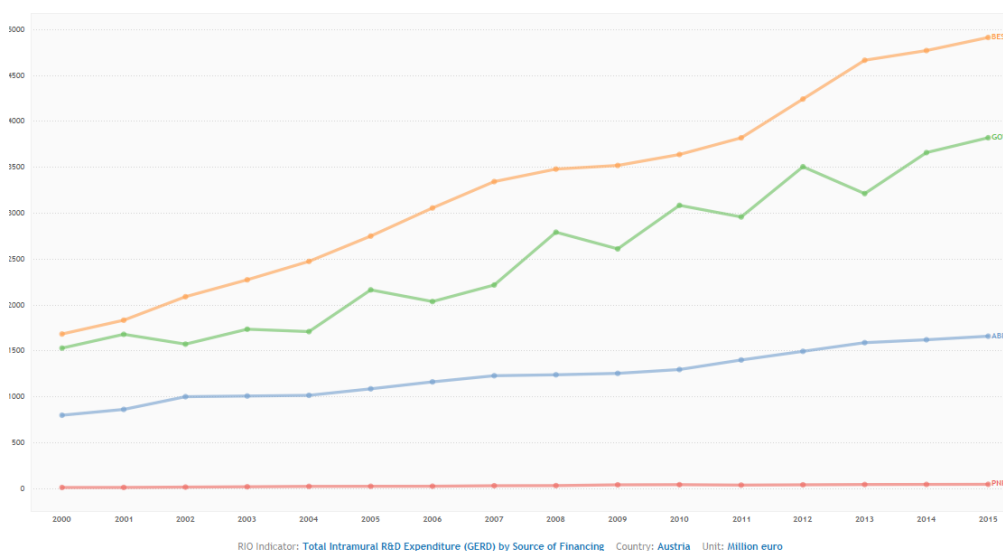


Figure 1 Development of government funding of total GERD.
Data source: Eurostat, 2016.

4.1 Public allocation of R&D and R&D expenditure

Public R&D funding was equal to 1.12% of GDP in 2015. Government and HES R&D expenditure was 0.85% of GDP in 2013, while it represented 37.7% of total GERD in 2014. EU funding of R&D in Austria is comparatively small. In 2013 its share accounted for only 1.9% of the overall total R&D funding in Austria. Around two thirds of EU funding comes from the European Framework Programmes for Research and Innovation. The remainder is mostly from Structural Funds, which are mainly absorbed at Länder-level.

The budget plan for 2016 reveals a small total increase in public R&D expenditures compared to 2015, but it also features some cuts, for instance to the Austrian Science Fund, the Climate and Energy Fund, and the contributions to the European Space Agency as well as R&D expenditure cuts within the budgets of BMVIT (BMF 2015). On the other hand, the fields of education and research have been least negatively affected by budget consolidation measures.

In 2016, universities saw an increase in their institutional funding and the competitively awarded *Hochschulraumstrukturmittel* (higher education structural funds) of €300m, to a total of €750m for the period 2016-2018. The budget of applied sciences universities also increased from €264.9m to €281.6m (BMF 2015b). Universities will also benefit from the "Research Billion" announced in November 2016 (see Section 1).

Austria allocates a high proportion of its public funding to private R&D; 25.9% of total public R&D funding went to the business enterprise sector in 2013. In general, public funding streams cover the entire R&D&I process from fundamental research to market innovation. More recently, missing links in this process are being addressed. For example, funds are allocated to prototype research to support the commercialisation of university (basic) research results. In addition, a wide range of policy instruments to foster knowledge and technology transfer have been launched in the past decade to ensure a high degree of connectivity among major actors in the R&I system.

On the other hand, indirect support of private R&D has increased in recent years. The research premium, a refund-based tax incentive, was raised to 12% of R&D expenditures as of 1 January 2016. The premium can be deducted or claimed on internal as well as extramural R&D expenditure. €493m were allocated in this way to Austrian businesses in 2014 and €502m in 2015. The instrument is currently evaluated. First results should be available by late 2016.

4.2 Private R&D expenditure

BERD stood at 2.18% of GDP in 2015. The business sector is the largest contributor to Austrian BERD, funding 1.45% of GDP in 2015, as opposed to the 1.12% of GDP from the government and higher education sectors combined (EU-28 in 2014: 1.13% and 0.68%, respectively). Moreover, contributions from abroad (0.49% of GDP in 2015) are made up largely of foreign multinational companies (or their subsidiaries) that conduct R&D in Austria. BERD has followed an upward trend in the past nine years apart from a slight slowdown in 2011. The size of this increase was around 0.45 percentage points, putting Austria on par with innovation-leading Member States.

The manufacturing sector's contribution to total BERD was roughly double that of the service sector for most of the past decade, due to a concentration of most R&D activity in a few high-tech manufacturing firms. However, the gap has been narrowing, with service sector BERD rising more rapidly than manufacturing BERD. The manufacturing sector increased its R&D intensity moderately, from 1.19% in 2006 to 1.3% in 2013. Only Germany, Finland and Sweden outranked Austria within the EU-28 in this regard. R&D intensity in the service sector rose from 0.48% to 0.78% between 2006 and 2013. Here, Austria ranks second after Denmark. The comparatively large increase in R&D in services is due to the expansion of IT and software companies as well as engineering firms that mainly provide consulting and construction/design services. In 2014, the biggest R&D spenders in Austria measured in terms of R&D expenditures in percentage of net turnover were Infineon (24.6%), Boehringer Ingelheim (22.3%), Robert Bosch (20%), followed by AMS, Frequentis, Bernecker+Rainer, Anton Paar, Epcos, FACC and Kapsch (Austrian Business Agency 2015). In terms of R&D expenditure volumes, Voestalpine

(industrial metals) is in the lead, followed by Andritz (industrial engineering), AMS (semiconductors) and Zumtobel (lighting solutions and components).⁹



Figure 2 Top sectors: manufacturing (C26: manufacture of computer, electronic and optical products; C27=manufacture of electrical equipment; C28=manufacture of machinery and equipment n.e.c.). Top sectors: service (G=wholesale and retail trade, repair of motor vehicles and motorcycles, J=information and communication, M=professional, scientific and technical activities).

In terms of inward BERD, 44% of foreign-controlled enterprises conducting R&D in Austria have their headquarters in Germany, 12% in the USA, and 10% in Switzerland. The remaining third has its headquarters in adjacent as well as other European countries (Schibany et al. 2004). International companies such as Baxter, BMW, Bosch, Novartis, Siemens, Magna, and Infineon have bundled their R&D activities and competence centres in Austria. The latter was the most research-intensive company in Austria in 2013 and 2014. Another example is Borealis, which decided in 2006 to turn its Austrian site located in Linz into the centre of its entire international research activities. Nevertheless, although growing in absolute terms, the share of funding from abroad has continuously decreased as a percentage of GERD from its highest level of 21.4% in 2002, which indicates a decreasing independency from corporate R&D funding from abroad.

4.3 Public sector innovation and civil society engagement

Since about fifteen years, public sector innovation is institutionally promoted through the Austrian Federal Chancellery, which currently operates a dedicated administrative section on public service and public sector innovation. To foster stronger collaboration with interested citizens, GovLab Austria was initiated by the Austrian Federal Chancellery together with the Danube University Krems in Spring 2016.¹⁰ It is intended to serve as a central node for innovation laboratories in the sphere of governance and as an open space for experiment and innovation for public administration, science and society.

In 2015, Austria was grouped in the "progressive cluster" in the Commission's eGovernment Benchmark Report, thus losing ground compared to its first mover ranking some years ago. While availability and usability of services, electronic identification, and security are highly developed, cross-border mobility of e-government services is still wanting (EC, 2015). E-government services were used by 93% of companies and by 520,000 people (6% of the population) in 2014.¹¹

Government data is openly available from the portals "Offener Haushalt" (open budget), data.gv.at, and opendataportal.at, totalling 14,350 data sets in early 2016. This fast development was supported by a quick agreement on an Austrian meta-data standard and further standardisation by Cooperation OGD Austria, an association of several public

⁹ <http://www.trend.at/wirtschaft/international/grosse-unternehmen-f-e-ausgaben-asien-europa-5946759>; accessed on 13 September 2016

¹⁰ <https://digitalgovernment.wordpress.com/tag/govlab/>; accessed on 30 August 2016

¹¹ <https://www.bka.gv.at/site/8197/default.aspx>; accessed on 24 August 2016

authorities. However, BMWF and BMVIT are among the laggards in making data openly available, having published only two data sets up until the beginning of 2016.¹²

In late spring 2015 BMWF launched the nation-wide Responsible Science Alliance,¹³ whose aim is to inform citizens about science and engage them in it, as well as to promote responsible science approaches within the Austrian R&D community. In this context the promotion of citizen science and open innovation are considered as the main fields of action. The Centre for Citizen Science, established in 2015 at OeAD, is tasked with promoting citizen science in Austria and supporting BMWF in policy delivery. This is mainly done via two intervention lines, the Top Citizen Science instrument and the Citizen Science Awards.

As regards open innovation, a large consultation process was launched in Winter 2015/2016 based on the quadruple helix concept (involving the public and stakeholders). The Open Innovation Strategy for Austria was officially adopted by the government in July 2016. It aims at increasing innovative capacities within a broad system of innovation, and reducing the inherent risk of failure through the early involvement of society and the market. It defines three core areas for action: development of a culture of open innovation and teaching open innovation skills among all age groups, formation of heterogeneous open innovation networks and partnerships across disciplines, branches of industry and organisations, and mobilisation of resources and creation of framework conditions for open innovation. Several open innovation spaces and labs are already operational, e.g. at the Austrian Railways, the Vienna University of Applied Sciences, the Open Innovation in Science Research and Competence Centre at the Ludwig Boltzmann Gesellschaft or BMVIT's urban mobility laboratories.

5. Innovation challenges

5.1 Streamline the support policy mix for private R&I

Description

The Austrian private sector is a strong R&D performer, with BERD having grown continuously in absolute terms from €5,520m in 2010 to €7,397m in 2015. The country ranks second in the EU in business R&D expenditures in terms of GDP. However, the innovation performance of Austrian companies is lagging behind their R&D expenditure levels. In the 2016 European Innovation Scoreboard, Austria ranks only 19th in non-R&D innovation expenditures and 18th in sales of new-to-market and new-to-firm innovations. Turnover from innovation as a percentage of total turnover has fallen from 13.6% in 2006 to 9.8% in 2012 (last available data).

The observable imbalance between R&D funding and innovation output is despite the array of public support instruments for private R&I which has been built up over the past two decades. The proliferation of instruments, in particular for supporting cooperation between public research institutions and SMEs, appears to have led to a high degree of fragmentation, spreading available funding over a plethora of instruments. Although most older measures have been evaluated and have received favourable assessments individually, overlaps or potential synergies between them have mostly been left unexplored, and coordination between initiatives has been limited (Cuntz 2015). In 2016 the Austrian court of audit recommended among other things that programmes with low

¹² <http://kdz.eu/de/content/offene-verwaltungsdaten-f%C3%BCnf-jahre-open-government-data-%E2%80%93-eine-kritische-w%C3%BCrdigung>; accessed on 24 August 2016

¹³ <http://www.bmfw.gv.at/Presse/AktuellePresseMeldungen/Seiten/Start-des-oesterreichischen-Responsible-ScienceModells-.aspx>

cost-effectiveness should be identified and streamlined, to look into the possibility of reducing the number of agencies involved in R&D funding, and to coordinate the monitoring of key indicators for the achievement of R&I-strategic goals with evaluations of funding programmes (Rechnungshof 2016). According to the report, especially many funding instruments on *Länder* level are not very effective due to their insufficient volumes.

Policy response

Direct support instruments have been streamlined to a certain degree over the past years. Common funding rates have been introduced, administrative procedures simplified and reporting requirements harmonised across instruments. Some existing programmes have been expanded and adapted after positive evaluations, instead of creating new and additional support instruments (COIN, Christian-Doppler-Laboratories, Laura-Bassi-Centres, COMET). On the other hand, although some measures that have reached the end of their budgeting period have been discontinued, FFG and AWS still manage a large portfolio of instruments that support private R&D and innovation activities.

Policy Assessment

Whereas some consolidation has taken place, many different R&I funding programmes still exist that in some instances are difficult to distinguish from one another in terms of their objectives and design. Rather than providing fitting solutions for highly diverse company needs, the fragmented funding landscape appears to be difficult to govern so as to maximise the contribution of support programmes to reaching strategic R&I policy goals.

5.2 Increase funding of excellent basic research

Description

The share of basic research funding in Austria's GDP (0.53%) is significantly lower than in countries which the European Innovation Scoreboard classifies as international innovation leaders (e.g. Switzerland 0.77%, Korea 0.73%). Also compared to intra-EU innovation leaders like the Netherlands, Germany and Finland, funding for basic research in Austria is low (Leitner et al. 2015). This impacts negatively on research excellence. Articles resulting from FWF-funded projects have been shown to be cited more often than other Austrian publications (van Wijk and Costas Comesaña 2014). Only 13.2% of Austria's best-ranked university's (University of Graz) publications are among the top 10% cited, compared with 18.9% for Switzerland's EPFL and 18.1% for the UK's Oxford University (Leiden Ranking 2016).

The allocation of funding through performance agreements tends to result in relatively equal allocations to researchers within universities, which does not incentivise excellence (Janger 2016). This is likely to impede the emergence of excellent research groups in specific fields which can muster a critical capacity, which in turn would enable universities to build up distinct profiles (Schuch and Gampfer 2016). Furthermore, research excellence correlates strongly with a university's ability to commercialise research results (Janger 2016). The Austrian funding mix risks an overemphasis on supporting knowledge transfer and commercialisation of applied research while neglecting one of the factors that determine universities' potential for success in this area in the first place.

Policy response

The "basic contribution" to the universities' budgets has been increased by €315m for 2016-2018, after having been raised already for the 2013-2015 period. In addition, performance-based funding available in 2016-2018 is €750m higher than during the

previous contracting period; especially the share of competitively awarded 'higher education structural funds' has considerably increased in relative terms.

The national university development plan 2016-2021 lists a strengthening of basic research as a systemic goal. In this sense, a share of the "research billion" announced in late 2016 is envisaged to fund high-risk frontier research, which may impact positively on basic research excellence.

Policy Assessment

Basic research is likely to benefit from the increased funding made available to universities in particular since 2016. Especially given growing constraints on overall public budgets in Austria, this expansion thus represents a step in the right direction. It remains to be seen whether those additional funds can be concentrated on individual recipient units to a sufficient degree to constitute a critical mass for fostering the emergence of top research in specific fields. The implementation of the national university development plan cannot be assessed at such an early stage.

Competitive funding for basic research channelled through the Austrian Science Fund, however, remains comparatively low. Regarding the FWF's focus on supporting individual projects of single applicants in person, it might be insufficient to substantially contribute to the expected profiling of universities.

5.3 Further increase equity capital supply for start-ups and scale-ups

Description

Whereas access to finance is not a short-term concern for Austrian SMEs in general, with only 7% of SMEs reporting it as difficult (European Central Bank 2016), supply of equity finance for young companies is still scarce, although the situation is improving. This scarcity holds back in particular the emergence of more fast-growing innovative companies with larger investment volumes, since these often have to rely to a large extent on equity, and thus worsens the outlook for longer-term employment and productivity growth. Venture capital is especially important during the scale-up stage of such 'gazelles'. Total venture capital investments in Austrian companies in 2015 stood at 0.033% of GDP, which is above the EU average (0.024%), but lower than in neighbouring Switzerland (0.044%), Sweden (0.037%) or Finland (0.051%). Whereas policy initiatives (see below) have had considerable positive impact, only 11 companies per million inhabitants had VC investments on their balance sheet in Austria (Invest Europe 2016). While this places Austria ahead of most EU Member States, it is still far away from Finland's 28 or Sweden's 34 companies.

Even though the supply gap of private equity is particularly wide for the scale-up phase of 'gazelles', it exists at all development stages of young companies. The distribution of total private equity investment in 2013 was 20% for seed/start-up, 42% for growth/scale-up, 27% for exit and 11% for replacement (AVCO 2014). Although no detailed breakdown is available, a comparison between investments received by Austrian companies and investments made by Austrian VC firms shows that most VC comes from foreign investors, in particular from Germany (BMFW 2015b), and from public VC instruments (see policy response).

Policy response

In 2015 the Ministry for Science, Research and the Economy issued the "Land of Founders" ("Gründerland") strategy stating the ambitious goal to turn Austria into the most attractive location for start-ups in Europe. Stakeholders from the entrepreneur and venture capital communities heavily contributed to formulating the strategy. It puts forward 40 actions revolving around regulatory framework conditions, access to finance, networking, and fostering an entrepreneurial mentality in society. A new law on

crowdfunding ("alternative financing law") passed in 2015. It significantly liberalised and clarified regulation of retail investment. Legal reforms are also planned to simplify IPOs. In 2014, the state development bank AWS established AWS Equity Finder, a capital brokerage platform, to facilitate contact between business angels, venture capitalists and crowdfunding and crowd-investment platforms.

Aside from improving framework conditions, the Austrian government also provides direct support to boost venture capital supply. This is done by four specific instruments operated by AWS. The AWS Venture Capital Initiative funds private VC investment in Austrian technology firms, especially in clean technologies, life sciences and ICT, in the start-up or early-growth stage (volume of €34m). The Business Angels Fund (€45m in total out of which €15m are financed by AWS; €7.5m by EIF and the rest by the Business Angels) matches Business Angels' investments with a 1:1 ratio. It also tackles the start-up and early-growth stages, but in a wider area of business sectors with usually not so high capital requirements. The "AWS-Gründerfonds" ('AWS-business start-up fund') funds A and B financing rounds with a total funding volume of €68.5m and targets technology-oriented innovative companies at the (early) scale-up stage. Finally, the "AWS-Mittelstandsfonds" ('AWS SME fund') targets the scale-up phase of already established technology firms with a volume of €80m. The start-up package announced in 2016 represents the first main step towards implementation of the "Gründerland" strategy. Among other things, it envisages an increase in funding for the Business Angels Fund and Seedfinancing of €20m each, co-financing of VC investments in innovative start-ups by up to 20%, establishment of a one-stop shop for registering new businesses, and tax reliefs for private investors' capital gains from VC investment in SMEs.

Policy Assessment

The financial instruments to support equity, in particular venture capital supply, seem to be successful so far. The VC investment received by Austrian companies in 2015 as a share of GDP represents an increase of around one third compared to the 2011-2015 average. The AWS Venture Capital Initiative seems to have a considerable impact on the development of fund-of-funds activities and the capturing of risk capital in Austria. Business angels' investments jumped from €2.9m in 2013 to €16.3m in 2015, placing Austria above e.g. the Netherlands, Belgium, Ireland or Switzerland. There are thus indications that the strong increase in public VC is starting to leverage private equity as well. Whether this improvement in the financing environment will gain further momentum and be sustainable cannot be assessed yet, partly because that not much data on exit/success rates is available.

In any case, the political commitment to improve framework conditions to facilitate this change has now been substantiated by the announcement of the start-up package. The measures related to access to finance seem likely to improve equity supply. Nevertheless, the impact of the proposed VC tax incentives on the growth of beneficiary companies might require close monitoring, as evaluations of similar schemes in other EU Member States have shown very small effects compared to their costs (National Audit Office 2014; Cowling et al. 2008). The alternative financing law lightens regulatory burden for crowdfunding substantially (also compared to similar legislation in other MS), but one year after adoption it is still too early to assess its impact.

6. Focus on creating and stimulating markets

This section aims at describing and assessing national level efforts to introduce demand-side innovation policies to stimulate the uptake of innovation or act on their diffusion, including public procurement and regulations supporting innovation. It also analyses policy measures aimed at internationalisation of companies with the aim of increasing the innovativeness of the economy.

Austria's industrial structure makes the emergence or creation of lead markets relatively unlikely, since the most innovative companies are highly specialised suppliers further upstream in global value chains. For them a more natural strategy is to respond to moves by their downstream customers. Exceptions are markets with low international integration, such as the construction and building sector, where energy efficiency regulation has stimulated the expansion of the corresponding market.

Public procurement in Austria represents around €40b per year (Cuntz 2015) or around 15% of GDP. Statistik Austria estimates that 2 to 3% of all government sector procurement in Austria falls under public procurement promoting innovation (PPPI / Innovationsfördernde Öffentliche Beschaffung, IÖB), while the potential is still not fully exploited.¹⁴ This gap between actual and potential use of PPPI is also reflected in the Global Competitiveness Report (WEF, 2016), where Austria ranks only 61st as regards "government procurement of advanced tech programmes" out of 138 countries, although Austria has a good¹⁵ innovation procurement concept (BMWFI et al. 2012) and an operating PPPI service centre. Although the PPPI service centre regularly organises awareness sessions, provides professional advice and training and accompanies innovative procurement projects with its expertise, its mobilisation effect might be increased. More time, sustained political commitment, higher commitment of the ministries at different levels of authority, and closer cooperation between the beneficiaries and the procurers is required to develop a cultural change in this respect in Austria.¹⁶ This assessment has been taken up in a corresponding recommendation of the Austrian Council for Research and Technology Development to the Austrian government in 2016.¹⁷ The recommendation also calls for an improved monitoring system to gain more reliable data on (innovation) procurement in Austria. In 2014, the EU directive 2014/24/EU on public procurement was adopted by the European Parliament introducing a new procurement procedure called "Innovationspartnerschaften" (i.e. innovation partnerships). The EU directive has not been implemented at national law yet, thus no experience with this instrument has been made so far.,. However, the new instrument enables on three subsequent steps (1) to organise the pre-commercial dialogue, (2) to develop prototypes and (3) to commercially procure.

The PPPI service centre has established the online platform www.innovationspartnerschaft.at¹⁸, a sort of market place to connect providers of innovative products and services with innovation-oriented public procurers. The number of registered and approved companies (around 70) is low, but constantly growing. The online platform also enables public authorities to announce challenges they face with regard to procurement. In return, research institutions, enterprises, citizens etc. are invited to offer innovative solutions for those challenges.

Although there are still several structural barriers and a few operative barriers to the full utilisation of PPPI's potential in Austria, the country seems to be on a good track regarding the implementation of public innovation procurement. As an example, the Federal Procurement Agency (BBG) won the Procurement of Innovation Award 2015 (EAFIP) for their procurement of an innovative wastewater recycling system for the national mint. This procurement case was chosen as it not only involved the application of innovation-friendly procurement procedures, but also ensured increased resource

¹⁴ Discussion input of Josef Mandl during the seminar on „Innovationsfördernde öffentliche Beschaffung in Österreich“, 14 September 2016, Austrian Chamber of Commerce, Vienna

¹⁵ This assessment was given by Jakob Edler during the seminar on "Innovationsfördernde öffentliche Beschaffung in Österreich", 14 September 2016, Austrian Chamber of Commerce, Vienna

¹⁶ Ibid

¹⁷ <http://www.rat-fte.at/veranstaltungen/articles/innovationsfoerdernde-oeffentliche-beschaffung-in-oesterreich.html>; accessed on 15 September 2016

¹⁸ <http://www.innovationspartnerschaft.at/>; accessed on 15 September 2016

efficiency, thereby aiding environmental sustainability.¹⁹ Furthermore, the PPPI initiative has won a recognition certificate in the course of the Austrian Public Sector Award 2016.²⁰

On November 8, the Austrian government adopted a package of R&I support measures totalling €700m of public and €500m of private funding between 2017 and 2021. €10m of those funds are intended to flow into innovation procurement for additional PPPI measures such as the extension of the PPPI competition, pilot projects using the new instrument "innovation partnership", a training course for public procurers as well as the improvement of the availability of data regarding (innovation) procurement.

¹⁹ http://ec.europa.eu/environment/ecoap/about-eco-innovation/business-fundings/austrian-procurement-wastewater-system-earns-praise_de, http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8532&lang=en; accessed on 15 September 2016

²⁰ https://www.oeffentlicherdienst.gv.at/verwaltungsinnovation/wettbewerbe/oesterreichischer_verwaltungspreis/verwaltungspreis_2016_final.html; accessed on 31 December 2016
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List of abbreviations and definitions

AIT	Austrian Institute of Technology
AT	Austria
AWS	Austria Wirtschaftsservice GmbH (Austria Business Service)
BERD	Business Expenditure for Research and Development
BES	Business Enterprise Sector
BMF	Bundesministerium für Finanzen (Austrian Federal Ministry of Finance)
BMVIT	Bundesministerium für Verkehr, Innovation und Technologie (Austrian Federal Ministry of Transport, Innovation and Technology)
BMWFJ	Former Austrian Federal Ministry of Economy, Family and Youth
BMWFW	Bundesministerium für Wissenschaft, Forschung und Wirtschaft (Austrian Federal Ministry of Science, Research and Economy)
EC	European Commission
EIF	European Investment Fund
ERA	European Research Area
ERDF	European Regional Development Funds
EU	European Union
EU-28	European Union including 28 Member States
FFG	Österreichische Forschungsförderungsgesellschaft mbH (Austrian Research Promotion Agency)
FP	Framework Programme
FWF	Fonds zur Förderung der wissenschaftlichen Forschung (Austrian Science Fund)
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
HEI	Higher Education Institution
HES	Higher Education Sector
HRST	Human Resources in Science and Technology
IP	Intellectual Property
IPO	Initial Public Offering
MS	Member State
ÖAW	Österreichische Akademie der Wissenschaften (Austrian Academy of Sciences)
PRO	Public Research Organisation

R&D	Research and Development
R&I	Research and Innovation
RI	Research Infrastructure
RTI	Research, Technology and Innovation
S3	Smart Specialisation Strategy
S&T	Science and Technology
SME	Small and Medium Sized Enterprise
VC	Venture Capital
WEF	World Economic Forum
ZSI	Zentrum für Soziale Innovation (Centre for Social Innovation)

Factsheet

	2009	2010	2011	2012	2013	2014	2015	2016
GDP per capita (euro per capita)	34300	35200	36800	37600	38000	38700	39400	40000
Value added of services as share of the total value added (% of total)	69.79	69.88	69.86	69.68	69.98	70.36	70.37	
Value added of manufacturing as share of the total value added (%)	18.46	18.67	18.77	18.93	18.65	18.54	18.91	
Employment in manufacturing as share of total employment (%)	15.35	14.93	14.95	14.99	14.84	14.72	14.72	
Employment in services as share of total employment (%)	71.3	71.82	71.93	72.2	72.49	72.55	72.9	
Share of Foreign controlled enterprises in the total nb of enterprises (%)	3.02	3.04	3.16	3.2	3.12			
Labour productivity (Index, 2010=100)	98.6	100	100.8	101.9	102.6	102.9	104.6	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	1.55	1.62	1.58	1.62	1.46	1.46	1.39	
Summary Innovation Index (rank)	8	9	11	12	9	11	11	
Innovative enterprises as a share of total number of enterprises (CIS data) (%)				54.4		59.5		
Innovation output indicator (Rank, Intra-EU Comparison)			11	11	10	11		
Turnover from innovation as % of total turnover (Eurostat)		11.9		9.8				
Country position in Doing Business (Ease of doing business index WB)(1=most business-friendly regulations)						20	21	19
Ease of getting credit (WB GII) (Rank)						48	53	
Venture capital investment as % of GDP (seed, start-up and later stage)	0.012	0.01	0.008	0.008	0.008	0.008	0.008	
EC Digital Economy & Society Index (DESI) (Rank)						13	13	12
E-Government Development Index Rank		24				20		16
Online availability of public services – Percentage of individuals having interactions with public authorities via Internet (last 12 months)	49	51	51	53	54	59	57	60
GERD (as % of GDP)	2.61	2.74	2.68	2.93	2.97	3.06	3.07	
GBAORD (as % of GDP)	0.75	0.77	0.79	0.77	0.8	0.8	0.81	
R&D funded by GOV (% of GDP)	0.91	1.05	0.96	1.11	1	1.11	1.12	
BERD (% of GDP)	1.78	1.87	1.84	2.06	2.1	2.16	2.18	
Research excellence composite indicator (Rank)				9				
Percentage of scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country		11.32	11.51	10.94	11.71			
Public-private co-publications per million population	58.31	63.1	63.88	58.51	54.19	59.01		
World Share of PCT applications	0.78	0.79	0.81	0.76	0.69	0.79		

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Figure 1 Development of government funding of total GERD. 9

Figure 2 Top sectors: manufacturing (C26: manufacture of computer, electronic and optical products; C27=manufacture of electrical equipment; C28=manufacture of machinery and equipment n.e.c.). Top sectors: service (G=wholesale and retail trade, repair of motor vehicles and motorcycles, J=information and communication, M=professional, scientific and technical activities)..... 11

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