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IMPACT ASSESSMENT

Accompanying the document

COMMUNICATION FROM THE COMMISSION

Framework for state aid for research and development and innovation

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Executive Summary Sheet
Impact assessment on the Framework for state aid for research and development and innovation
A. Need for action
Why? What is the problem being addressed?
<p>The main problems for state aid control in the field of research, development and innovation (R&D&I) are related to the need to ensure that the applicable rules:</p> <ul style="list-style-type: none"> (i) bring about a higher level of R&D&I activities than would otherwise occur, while ensuring that the positive effects of state aid outweigh its potential negative effects in terms of distortions of competition in the internal market, (ii) take sufficiently into account other EU policies, in particular with a view to ensuring continued interaction with EU R&D&I policy in the context of the priority themes of the Europe 2020 strategy, and (iii) contribute to further clarity and simplification in the light of the EU initiatives on better regulation. <p>In addition, whilst the basic principles of the current regime are well accepted, it emerges from the Commission case practice and the public consultations that its practical implementation raises several problems relating to a lack of clarity concerning the presence of state aid in typical R&D&I situations, a restrictive scope of aid objectives, and an insufficient degree of predictability of the rules on the assessment of large individual aid.</p>
What is this initiative expected to achieve?
<p>The revision of the R&D&I state aid rules aims at:</p> <ul style="list-style-type: none"> (i) enabling public interventions that are effectively targeted towards growth-enhancing activities while limiting distortions of competition that would undermine a level playing field in the internal market, (ii) focusing the Commission assessment on the potentially most distortive cases, (iii) minimising administrative burdens and compliance costs on companies and national administrations, and (iv) simplifying and rationalising the transparency and reporting requirements for Member States.
What is the value added of action at the EU level?
<p>The Treaty on the Functioning of the European Union (TFEU) gives exclusive competence for assessing the compatibility of state aid to the Commission. Commission guidelines are thus essential to ensure uniform rules throughout the Union for the granting of R&D&I state aid that could contribute to sustainable growth and jobs. Commission action is necessary to ensure both that companies can receive the support they may need to address those market failures that hamper R&D&I activities and that aid is limited to the minimum necessary. The Commission also acts as an arbiter by scrutinising in more detail the expected positive and negative effects of the potentially most distortive notified aid, in particular by verifying that certain common principles are fulfilled (e.g. incentive effect and proportionality of the aid).</p>
B. Solutions
What legislative and non-legislative policy options have been considered? Is there a preferred choice or not? Why?
<p>In the absence of compatibility criteria being laid down in the R&D&I state aid rules, the Commission would have to assess aid notifications on a case-by-case basis in direct application of Article 107(3)(c) of the TFEU. This situation would not ensure equal treatment, legal certainty or predictability, and could lead to subsidy races between Member States that would highly damage trade and competition within the internal market. Rules on R&D&I state aid are therefore necessary to ensure uniform conditions for the granting of aid in the Union (i.e. a 'doing nothing' approach is not conceivable). Other policy instruments than regulation at EU level (e.g. self-regulation, open method of coordination, market-based instruments) would not be effective. The preferred policy option consists in a far-reaching reform of the current rules both as regards their</p>

<p>scope and the design of the appropriate compatibility criteria. This option is consistent with the State Aid Modernisation initiative, in particular with its objective of focusing the substantive assessment of aid on a more limited number of cases with the biggest potential impact on the market.</p>
<p>Who supports which option?</p>
<p>Member States and stakeholders, in their replies to the first public consultation indicated that, despite some identified problems, the current regime worked well and provided a sound basis for channelling Member State resources towards 'good' R&D&I aid (well-designed, targeted at identified market failures and objectives of common interest, proportionate and least distortive). Nevertheless, the preferred option, which has been publicly presented, first in an Issues Paper, then in the draft R&D&I Framework, the draft GBER and the draft Communication on aid for important projects of common European interest (IPCEI), is supported by all Member States who have welcomed the improvements offered by the proposal compared to the current system.</p>
<p>C. Impacts of the preferred option</p>
<p>What are the benefits of the preferred option (if any, otherwise main ones)?</p>
<p>The preferred option ensures full alignment and complementarity of the R&D&I state aid rules (Framework and GBER), addresses the need for explanations on the presence of aid, introduces new or streamlined compatibility criteria for an enlarged set of aid categories, has the expected most important positive impact on mobilisation of R&D&I investments and competitiveness, and offers the highest level of legal certainty without higher adaptation costs than other options. It also ensures a consistent and flexible approach under which aid for IPCEI may be provided in all areas (including R&D&I). The preferred option therefore ensures the largest degree of achievement of policy objectives.</p>
<p>What are the costs of the preferred option (if any, otherwise main ones)?</p>
<p>The preferred option will provide legal certainty and transparency to Member States. At the same time, it will provide businesses with the clarity and predictability needed to make the necessary investments in R&D&I. By ensuring that more measures would be exempted from the notification obligation, it moreover contributes to simplification and reduction of administrative burdens.</p>
<p>How will businesses, SMEs and micro-enterprises be affected?</p>
<p>Since any compliance costs will mainly be supported by national administrations that go through the notification process, at the level of the beneficiary undertakings the administrative burden should be limited to the usual process to apply for aid.</p>
<p>Will there be significant impacts on national budgets and administrations?</p>
<p>The revised rules will contribute to avoid excessive administrative burdens.</p>
<p>Will there be other significant impacts?</p>
<p>The application of the revised rules is expected to enhance R&D&I activities and competition in the internal market, and thus incentivise enterprises, including new ones, to enter markets and innovate, improving productivity and competitiveness in a global context. By rendering the assessment of the effects of R&D&I state aid by the Commission more efficient, they should also better support Member States' policies to address the relevant structural barriers and market inefficiencies.</p>
<p>D. Follow up</p>
<p>When will the policy be reviewed?</p>
<p>DG Competition will continuously monitor the application of the R&D&I state aid rules to assess its effects and determine if adjustments are required. DG Competition will also conduct an ex-post evaluation of the new rules with a view to their possible revision for the period after 2020, with the involvement of Member States and other interested parties.</p>

1. INTRODUCTION

Under Article 107(1) of the Treaty on the Functioning of the European Union ("TFEU"), State aid is prohibited, unless it is compatible with the internal market under Articles 107(2) or 107(3) TFEU. State aid rules applicable in the field of research and development and innovation ("R&D&I") are laid down in the Community Framework for State aid for research and development and innovation¹ ("the R&D&I Framework" or "the Framework") and in the General Block Exemption regulation ("the GBER")².

The Commission has a wide margin of discretion when applying Article 107(3) TFEU.³ The exercise of such discretion involves economic and social assessments which must be made in a Union context.⁴ Spelling out the criteria on which such assessments are based ensures a consistent approach as well as legal certainty.

The Framework defines the Commission's margin of discretion in assessing the compatibility of State aid for R&D&I with the internal market under Articles 107(3)(b) and (c) TFEU. It has binding effect on the Commission, which must approve notified State aid that is in line with the Framework's compatibility criteria, as well as on Member States that have accepted the appropriate measures proposed therein. The conditions under which Member States can implement certain State aid measures without prior notification are set out in the GBER.

The Commission has traditionally taken a favourable view on aid for research and development ("R&D") activities. Since 1986 it has set out compatibility rules for such aid and repeatedly adapted these rules in successive Frameworks to take account of developments and experience gained in case practice.⁵ Innovation aid objectives have been included for the first time in the current R&D&I Framework. Moreover, R&D aid measures have been included in block-exemption regulations since 2004.⁶

In its Communication on EU State aid modernisation⁷ ("the SAM initiative"), the Commission set out an ambitious State aid reform with three main objectives: to foster growth in a strengthened, dynamic and competitive internal market; to focus enforcement on cases with the biggest impact on the internal market; and to streamline rules and enable faster decisions. The revision of the Framework, which entered into force on 1.1.2007 and is due to expire on 30.6.2014⁸, is an integral part of the SAM initiative⁹. This is also the case for the revision of the GBER, which entered into force on 28.8.2008 and will also expire on 30.6.2014¹⁰.

The Framework's scope, architecture and substantive rules were developed in 2005/2006 and were intended to contribute to EU policies, in particular the "Lisbon Strategy". The scope and the substantive rules of the GBER provisions on R&D&I aid reflect to a very high extent the

¹ OJ C 323, 30.12.2006, p. 1.

² Commission Regulation (EC) No 800/2008 declaring certain categories of aid compatible with the common market in application of Articles 87 and 88 of the Treaty, OJ L 214, 9.8.2008, p. 3.

³ Court judgment, C 39/94 *SFEI/La Poste*, para (36).

⁴ Court judgment, C 730/79 *Philip Morris*, para (24).

⁵ Cf. point 1.4.2 of the 1986 Community Framework for State Aid for Research and Development, OJ C of 11.4.1986, p.2, and points 1.9 and 1.10 of the successor 1996 Framework, OJ C 45 of 17.2.1996, p.5.

⁶ Commission Regulation No 364/2004 of 25.2.2004 amending Regulation (EC) No 70/2001 as regards the extension of its scope to include aid for research and development, OJ L 63 of 28.2.2004, p.22.

⁷ COM(2012) 209 final of 8.5.2012.

⁸ OJ C 360, 10.12.2013, p. 1.

⁹ A series of reforms to modernise state aid was announced in the Commission Work Programme 2013, including key sectors such as R&D&I aid (COM(2012) 629 final of 23.10.2012). The revision of the Framework was item N° 2013/COMP/004 on the Agenda Planning for such Work Programme.

¹⁰ OJ L 320, 30.11.2013, p. 22.

ones of the Framework. The relevant policies have in the meantime been superseded by the EU's current policies, especially the Europe 2020 strategy ("EU 2020")¹¹.

This Impact Assessment explores the need to revise the current R&D&I state aid rules¹², the policy objectives that should be pursued, as well as options for such revision and their impact.¹³

2. PROCEDURE AND CONSULTATIONS

While the general chronology of the revision process regarding R&D&I State aid rules is set out in Annex 10.1, the main events are described in more detail in the present section.

DG COMP established an Impact Assessment Steering Group¹⁴, which met on 12.9.2012, 31.1.2013, 16.7.2013, 14.1.2014 and 13.2.2014. In parallel, DG COMP held additional meetings with those services for which the R&D&I State aid rules are most relevant¹⁵.

Moreover, with respect to the rules on aid for important projects of common EU interest ("IPCEI"), DG COMP established a working group with the relevant Commission services¹⁶.

Throughout the process, DG COMP collected individual comments and expertise from Member States, regions, and stakeholders such as industry associations and research organisations¹⁷.

The results of all public consultations and multilateral meetings referred to in this section have been taken into account in the present Impact Assessment.

2.1. Consultation of the Impact Assessment Board

A draft of this Impact Assessment was agreed at the last meeting of the IASG on 13.2.2014 and submitted to the Impact Assessment Board on 26.2.2014 (updated on 11.3.2014).

The Board issued a positive opinion on the Impact Assessment, by written procedure, on 31.3.2014, with some recommendations for improvement.

First, it was recommended to strengthen the problem definition by focusing it more clearly on areas in which critical problems have been identified, namely those related to obstacles to R&D&I investments. Second, it was suggested to clearly structure the options under consideration around the issues identified in the problem definition, clarifying the different approaches to dealing with them. Third, it was recommended to give a better indication of the impact of the various options on total R&D&I investment (in particular by building on existing case practice), as well as to more robustly assess the risk of negative effects on competition as a result of the proposed changes. Finally, it was held that the report should give a better overview of the input received from stakeholders, highlighting which specific groups will be affected.

The recommendations of the Board were taken into account and implemented in the present Impact Assessment.

2.2. Mid-term Review of the R&D&I Framework

As a preparatory step to the revision process, DG COMP carried out a Mid-term Review of the R&D&I Framework three years after its entry into force¹⁸, the results of which were published

¹¹ COM(2010) 2020 final, 3.3.2010, p. 20.

¹² For the present purposes, and unless indicated otherwise, all references to the R&D&I Framework should be understood as including the analogous provisions of the GBER.

¹³ This impact assessment has been carried out by the Commission's Directorate-General for Competition (DG COMP) which, within the Commission, is primarily responsible for the enforcement of EU competition rules, including rules on State aid for R&D&I.

¹⁴ The following services were invited to participate: the Secretariat General, the Legal Service, Directorates General ECFIN, ENTR, EMPL, AGRI, CLIMA, ENER, MOVE, ENV, RTD, CNECT, MARE, MARKT, REGIO, TAXUD, TRADE, BUDG, and the Joint Research Centre (JRC).

¹⁵ DGs CNECT, ENTR, REGIO and RTD.

¹⁶ Meetings were held on 15.5.2013, 28.5.2013, 10.6.2013, 1.10.2013, 9.1.2014 and 17.1.2014.

¹⁷ DG COMP accepted all meeting requests that have been addressed to its services on this topic.

on 10.8.2011 in a Commission Staff Working Paper.¹⁹ The Review was carried out on the basis of case practice, but also on the basis of stakeholders' enquiries on interpretational questions.

In general, the Framework was found to have constituted a useful instrument for well-targeted public support. Nevertheless, Member States have not used the R&D&I State aid rules to their full extent. In particular, Member States appeared to remain below the permitted maximum aid intensities. The impact of innovation measures was also found to possibly require closer scrutiny, in view of their relatively recent introduction²⁰, which might in some cases have played a role in Member States' alleged reluctance to fully exhaust the state aid rules on innovation. The Review also identified provisions that gave rise to interpretational issues²¹, which are described in more detail in the Staff Working Paper.

The Review finally concluded that, it would be important to review more thoroughly the experience gained in applying the Framework in preparation for its revision in 2013.

2.3. First public consultations

In a first public consultation lasting from 20.12.2011 until 24.02.2012, the Commission invited Member States and interested parties to submit their input and views on the revision of EU State aid rules for supporting R&D&I. The consultation was based on a questionnaire to collect views on the Framework and on the revision thereof, as well as statistical and qualitative information on national R&D&I policies at large and on national state aid measures for R&D&I in particular. DG COMP analysed the contributions received and published the non-confidential versions of such contributions on its website.²²

In total, the Commission received and analysed 99 responses²³, which in general showed that the Framework is considered as sufficient to cater for the basic needs of R&D support. In particular, allowed aid intensities were generally perceived as appropriate, and aid granted for R&D projects remained significantly below the allowed maxima in most cases.

Stakeholders however pointed to a number of aspects which would need to be revised, streamlined or clarified, and which can be summarised as follows: provisions regarding the presence of State aid in typical R&D situations²⁴ were useful, but could be made more precise in order to cover a wider range of situations; aid for research infrastructures²⁵ should be clearly addressed, not least in view of their importance for overall R&D&I policy²⁶; the definition of the research organisations²⁷ and related provisions would merit being reconsidered and further clarified; some Member States pointed to the need for a better alignment of conditions in the Framework and the GBER and suggested enlarging the scope of application of the later; concerning the assessment of aid to promote IPCEI²⁸ a number of stakeholders (mostly from industry) pleaded for a clearer approach, in particular to projects involving extensive cross-border industrial collaboration, and where any significant intra-EU competition is absent; a

¹⁸ Pursuant to point 10.3 2nd subparagraph of the R&D&I Framework.

¹⁹ http://www.ec.europa.eu/competition/state_aid/legislation/rdi_mid_term_review_en.pdf.

²⁰ In particular, there was some uncertainty regarding the eligibility of some innovation aid measures.

²¹ The contribution of the participating undertakings to the costs of the research organisation in R&D-collaboration (point 3.2.2(3) of the Framework), the bonus for cross-border collaboration in at least two Member States (point 5.1.3(b)(i) of the Framework), aid for young innovative enterprises (point 5.4 of the Framework), aid for the loan of highly qualified personnel (point 5.7 of the Framework) and the definition of 'R&D-project'.

²² Both the questionnaire and the non-confidential versions of the contributions received are available at: http://www.ec.europa.eu/competition/consultations/2012_stateaid_rdi/index_en.html.

²³ By 41 public authorities, 33 registered organisations, 24 unregistered organisations, and 1 EU-citizen.

²⁴ See Chapter 3 of the R&D&I Framework.

²⁵ Neither the Framework nor the GBER provides for specific compatibility criteria for such aid.

²⁶ The public consultation however also showed that many Member States tend to incorrectly consider support for research infrastructures as inherently State aid free.

²⁷ See point 2.2 d) of the R&D&I-Framework.

²⁸ Chapter 4 of the Framework.

significant number of stakeholders considered that the present rules on aid for demonstration and pilot projects may not sufficiently take into account the particularities of breakthrough technologies that address societal challenges and usually require a high degree of collaboration²⁹; and most stakeholders expressed concerns that the allowed innovation aid measures are too restrictive (e.g. limitations in eligible costs, eligible beneficiaries, time-lines and aid levels), some of them claiming that the applicable rules resulted in unnecessary bureaucracy to the extent that several Member States used *de minimis* aid³⁰ instead.

Some of the responses that the Commission received moreover concerned distortions of international trade and competition due to subsidies granted outside the EU, and in particular the current Framework's "matching clause"³¹. Whilst pointing to its potential importance as an instrument to underpin EU's global competitiveness, some stakeholders perceive shortcomings of the matching clause, due to its alleged restrictiveness and the alleged difficulty in identifying and demonstrating public support granted by third countries.

Since most of the provisions of the GBER are identical to the ones of the Framework, certain issues mentioned above were raised also in the first public consultation on the GBER, which took place between 20.6.2012 and 12.9.2012³².

2.4. External expertise

For the purposes of this Impact Assessment, DG COMP used external expertise from a large number of sources. These are listed in Annex 10.2.

2.5. Workshop with Member States and other stakeholders

Based on its own experience with R&D&I State aid as well as on the contributions to the first public consultation, DG COMP published an Issues Paper in December 2012³³, putting forward some envisaged policy options and possible lines of reform of the applicable State aid rules. That paper served as the basis for discussion with other Member States, EEA-countries, the EFTA-surveillance authority, the European Parliament, the Committee of Regions and the European Economic and Social Committee, certain stakeholders who contributed to the public consultation and other Commission services, during a Workshop held on 9.1.2013.

The aim of the Workshop was in particular to have an open discussion on three key topics presented in the Issues Paper: public funding of research organisations and research infrastructures, innovation support measures, and substantive compatibility analysis of aid³⁴.

In general, participants agreed that clarifications are needed on the presence of State aid in R&D&I-typical situations³⁵, recommending that such clarifications should be practical and allow for sufficient flexibility; with respect to aid for research infrastructures, clearer compatibility rules would be needed; participants also agreed that innovation aid should be flexible enough to properly encourage collaboration, knowledge transfer and mediation, and large-scale demonstrations; the possible development of a new category of "small amounts of compatible aid for innovation" and the inclusion of non-technological innovation were

²⁹ In this context, responses pointed to the need to counter the decline in the industrial deployment of cutting-edge innovations in the EU.

³⁰ Commission Regulation (EC) 1998/2006 of 15.12.2006 on the application of Articles 87 and 88 of the Treaty to *de minimis* aid, OJ L 379 of 28.12.2006, p.5.

³¹ Section 5.1.7 of the R&D&I Framework. That clause allows R&D project aid that exceeds the regular aid ceilings if competitors located outside the EU receive equivalent aid for similar activities.

³² Consultation documents and responses are available at:

http://www.ec.europa.eu/competition/consultations/2012_gber/index_en.html.

³³ http://ec.europa.eu/competition/state_aid/legislation/rdi_issues_paper.pdf.

³⁴ Speeches and presentations made at the Workshop are available at:

http://www.ec.europa.eu/competition/state_aid/legislation/horizontal.html.

³⁵ Economic and non-economic nature of the activities of research organisations, the market price of intellectual property rights (IPR) and the issue of exclusive and non-exclusive dissemination of IPR.

welcomed; with respect to the substantive assessment of aid, many participants perceived the proposed net extra costs approach as going against the objectives of simplification and faster decision-making; the suggested new formal incentive effect criterion (a project should not start before the Member State has decided to grant the aid) was in particular met with scepticism by a large number of Member States; finally, a few participants pointed to strong global competition³⁶, and considered the matching of aid levels outside the EU as a means to keep manufacturing in the EU, while others pointed to the risk of subsidy races.

Member States and stakeholders found the revision of the R&D&I State aid rules necessary, but called for an evolution rather than a revolution in current practice. The Issues Paper served as a good basis for discussion and its quality was widely appreciated. Further to the Workshop, some Member States³⁷ submitted written comments on the Issues Paper.

2.6. Commission inter-service consultations

On 12.7.2013, DG COMP launched an inter-service consultation on a draft revised R&D&I Framework. The ISC was closed on 1.8.2013 with 18 agreements (some with comments to be taken into account) and 3 negative opinions (DGs CNECT, ENTR and RTD). The issues raised in the negative opinions concerned *inter alia* treatment of economic activities carried out by research organisations, pricing of the use of research infrastructures, pre-commercial procurement, treatment/definitions of aid for demonstration and pilot plants, aid intensities and notification thresholds. All 3 negative opinions (as well as some of the agreements with comments) expressed that changes to the rules on aid for IPCEI were crucial, in particular with a view to clarify the compatibility criteria, and thereby make the provisions more operational, as well as to explicitly include close-to-the-market activities. The issues were discussed in several meetings between the involved DGs, at management level as well as at technical level. Following such discussions, an agreement on launching a public consultation on the draft revised Framework was reached on 12.11.2013.

2.7. Public consultations on draft new texts

In a second public consultation that took place from 20.12.2013 until 17.2.2014, the Commission invited Member States and interested parties to submit their views on a draft revised R&D&I Framework.³⁸ In total, the Commission received and analysed 104 responses³⁹, showing that most Member States and stakeholders generally welcome the draft Framework, especially the provision of further guidance on the presence of aid, the introduction of a new category of aid for research infrastructures and the increased flexibility for aid for prototypes and pilots and for innovation aid. Substantive comments focussed on research infrastructures⁴⁰, innovation aid⁴¹, and proportionality issues⁴². Most respondents raised

³⁶ In particular in the nanoelectronics and semiconductor sectors.

³⁷ Estonia, France, Germany, Hungary, Ireland, Latvia, Poland, Romania, Slovakia and the United Kingdom.

³⁸ http://ec.europa.eu/competition/consultations/2013_state_aid_rdi/index_en.html.

³⁹ By 27 public authorities, 38 registered organisations, 37 unregistered organisations, and 2 EU-citizens. The non-confidential versions of the responses are published at: http://ec.europa.eu/competition/consultations/2013_state_aid_rdi/index_en.html.

⁴⁰ A number of Member States as well as many research organisations considered the proposed ancillarity threshold as too low; this view seems however to, at least partially, be based on a misconception that funding cannot be provided for research infrastructures where economic activities exceed the proposed limit, which is not the case as such economic activities may be supported by state aid both under the Framework and the GBER. At the same time, some Member States also argued that the proposed aid intensity could be higher.

⁴¹ With respect to operating aid for innovation clusters, a number of Member States and professional associations considered the proposed time-limit to be too restrictive. As for innovation support and advisory services, some Member States and several industrial stakeholders found that the aid intensity should be higher and argued in favour of maintaining the current approach, which rather limits such aid to 200,000 euros over 3 years without any pre-defined ceiling on aid intensity. Finally, some Member States and professional associations found the proposed aid intensity for feasibility studies too low for smaller companies.

clarification/interpretational issues relating to definitions, or presence of aid in funding of research infrastructures and in collaborations between research organisations and industry. Also, a few comments regarding the matching clause were provided: while some Member States and stakeholders argued for making better use of it, others considered that its protectionist spirit is outdated and does not fit with the SAM objectives. Furthermore, many respondents found the transparency and evaluation requirements administratively burdensome and feared they could lead to confidentiality issues, in particular for fiscal measures.

Draft new GBER provisions on R&D&I aid were subject to a first consultation from 8.5.2013 until 28.6.2013⁴³ and, for additional measures⁴⁴, from 24.7.2013 until 10.9.2013⁴⁵. The drafts were generally welcomed, in particular the increased notification thresholds and the inclusion of aid for innovation and for research infrastructures (although certain aspects were considered too restrictive, e.g. non-preferential access of co-financers and aid intensity). Also, additional guidance regarding economic/non-economic activities was requested, including an explicit limit of ancillary activities. The proposed deduction of commercial revenues of pilots and demonstrators was perceived as too vague (and by some respondents as too extensive in time). After having addressed some of these issues, the draft GBER text was subject to a second public consultation between 18.12.2013 and 12.2.2014⁴⁶. Many respondents asked for an increase in the aid intensity for feasibility studies (in particular for SMEs) and for further simplification of the consideration of commercial revenues of pilots and demonstrators. Some Member States requested more generous conditions for aid for research infrastructures (e.g. increased ancillary thresholds, higher aid intensities, more flexible rules on treatment of co-financers). A large number of Member States found that the period during which operating aid to innovation clusters can be granted could be extended. Some respondents considered that the proposed aid intensity for innovation support and advisory services was too low.

In a separate public consultation, a draft Communication on IPCEI was presented on 28.1.2014⁴⁷. In general, Member States and stakeholders welcomed the communication, in particular with regard to its future application to all categories of aid and economic sectors, whilst putting forward for further reflection a number of issues that can be grouped as follows: first, as regards the eligibility of projects, some Member States and industrial stakeholders asked for making it easier to qualify, in particular by allowing the possibility to cover projects that originate in a single Member State; second, as regards the compatibility assessment, views were expressed that the proposed requirements as to the demonstration of the incentive effect and the counterfactual analysis were too strict; third, a few stakeholders considered that transparency requirements (which allegedly could be a disadvantage in the global perspective) were too demanding, and wondered about the possible introduction of a matching clause comparable to the one that features in the R&D&I Framework.

⁴² A large number of Member States, as well as some stakeholders (mainly from the aeronautics sector) found that the net extra costs approach could be too burdensome and difficult to use for assessing the proportionality of aid, and argued that such approach would not fit the specific characteristics of R&D projects with a relatively high degree of uncertainty and for which there would normally be no alternative (counterfactual).

⁴³ http://ec.europa.eu/competition/consultations/2013_gber/index_en.html.

⁴⁴ By the time of the first consultation, the Enabling Regulation (EC) No 994/98 (OJ L 142, 14.5.1998) did not allow the Commission to block-exempt innovation aid measures for large undertakings. Therefore, the first consultation did not cover any provisions for such aid. However, following the adoption of the new Enabling Regulation on 22.7.2013, the Commission consulted separately on provisions for such innovation aid. The two GBER consultation documents were later merged into a single one.

⁴⁵ http://ec.europa.eu/competition/consultations/2013_second_gber/index_en.html.

⁴⁶ http://ec.europa.eu/competition/consultations/2013_consolidated_gber/index_en.html.

⁴⁷ http://ec.europa.eu/competition/consultations/2014_state_aid_cei/index_en.html.

2.8. Multilateral meetings with Member States

A multilateral meeting with Member States (as well as EEA members) regarding the draft R&D&I Framework and the draft Communication on IPCEI was held on 4.3.2014. Member States were in general positive on both drafts. With respect to the R&D&I Framework, in line with responses to the consultations described in the previous section, the main concerns of Member States were funding of research infrastructures, the net extra costs approach and the evaluation and transparency criteria. Several Member States also asked for additional clarifications of definitions and of provisions on existence of aid. Regarding the IPCEI Communication, some Member States asked for simpler eligibility criteria as well as for less strict compatibility criteria, in particular regarding the incentive effect and the counterfactual analysis. A few Member States moreover raised questions relating to procedures (possible use of joint notifications and scope for faster decisions).

For the GBER, three advisory committees were held⁴⁸. Member States expressed overall broad support for the drafts, in particular with regard to the inclusion of new R&D&I categories. Besides those mentioned above, the main issues raised concerned the exclusion of large aid schemes (which a large number of Member States viewed with scepticism) and publication requirements for individual beneficiaries, especially where fiscal measures are at stake.

3. PROBLEM DEFINITION

With a view to better define the current policy needs in line with the priorities established by EU 2020, and assess how far these priorities can be taken into account by the envisaged revision of the R&D&I State aid rules, this section starts with an overview of the EU policy areas most relevant for such revision. Thereafter, it outlines and describes the relevant problems.

3.1. EU policy issues that require action

3.1.1. Growth Strategy

Efficient R&D&I spending (private and public) contributes to growth and jobs in the EU. The current Framework is the result of a previous modernisation process⁴⁹ and was meant as a contribution to the EU's "Lisbon Strategy" with the aim of attaining an overall R&D&I spending of 3% of GDP by 2010, two-thirds of which coming from the private sector.⁵⁰ To that end, aid should be increasingly oriented towards support for certain horizontal objectives such as research and innovation and the optimisation of human capital.

In its current EU 2020 strategy for smart, sustainable and inclusive growth, the Commission retained the objective that 3% of the EU's GDP should be invested in R&D. To the extent that R&D&I State aid policy can contribute to EU 2020 objectives⁵¹, the most relevant "Flagship Initiatives" are:

- "*Innovation Union*"⁵² with the objectives of delivering the European Research Area (in particular as regards R&D collaboration, dissemination, transfer and use of research results,

⁴⁸ On 1.7.2013 (GBER), 5.9.2013 (additional categories) and 21.2.2014 (entire GBER).

⁴⁹ See *European Commission*, State aid action plan - Less and better targeted state aid: a roadmap for state aid reform 2005–2009 (Consultation document); 7.6.2005, COM(2005) 107 final.

⁵⁰ Lisbon Special European Council of 23-24 March 2000, Presidency Conclusions, part I, point 5, 1st alinea. "Re-launch" of the Lisbon Strategy at the Spring European Council in Brussels, on March 2005, European Council of 22/23 March 2005, Presidency Conclusions.

⁵¹ The EU 2020 Communication makes a general reference to the role of State aid: "State aid policy can also actively and positively contribute to the Europe 2020 objectives by prompting and supporting initiatives for innovative, efficient and greener technologies, while facilitating access to public support for investment, risk capital and funding for research and development.", p. 21.

⁵² Communication from the Commission, of 6.10.2010, COM(2010) 546 final.

and research infrastructures); enhancing access to finance for innovative companies; and social innovation (non-technological innovation).

- *"An Integrated Industrial Policy for the Globalisation Era - Putting Competitiveness and Sustainability at Centre Stage"*⁵³ of which the most relevant objectives are: to improve access to finance for businesses, especially for SMEs and innovation; to provide a framework, within competition rules, to support the competitiveness of European industry and the transition towards a more resource-efficient industry; fostering industrial innovation; and tackling societal challenges.
- *"A Digital Agenda for Europe"*⁵⁴, which enumerates a number of actions that should deliver sustainable economic and social benefits from a digital single market based on fast and ultra-fast internet and interoperable applications, and calls upon Member States to double annual total public spending on R&D in ICT by 2020, from EUR 5.5bn to EUR 11bn (including EU programmes), in ways that leverage an equivalent increase in private spending from EUR 35 billion to EUR 70 billion.
- *"A resource-efficient Europe"*⁵⁵, which stresses that, in order to increase resource efficiency, it is in particular necessary to develop new products and services, find new ways to reduce inputs, optimise production processes, management and business methods, and improve logistics. Its objective is to ensure EU-wide, coordinated public support for R&D&I to increase the availability and performance of the necessary technologies.

The EU's growth strategy implies that action is required in support of projects that are so complex, large and costly that the resources to build and operate them must be pooled across Europe to attain an appropriate critical mass of funding.⁵⁶ Such projects, which may qualify as IPCEI, could reach beyond the limits of R&D&I, and could involve several Member States.

With respect to the possible achievement of the 3% objective, it can be noted that, despite the economic crisis, the expenditure on R&D has increased during the last years. However, such increase is rather slow, and EU R&D intensity stood at only 2.06% of GDP in 2012 (up from 1.84% in 2007), below its level in the US (2.79%), South Korea (4.36%) and Japan (3.35%), and only marginally above that of China (1.98%). This mainly reflects a deficit in business R&D investment, which then accounted for 1.3% of GDP. At the present pace, the EU 2020 target of R&D investment corresponding to 3% of GDP would thus not be achieved.

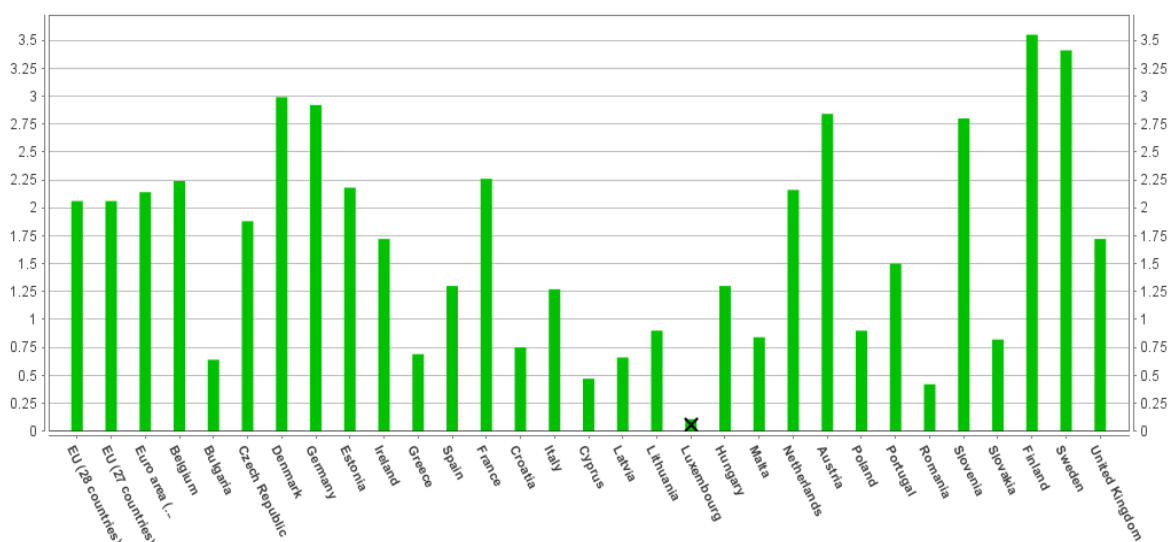
⁵³ Communication from the Commission of 28.10.2010, COM(2010) 614 final.

⁵⁴ Communication from the Commission of 26.8.2010, COM(2010) 245 final/2.

⁵⁵ Communication from the Commission of 26.1.2011, COM(2011) 21 final.

⁵⁶ Innovation Union, p. 10 with regard to infrastructure; An Integrated Industrial Policy, p. 6 with regard to large scale demonstration projects and pilot test facilities.

Figure 1: Gross domestic expenditure on R&D as a percentage of GDP⁵⁷



3.1.2. R&D&I policy

The promotion of R&D&I is an important objective of the EU. It is enshrined in Article 179(1) TFEU, which stipulates that "[t]he Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry".

At EU level, R&D&I support is implemented mainly under Horizon 2020⁵⁸, the EU's Framework Programme for Research and Innovation for the period 2014-2020. This programme has three key priorities that correspond to those of EU 2020 and the Innovation Union: Excellent Science, Industrial Leadership and Societal Challenges. It covers activities such as funding collaborative research, providing accessible research infrastructures, building leadership in enabling and industrial technologies, facilitating access to risk finance, supporting innovation in SMEs, and facilitating the transition from research to market with a new focus on innovation-related activities, such as piloting, demonstration, test-beds, and support for public procurement and market uptake.

3.1.3. State aid policy

In the context of the aforementioned SAM initiative, the Commission has decided to revise and streamline its main state aid acts and guidelines. To accelerate the decision-making process, a new Procedural Regulation⁵⁹ as well as a new Enabling Regulation⁶⁰ allowing the Commission to further extend the scope of the GBER, have been adopted. After the adoption of the new broadband guidelines⁶¹, the new regional aid guidelines⁶² and the new risk finance guidelines⁶³,

⁵⁷ <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsc00001>.

Although the 3% objective refers to the whole EU, it can be noticed that only six Member States (Denmark, Germany, Austria, Slovenia, Finland and Sweden) had reached R&D expenditure of at least 2.5% of GDP.

⁵⁸ COM(2011) 808 final, COM(2011) 809 final, COM(2011) 810 final, COM(2011) 811 final and COM(2011) 812 final of 30.11.2011.

⁵⁹ Council Regulation (EU) No 734/2013 of 22.7.2013, amending Regulation (EC) No 659/1999 laying down detailed rules for the application of Article 93 of the EC Treaty, OJ L 204, 31.7.2013, p.15.

⁶⁰ Council Regulation (EU) No 733/2013 of 22.7.2013, amending Regulation (EC) No 994/98 on the application of Articles 92 and 93 of the Treaty establishing the European Community to certain categories of horizontal State aid, OJ L 204, 31.7.2013, p.11.

⁶¹ Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks, OJ C 25, 26.1.2013, p.1.

⁶² Guidelines on regional State aid for 2014-2020, OJ C 209, 23.7.2013, p.1.

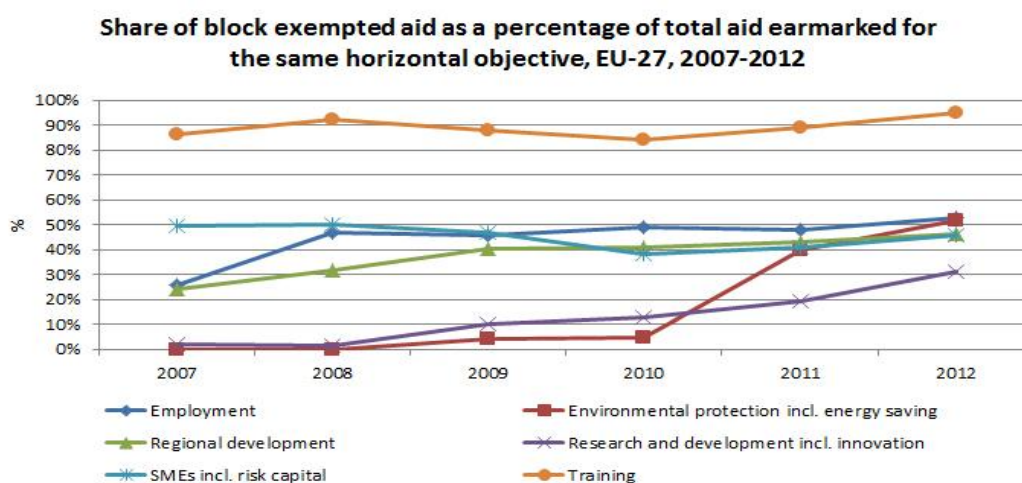
the Commission envisages to adopt the remaining parts of the SAM package, including the R&D&I Framework and the GBER during the first half of 2014.

The revised State aid rules should facilitate the treatment of ‘good aid’ (well-designed, targeted at identified market failures and objectives of common interest, proportionate and least distortive) and prevent the granting of ‘bad aid’ (which distorts competition, frustrates innovation, delays necessary adjustments and fragments the internal market). This should be achieved through a coordinated approach rooted on common principles, which will also ensure consistency across different guidelines and block-exemptions, including with regard to IPCEI.

The common principles underpinning the revised guidelines require that aid: (1) contributes to a well-defined objective of common interest; (2) is necessary in order to overcome a market failure; (3) is an appropriate instrument to achieve the relevant objective; (4) changes the behaviour of the beneficiary company (i.e. has an incentive effect); (5) is limited to the minimum necessary; (6) avoids any undue negative effects; and (7) is awarded in a transparent manner. Aid will be considered compatible only if it satisfies each of these criteria.

To the extent that the GBER stipulates the conditions required for R&D&I measures to be assumed to comply with those common principles, its existence in the period 2008-2013 already significantly widened the possibility for Member States to implement aid measures without prior notification.

Figure 2: *Share of block-exempted aid in relation to total aid for the same objective*⁶⁴



With respect to R&D, 248 schemes including aid for fundamental research, 575 for industrial research and 577 for experimental development were introduced by end 2013 under the GBER. The GBER was also used for innovation measures, 201 of which referred to industrial property rights for SMEs, 100 to young innovative enterprises, 159 to innovation advisory and support services, and 69 to the loan of highly qualified personnel⁶⁵. This notwithstanding, and in spite of an upward trend, the use of the GBER remains relatively limited in the R&D&I field, as the share of block-exempted aid only recently reached 30% of total R&D&I aid.

3.2. Problems linked to the R&D&I State aid rules

3.2.1. General problem

A general problem arises from the fact that the current R&D&I State aid rules may no longer be a suitable basis for directing aid to activities in pursuit of the EU's growth objectives set out in

⁶³ Guidelines on State aid to promote risk finance investments, OJ C 19, 22.1.2014, p. 4.

⁶⁴ http://ec.europa.eu/competition/state_aid/scoreboard/horizontal_objectives_en.html.

⁶⁵ Since most measures implemented under the GBER provide for several categories of aid, these figures cannot be added up.

section 3.1 above. It thus has to be ensured that the revised State aid rules cater sufficiently for the deployment of new initiatives under EU 2020, while at the same time not resulting in undue negative effects on the internal market.

3.2.2. *Specific problems linked to the scope, design and architecture of the rules*

Since the entry into force of the R&D&I Framework, the Commission has gained extensive experience in assessing R&D&I State aid measures (see Annex 10.3). An internal evaluation of such experience, as well as the results of the public consultations and external expertise, indicate a number of areas that would merit further reflection: the guidance on the presence of State aid in R&D&I-specific situations, the precise scope of eligible aid objectives; the relatively limited use of the GBER (and its articulation with the Framework), and the compatibility criteria for the assessment of large individual aid.

3.2.2.1. Lack of clarity could hinder the achievement of R&D&I objectives

(a) State aid in R&D&I specific situations

The current Framework provides for certain definitions and explanations whereby legal certainty as to the presence of State aid should be ensured,⁶⁶ but not for any consideration of the extent of economic activities a research organisation may pursue: in particular, public funding for even the most marginal economic activity is in principle subject to EU State aid rules. Case practice and jurisprudence have however developed criteria on economic activities that can be considered as ancillary in nature and non-separable from the main non-economic activities.⁶⁷ Such criteria could be consolidated and codified in the revised Framework.

Moreover, most answers to the public consultations showed that, while the existing explanations were in general considered to be useful, they should become more precise and practical, and cover a wider range of possible situations. The need for increased legal certainty as regards the relevant explanations and definitions were also confirmed by numerous queries received since the entry into force of the Framework from both Member States' authorities and stakeholders, as well as by external expertise that underlined the Framework's positive effect on R&D collaboration whilst restating the need for improvement of the relevant provisions⁶⁸.

Insufficient legal certainty may have multiple undesirable results. Besides State aid complaints and the possible award of illegal State aid⁶⁹, it may in particular lead to obstruction of industry-academia collaboration, technology transfer and R&D services by research organisations on behalf of industry, which are constituents of the EU's growth strategy. In particular, case

⁶⁶ Chapters 2 and 3 of the Framework provide for a definition of "research organisation" and a generic definition of economic activities, as well as for certain criteria to recognise the existence of State aid in R&D&I-specific situations, namely public funding of research organisations and innovation intermediaries, collaboration between publicly funded research organisations and undertakings, technology transfer, and contractual R&D and services on behalf of industry.

⁶⁷ Court judgement of 11.7.2006, C-205/03, *FENIN*, para (27); General Court judgment of 12.9.2013; *Germany/Commission*, para (29); Commission decision of 29.6.2011, in C 35/08 (ex NN 11/08), *Institut Français du Pétrole*, considerations in (278) – (284) and dispositive part of the decision in Art. 8, OJ L 14/1 of 17.1.2012.

⁶⁸ Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: R&DI State Aid Study, cf. point 6.4, p. 110 et seq.. According to that study, IPR transfer to industry and the pricing of contracted research performed by universities and research organisations remain areas of high uncertainty (p. 116). This could explain that 26% of surveyed research organisations believe that the Framework gives an incentive for collaboration mainly to research organisations but less so to companies (p. 112), with industry complaining, that, in order to be up to the perceived concept of market price, research organisations would charge unrealistically high prices (p. 109, 112).

⁶⁹ See e.g. the Commission's decision in case NN 65/2007 – AU – *Ludwig Boltzmann Institut für Krebsforschung*, OJ C 7 of 12.1.2008.

practice shows that practical guidance is needed on the market price for transferred knowledge⁷⁰, the use of research infrastructures⁷¹ and the concepts of economic activities and non-economic activities⁷².

The impact of such lack of legal certainty on the scope of the relevant R&D&I activities and corresponding investment cannot be quantified. Nevertheless, decision practice, expertise as well other relevant information described above clearly indicate that failure to provide such improved guidance may hamper such activities and investments.

(b) The notion of State aid and EU funding

Existing R&D&I State aid rules do not explain that support that is not under Member State control, but is managed by the Commission or implementing bodies such as executive agencies or EU Joint Undertakings, does not constitute state aid. The Commission's case experience as well as the first public consultation showed that existing rules about cumulation of different types of support leave a margin of interpretation with regard to the treatment of both Union and State-resources for the same eligible costs. Therefore, aid granting authorities and stakeholders are unsure of whether such support must be taken into account when ensuring that aid is proportional. In this respect, it is paramount to ensure coherence with interventions under Horizon 2020.

(c) Public procurement of R&D&I

The Framework generally states that, if public R&D contracts are awarded at market conditions (an indication for which may be that a tender procedure has been carried out), normally no State aid is involved⁷³. However, it does not provide any indication on the presence of State aid in situations where pre-commercial procurement takes place.

The Council concluded that public procurement should be better geared to creating greater demand for innovative goods and services.⁷⁴ Further, pre-commercial procurement is an effective driver of innovation.⁷⁵ In line with the Innovation Union Flagship commitments, from 2011 Member States and regions should set aside dedicated budgets for public procurement of innovative products and services.⁷⁶

This notwithstanding, pre-commercial procurement could be distortive if the procurement terms are more favourable than market terms. Moreover, public procurement Directives do not define situations when such procurement includes State aid. To date, only a Commission's Communication on Pre-commercial procurement⁷⁷ and a corresponding staff-working paper provide for some basic criteria for the exclusion of aid. In particular, the staff working paper

⁷⁰ See e.g. the Commission decision in case SA.27187 'Delftship', OJ C 196 of 4.7.2012, p.3. The issue of 'market price' in this case is the object of a pending Court case, T 488-11, OJ C 331 of 12.11.2011, p.26.

⁷¹ See e.g. the Commission decision in case SA.19866 'Complaint against the activities of IMS Fraunhofer-Institut Duisburg', OJ C 40 of 17.2.2010, p.3.

⁷² See e.g. the Commission decisions in cases NN 54/2006 – CZ, 'Přerov logistics College' OJ C 291 of 30.1.2006, p.18, and N 343/2008 – HU, 'Individual aid to the College of Nyíregyháza for the development of the Partium Knowledge Centre', OJ C 35 of 12.2.2009, p.4.

⁷³ Cf. Section 2.1 of the Framework, with reference to Directive 2004/17/EC of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors, Directive 2004/18/EC of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts.

⁷⁴ Council Conclusions of 4.2.2011, point 20.

⁷⁵ According to the Innovation Union Communication, p.16, "public procurement accounts for some 17% of the EU's GDP. It represents an important market, particularly in areas such as health, transport and energy. (...)Yet little public procurement in Europe is aimed at innovation, despite the opportunities under the EU procurement directives."

⁷⁶ Innovation Union Communication, p. 17.

⁷⁷ Communication from the Commission of 14.12.2007, COM(2007) 799 final, Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe.

points out clearly that in pre-commercial procurement, it is critical to check whether or not a company participating in the procurement receives an advantage.⁷⁸

Moreover, the replies to the first public consultation showed that the Framework should provide some guidance on the existence (or absence) of State aid in public procurement situations. Also in the second public consultation, a number of further clarifications were sought. The present situation is thus suboptimal, and could affect the effective deployment of pre-commercial procurement. Although the impact of such new clarifications on public investment and thereby on the incentive on industry to innovate cannot be quantified, the overall potential of public procurement is obvious: in 2009, contracts governed by EU public procurement rules accounted for 3.6% of EU GDP (amounting to EUR 420 billion), and the overall value of calls for tenders published in the Official Journal of the EU represents around 19% of the total expenditure on public works, goods and services.

3.2.2.2. Restrictive scope of aid objectives

(a) State aid for research infrastructures

Research infrastructures are an essential element of the EU's growth strategy,⁷⁹ and public funding assumes an important role in providing access to "world-class" research infrastructures.⁸⁰ In some cases⁸¹ public funding of research infrastructures does not take the form of state aid, for instance when it is granted to a research organisation which will not use the infrastructure to perform economic activities, but rather for its own non-economic research. There are however a number of cases⁸² where Member States have used state aid to support such infrastructures, which will be rented out to e.g. private enterprises.

With respect to the existence of State aid, although the guidance provided in the Framework on the non-economic or economic character of certain activities (as addressed in section 3.2.2.1(a) above) can be applied by analogy to research infrastructures, neither the GBER, nor the Framework, explain in any detail where state aid could be present in their construction and operation. Case practice, external expertise, as well as responses to the public consultations show that this "regulatory gap" creates legal uncertainty, also as to which of the parties involved in a publicly financed research infrastructures (owners, providers or users) is subject to State aid rules, and for which activity⁸³, and therefore has a potential impact on effective support.

As to the possible introduction of aid for the establishment of research infrastructures (on a stand-alone basis⁸⁴) in the R&D&I State aid rules, it should be noted that they are generally large ventures that may require a significant level of investment to be built or set up.⁸⁵ Although

⁷⁸ Commission Staff Working Paper of 14.12.2007, SEC(2007) 1668, p.5.

⁷⁹ Cf. 'Innovation Union', p.10; Communication from the Commission, of 26.8.2010, COM(2010) 245 final/2, 'A Digital Agenda for Europe'. Research Infrastructures and the Europe 2020 Strategy, Report published by the European Strategy Forum on Research Infrastructures (ESFRI).

⁸⁰ Cf. Innovation Union Communication, p.33.

⁸¹ See e.g. the Commission's decision in case N 365/2007 – DE – *Errichtung des Fraunhofer Center for Silicon Photovoltaics*, OJ C 91, 12.4.2008.

⁸² See e.g. the Commission's decisions in cases of N 539/2005 – DE – *Forschungsplattform Nanoelektronik Dresden* (OJ C 222, 12.9.2006); N 525/2001 – IE – *Cluster Incubator Scheme* (OJ C 136, 3.6.2005); C 3/2004 – DE – *State aid for the development of municipal infrastructure* (OJ L 295, 11.11.2005); NN 65/2007 – AU – *Ludwig Boltzmann Institut für Krebsforschung* (OJ C 7, 12.1.2008); N 301/2010 – DK – *Green Labs* (OJ C 131, 3.5.2011); and SA.33615 (2011/N) – FR – *Extension du régime d'aide FCE aux programmes d'investissements d'avenir* (OJ C 63, 2.3.2012).

⁸³ Cf. Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: R&DI State Aid Study, point 5.3.4.1. The assessment of aid at the levels of various parties involved is complex; see e.g. the mentioned decisions in cases C 3/2004 and N 525/2001.

⁸⁴ That is to say, not under an R&D project aid or as innovation cluster aid.

⁸⁵ Cf. the report published by the ESFRI, according to which there are over 500 infrastructures in the EU, representing an aggregate European investment of by all funders (mostly national) of more than EUR 100

not all large-scale projects that have an economic purpose (and are not limited to fundamental research) can be automatically presumed to be affected by market failures⁸⁶, it seems crucial to devise an appropriate definition of research infrastructures and develop appropriate compatibility rules applying to those cases where a market failure appears to exist.

As to the relevant compatibility rules, both case practice⁸⁷ and expertise⁸⁸ indicate that the narrow scope of existing assessment criteria leads to legal uncertainty as to which funding rules the Member State concerned should apply, the assessment process and the limits of aid. Improving legal certainty in this respect necessitates introducing rules on the compatibility of State aid for research infrastructures, which requires an extensive revision of R&D&I State aid rules, possibly both in the GBER and in the Framework in order to address the concerns raised in the public consultations.

The estimated funding needs of research infrastructure illustrate the importance of a secure legal environment for public support in this area: according to a paper by the European Strategy Forum on Research Infrastructure (ESFRI), "... by 2015 the EU should have completed and/or launched 60% of the ESFRI Roadmap projects. (...) This means that the EUR 100 billion total in RI investment in Europe today will be increased by about EUR 20 billion by 2020"⁸⁹.

In brief, it appears that there is a need for clarification regarding economic and non-economic activities and for criteria for the exclusion of indirect advantages to the users of research infrastructures. It is also clear that there is a need for an appropriate basis for compatibility of aid for the establishment or upgrade of research infrastructures (e.g. eligible costs, maximum aid intensity, limitations of undue distortions), including with regard to its possible inclusion in the GBER.

(b) Innovation aid

With the present Framework innovation aid was brought into the scope of State aid rules, as it provides for criteria to assess six innovation aid measures.⁹⁰ There are indications that existing rules do however not sufficiently allow mobilising public innovation-related investments that in turn would give an incentive for further private investment.

Available information does not allow for a precise evaluation of innovation aid (and thus of public and private investment in innovation aid categories provided by the existing Framework), since Member States as a rule provide such aid under schemes that also include R&D aid. Innovation has so far not been recorded separately.⁹¹ It appears nevertheless that the use of innovation aid has been relatively limited: during the period 2007-2013, the Commission

billion, with a yearly operation and maintenance cost of EUR 10 billion to EUR 15 billion - Research Infrastructures and the Europe 2020 Strategy (ESFRI).

⁸⁶ A study on innovation market failures found that: "However, whether problems in obtaining external finance represent financial market failures is highly controversial, since there is much evidence that large projects systematically underperform against forecast costs, timetabling and revenues, particularly in the case of infrastructure projects." European Commission, *Innovation market failures and state aid: developing criteria*, Report prepared for DG ENTR, November 2005, p. 65.

⁸⁷ The complex application of non-specific criteria to aid to research infrastructures is obvious e.g. in the decision in State-aid case N 301/2010 – DK – *Green Labs*, OJ C 131 of 3.5.2011.

⁸⁸ Cf. Report "National State aid in support of Innovation and SME's: Strengths and weaknesses of the EU State aid control system", p. 151.

⁸⁹ Research Infrastructures and the Europe 2020 Strategy, Report published by the European Strategy Forum on Research Infrastructures (ESFRI), p.10.

⁹⁰ Aid for young innovative enterprises, for process and organisational innovation in services, for innovation advisory services and for innovation support services, for the loan of highly qualified personnel, for innovation clusters (sections 5.4 – 5.8 of the R&D&I Framework). With the exception of aid for process and organisational innovation and aid for innovation clusters, which do not apply exclusively to SMEs, these aid categories have also been included in the current GBER (Articles 35 – 37).

⁹¹ E.g. the Commission Staff Working Paper to the autumn-2012 update of the State Aid Scoreboard, p.11: http://ec.europa.eu/competition/state_aid/studies_reports/2012_autumn_working_paper_en.pdf.

approved 226 aid schemes, of which only 24 were innovation oriented schemes and 64 mixed measures, pursuing both R&D and innovation objectives..

Responses to the first public consultation also indicate that existing criteria may be too restrictive (e.g. limitations in eligible costs, eligible beneficiaries, time-lines, aid levels) to allow effective support for innovation. This allegedly results in increased bureaucracy and/or an increased use of other instruments (e.g. *de minimis* aid) for innovation objectives. Those claims are generally confirmed by a survey among Member States⁹² showing first, a need for better definitions of certain innovation aid categories⁹³ and second, that some categories⁹⁴ may be too restrictive to be useful. Although the proposed R&D&I Framework and GBER texts which were subject to public consultations had been streamlined and many of the alleged restrictions had been abolished, certain concerns were still expressed in the consultations⁹⁵.

Moreover, both internal and external expertise indicates that the quality of public innovation support has margin for improvement.⁹⁶

In summary, available information suggests that the scope of current innovation aid rules, as well as the permitted aid limits for such aid may be restricting its effectiveness in contributing to the EU's objectives.

(c) Aid for prototypes and pilot plants

Under the current Framework, also aid for demonstration and pilot projects, which are relatively close to the market, can be allowed. However, for prototypes and pilots which are used commercially after the R&D phase, it is required to deduct any revenues stemming from their subsequent commercial use *ex ante* from the eligible costs in order to limit any spill-over of the aid to the production phase⁹⁷.

In the first public consultation, a significant number of stakeholders pointed to a lack of clarity as regards the methods for deducting commercial revenues, and also regarding the distinction between eligible experimental development and commercial activities. Respondents have also considered that pilot plants and demonstration projects may entail very high risks despite their market proximity, which could justify a more flexible approach to public support for this stage of a development process. An analysis of 11 cases in three selected industries (industrial biotechnology, renewable energy, aerospace) indicates that public funding may be crucial to overcome market failures and to shorten the time-to-market⁹⁸. That same analysis further indicates that applicable State aid rules are perceived as complex, and that the assessment of such projects is viewed as time-consuming. In the consultations on the draft GBER, several respondents confirmed this perceived complexity.

Contributions to the first public consultations further indicated that the present rules may not sufficiently take into account the particularities of breakthrough technologies, which usually require a high degree of collaboration between different types of actors from several Member States, and pointed to the need to counter the tendency towards a decline in the industrial

⁹² Cf. *Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: R&DI State Aid Study*, point 5.2.1.

⁹³ In particular for innovation clusters, process and organisational innovation, advisory and innovation support.

⁹⁴ In particular for young innovative enterprises, innovation advisory services and organisational innovation.

⁹⁵ Mainly the proposed limitation of the period for operating aid to innovation clusters was considered too strict.

⁹⁶ Cf. the Commission's Communication 'Industrial Policy: Reinforcing competitiveness' emphasizing that although many Member States have taken steps to intensify support for research and innovation, they should reduce the fragmentation of support schemes to ensure the most efficient use of limited resources, and the report '*Next Generation Innovation Policy*' by Ernst & Young (2011), which found that the level of public support to R&D and innovation investments "...does not seem to be the real issue. It is not the quantity of public funding of R&D and innovation, but rather its quality that hampers EU's economic recovery" (p.9).

⁹⁷ Section 2.2(g), second paragraph, of the R&D&I Framework.

⁹⁸ Cf. Report '*National State aid in support of Innovation and SME's: Strengths and weaknesses of the EU State aid control system*'.

deployment of cutting-edge innovations in the EU that has been identified *inter alia* in the 2011 Innovation Union Scoreboard⁹⁹. Indeed, at least in the field of green technology development, it was perceived in the Commission's case practice, that the market failures faced by the beneficiaries were rather severe.¹⁰⁰ Moreover, experience in individual aid cases points to a gap in the current definition of 'industrial research'¹⁰¹, which excludes prototypes, even if laboratory-scale prototypes that are necessary to obtain proof of concept and that normally cannot be used for any commercial purpose could be included therein¹⁰².

These issues seem to have been fully addressed in the draft R&D&I Framework and GBER, since very few comments on this topic were received in the second public consultations.

3.2.2.3. Limited use of the R&D&I provisions in the GBER

Currently, the Framework and the GBER contain parallel provisions on the assessment of most R&D&I measures¹⁰³ (so-called "standard assessment criteria"), with the Framework including additional compatibility criteria for large individual aids, which are considered as having a higher potential of distorting competition and trade and are subject to a detailed assessment. In the public consultations, almost all Member States and stakeholders demanded that both definitions and compatibility criteria (e.g. aid intensities, aid amounts, eligible costs) are further aligned between the GBER and the Framework. Moreover, in the first public consultation some Member States asked for an increase of the notification thresholds.¹⁰⁴ The second public consultation has shown that almost all Member States and stakeholders were satisfied with the proposed new levels, which included substantial increases of many of the thresholds.

The SAM initiative aims *inter alia* at focusing enforcement on cases with the biggest impact on the internal market and enabling faster decisions. However, as shown in figure 2, in spite of its importance for reducing the total average time for designing and delivering a measure, the use of the GBER has remained relatively limited in the area of R&D&I aid. It could thus be useful to explore if more aid measures can be included in the scope of the GBER and whether it is justified to duplicate the relevant rules in the Framework. In particular, the GBER's rules on R&D&I could be simplified and streamlined, not least by providing for increased notification thresholds, and including revised rules on commercially usable prototypes or pilot projects, research infrastructures, and innovation aid.

⁹⁹ http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf.

¹⁰⁰ This is typically the case for new green technologies. See the decision in case SA.32263 – SE – *Aid for the development of a demonstration plant for wave energy technology* (OJ C 76, 15.3.2012), which is summarised in Annex 10.3. See also the Commission's decisions in cases N 493/2009 – FR – *GAYA* (OJ C 213, 6.8.2010), N 193/2010 – SE – *R&D aid for the LignoBoost project* (OJ C 196, 5.7.2011), N 276/2010 – SE – *Aid for the GoBiGas project* (OJ C 196, 5.7.2011) and N 240/2010 – SE – *Aid to Domsjö Fabriker* (OJ C 180, 21.6.2011)

¹⁰¹ Art. 30 of the GBER and Section 2.2 f) of the F&D&I-Framework.

¹⁰² E.g. Commission decision of 29.9.2010, NN 39/2010 – NL, *Individuele O&O-steun aan "Mapper"*, para (15) in combination with (1), and of 16.4.2013, SA.35432 (2012/N) –NL – *Individual R&D-aid 'Mapper II'*, para (10) , where the Commission found that the beneficiary had "*obtained its 'Proof of Lithography' (POL) milestone using a demonstrator machine in a laboratory set-up.*"

¹⁰² E.g. Commission decision of 29.9.2010, NN 39/2010 – NL, *Individuele O&O-steun aan "Mapper"*, para (15) in combination with (1), and of 16.4.2013, SA.35432 (2012/N) –NL – *Individual R&D-aid 'Mapper II'*, para (10) , where the Commission found that the beneficiary had "*obtained its 'Proof of Lithography' (POL) milestone using a demonstrator machine in a laboratory set-up.*"

¹⁰³ Chapter 5 of the Framework provides for assessment criteria applicable to R&D&I aid that is below notification thresholds, whilst Articles 31-37 of the GBER transpose the main bulk of the measures covered by the Framework into the block-exemption.

¹⁰⁴ According to the European Techno-Economic Policy Support Network (ETEPS) study ("*Analysis of the evolution of the costs of research in the EU*", p. 325), R&D costs rose by an average of 47% over the five years to 2010 and the same trend is expected for the coming period.

3.2.2.4. Insufficient clarity and predictability of the rules on the assessment of large individual aid

As recalled in section 3.2.2.3, aid with a high potential of distorting competition and affecting trade is not block-exempted, but is subject to a detailed assessment by the Commission under the Framework. Pursuant to the Framework's assessment criteria, State aid for R&D&I can be declared compatible with the internal market where it addresses a market failure and proves necessary to increase R&D&I activities, provided that the ensuing distortion of competition and effect on trade are not contrary to the common interest.¹⁰⁵

The Commission's experience in applying these criteria has shown that its underlying assumptions remain fundamentally valid.¹⁰⁶ Nevertheless, whilst confirming that current detailed assessment criteria are in principle well founded, responses to the public consultations suggested that there is a demand for further guidance and interpretation of the rules. In absence of such guidance, the preparation of notification documents is allegedly difficult, and this could increase both the costs and the duration of the procedure.

An expert report points to the complexity of R&D&I State aid rules and considers it not straightforward to get a comprehensive picture of their scope, criteria and requirements. The report relates this weakness to what it deems a slow process for decisions on individual notifications, and underlines that especially in sectors characterised by rapid technological and innovation development, the importance of fast decision-making is essential to enable the exploitation of new innovations.¹⁰⁷ Another study¹⁰⁸ indicated that, while the duration of cases in general decreased by 34 days following the entry into force of the Framework, the duration of the notification phase for large individual aids increased by 53 days.¹⁰⁹ In this regard, the study also points out that, according to Member States, the longer decision process after 2007 was not generally caused by delays within the Commission, but rather due to the lack of clarity and complexity of the rules.

In this regard, it appears that more explicit guidance on the use of certain aid instruments (appropriateness) and on the assessment and demonstration of proportionality would make the rules clearer and would increase their predictability. In view of the abovementioned studies, this could also increase the speed of decision-making since it would be clear both for Member States and beneficiaries what level of information is needed for the assessment.

3.2.3. *Specific problems linked to the implementation of the Framework*

The implementation of the Framework may finally lead to problems relating to the competitiveness of European industry, for which in particular two provisions are relevant: aid for important projects of common European interest and the matching of aid intensities to the ones provided to competitors outside of the EU.

¹⁰⁵ The underlying compatibility assessment is currently formalised as a "balancing test" as set out in Point 1.3.1 of the R&D&I Framework. Chapter 7 of the Framework translates this general "balancing test" into operational assessment criteria.

¹⁰⁶ Experience in applying the detailed assessment was in particular discussed in the Mid-term Review of the Framework, p. 4-5.

¹⁰⁷ Report "National State aid in support of Innovation and SME's: Strengths and weaknesses of the EU State aid control system", section 7.

¹⁰⁸ Monitoring study regarding the State Aid Framework for Research, Development and Innovation: R&DI State aid Study 2012, for DG Research and Innovation by LOGOTECH et al, in particular p. 115-117.

¹⁰⁹ According to the study, the duration was pre-2007 ca. 182 days, and as of 2007 ca. 235 days. However, it should be noticed that this period runs from the notification of a case until the publication of the decision in the OJ. This means that it also includes confidentiality discussions as well as the time required for finalising publication, which together normally takes 2-3 months.

3.2.3.1. Aid for important projects of common EU interest (IPCEI)

The R&D&I Framework and the environmental aid guidelines contain criteria, based on Article 107(3)(b) TFEU, for the assessment of aid for IPCEI.¹¹⁰ At present, these texts are the only secondary legal acts that provide for such criteria: subject to a case-by-case assessment, aid for such projects may be authorised up to the level that proves necessary to overcome the pronounced market failures and risks that hinder their deployment. Aid could thus even exceed the ceilings authorised on the basis of Article 107(3)(c).

Case practice regarding the use of Article 107(3)(b) TFEU is limited. This provision has in the past been mainly used to approve aid for some large R&D projects¹¹¹ and in the transport sector¹¹². However, since the entry into force of the Framework, Member States have not notified any R&D&I aid for IPCEI. On the one hand, this might be attributable to a lack of relevant cross-border collaboration between Member States or budgetary reasons, or could indicate that aid ceilings as applicable under Article 107(3)(c) are generally sufficient to cater for the specific needs of such projects. On the other hand, there are indications that existing criteria do not ensure the necessary clarity as regards both the eligibility of a given IPCEI and the assessment process to which it would be subject by the Commission.

In the public consultations, some stakeholders (mostly from industry) pleaded for a clearer approach to such projects, in particular those characterised by extensive industrial collaboration at a European scale, absence of significant intra-EU competition and worldwide markets. In its final report of June 2011, the High-Level Expert Group on Key Enabling Technologies (KETs) recommended considering how to use the rules of Article 107(3)(b) to support large scale open-access technology development, testing and demonstration facilities, including pilot lines and demonstrators where these would make a significant contribution to strengthening EU competitiveness.¹¹³

In a broader sense, the problem could be that relevant assessment criteria for IPCEI could be required and relevant not only for R&D&I and environmental objectives, but also for other policies and actions in pursuit of common European objectives, in particular as regards the EU 2020 objectives, the Union's flagship initiatives and key areas for economic growth such as the KETs or the Trans-European Transport and Energy Networks. Indeed, since 2007, the few cases which were authorised on the basis of Article 107(3)(b) TFEU were all outside the field of R&D&I.

The link between large and collaborative projects of common European interest and competitiveness objectives is particularly evident in the area of innovation to meet societal challenges such as an ageing population, the effects of climate change, and reduced availability of resources. Whilst successfully developing breakthroughs in response to these challenges will boost competitiveness, and enable European companies to lead in the development of new technologies, to grow and assume global leadership in new growth markets, efforts and expertise must however be pooled and critical mass achieved, in view of the scale and urgency

¹¹⁰ For their respective purposes: Chapter 4 of the Framework and Point 3.3 of the environmental aid guidelines. In essence, eligible projects should be very large and risky, generate positive external effects in the economy at large, and preferably rely on cross-border collaborations between undertakings in a significant number of Member States.

¹¹¹ See the Commission decisions on aid measures concerning microelectronic technology falling within the scope of the MEDEA+ programme (Cases N 701/A/2001, FR – R&D State Aid MEDEA+, N 702/B/2001; N 207/2002; N 62/2003; N 8/2003 and N 478/2003), with reference to the 1996 R&D Framework, point 3.4.

¹¹² See the Commission decisions on the planning phase of a tunnel between Denmark and Germany (Case N 157/2009 – DK – *Financing of the planning phase of the Fehmarn Belt fixed link*), the channel tunnel rail link project (Cases N 576/1998 and N 706/2001 – UK - *The Channel Tunnel Rail Link*) and the financing of the Belgian TGV (Case N 800/1996 – *Belgian TVG*).

¹¹³ High-level Expert Group on KETs, Final Report, 28.6.2011, p.36:
http://ec.europa.eu/enterprise/sectors/ict/files/kets/hlg_report_final_en.pdf.

of such challenges and the scarcity of resources available to address them.¹¹⁴ Clear and operational assessment criteria for IPCEI would contribute to allowing such breakthroughs to quickly find their way to the market.

In general terms, three different questions therefore arise. First, should Article 107(3)(b) be applied more frequently, particularly for projects in sectors and domains of strategic importance?¹¹⁵ Second, should existing State aid rules be revised in order to make them more operational and thus enhance the predictability of compatibility assessments under Article 107(3)(b)? Third, given that aid for IPCEI may reach beyond R&D&I into other policy fields, should existing assessment criteria not only be revised but also consolidated in one single document applicable across all policy objectives?

3.2.3.2. International (extra EU) dimension ("matching aid")

In order to respond to distortions of global competition, the Framework allows Member States to exceed regular aid ceilings to "match aid" that competitors located outside the EU receive for similar activities.¹¹⁶ The Framework is the only body of State aid rules that contains such a "matching clause". It has to date never been invoked, neither under the current Framework nor under the preceding Framework of 1996, where it had been introduced for the first time.

Some contributors to the first public consultation perceived the current matching clause as too burdensome. They view the clause's standard of proof as too demanding and thus difficult to meet, mainly due to the confidential nature of the information requested. With the aim to facilitate meeting such standard of proof, some of them therefore advocated the establishment of a monitoring system (or "observatory"), to collect data on global markets and trade, on state subsidies granted abroad, and on the potential necessity to apply the matching clause in certain sectors¹¹⁷. At the same time, some Member States were critical to the matching clause, which they considered should be abolished.

In this regard, it can first of all be noticed that other legal instruments are available for countering global competition distortions, in particular WTO agreements on subsidies and countervailing measures (SCM Agreement) and on trade-related investment measures (TRIM Agreement). Second, to the extent that the matching clause has never been used and several Member States have confirmed in the first public consultation that aid granted for R&D projects in most cases remain significantly below the allowed maxima, it could be argued that the present rules sufficiently cater for the international dimension by allowing an appropriate margin to "match" aid within the limits of the Framework. Finally, available expertise on the matching clause does not provide any specific analysis of its capability to effectively address global competition concerns. In particular, a study on market distortions in the area of KETs¹¹⁸ examines the clause's operability but cannot provide any conclusive assessment of its effectiveness. Another study on the impact of the R&D&I Framework on competitiveness¹¹⁹

¹¹⁴ Cf. the discussion of European Innovation Partnerships in Section 5 of the Innovation Union Communication, p. 22-23.

¹¹⁵ As recommended in the Report 'Impact de l'encadrement communautaire des aides d'état à la recherche et développement et innovation sur la compétitivité de l'Union européenne', p.123, as well as by the mentioned High-Level Group on KETs.

¹¹⁶ See section 5.1.7 of the R&D&I Framework.

¹¹⁷ As such, the possible establishment of a 'Foreign-aid Observatory' goes beyond the scope of the revision of R&D&I State-aid rules.

¹¹⁸ Study on the international market distortion in the area of KETs: A case analysis, 13.5.2013, Final Report prepared by the ECSIP Consortium for DG Enterprise and Industry of the European Commission (ECSIP Report).

¹¹⁹ Report 'Impact de l'encadrement communautaire des aides d'état à la recherche et développement et innovation sur la compétitivité de l'Union européenne', 2008, Study carried out by Technopolis on behalf of Direction générale des Entreprises (DGE).

found that industry favours not applying the matching clause, due to fears that it might lose its 'detering effect' and result in an escalation that would be prejudicial for all parties.

Available expertise moreover provides only scant evidence of market distortions due to the influence of R&D aid on location: the aforementioned study on market distortion in the area of KETs found that the host country does not rely on a single instrument but rather offers a combination of different incentives (a "location package") to potential investors. Furthermore, even if the study found three cases where they appeared decisive for the selection of locations outside the EU, investment incentives themselves are not generally seen as sufficient for attracting foreign direct investment.¹²⁰ Whilst suggesting that R&D aid may indeed influence location decisions to a limited extent, an OECD report also fails to provide any conclusive evidence in this regard.¹²¹

In view of the above, and taking into consideration that the current wording of the matching clause does not impose any specific conditions or practical limitations, neither in substance nor in procedural terms, that would bar the submission of (at least circumstantial) evidence on aid granted outside the EU, no indications have been provided to point to the need for a revision of the matching clause, which incidentally may be in conflict with WTO law¹²².

This notwithstanding, the revision of R&D&I State aid rules could contribute to addressing possible distortions of international competition problems. On the one hand, in order to facilitate the collection of information on aid levels outside the EU, reference could be made in the revised Framework to the possible use of new market-investigation powers conferred by the Council to the Commission, with the new Procedural Regulation¹²³. On the other hand, global competition could be better taken into account in the detailed assessment of aid for large R&D projects, in particular where an alternative project would be wholly or partly carried out outside the EU.

3.3. Key players/populations affected

Member State authorities are responsible for planning, notifying, implementing and monitoring R&D&I State aid measures in their jurisdictions. The Framework as a secondary legal act lays down the Commission's approach when exercising its margin of appreciation in assessing the compatibility of R&D&I State aid measures with the internal market. Therefore, aforesaid entities are directly affected by the Framework and its revision. Moreover, an increased use of the GBER could lead to a substantial effect on Member States' authorities, which would have to have in place the resources for assessing and implementing block-exempted aid.

Research organisations and innovation intermediaries may be recipients of public support. Insofar as such support is for non-economic activities, it does not constitute State aid. Besides being potential recipients of State aid when performing economic activities, they may however also transfer advantages from such support to undertakings, in situations of R&D services or works contracts, R&D collaboration and knowledge transfer. The Framework provides guidance on the definition of research organisations, the economic or non-economic character of a funded activity, and the presence of indirect State aid to undertakings, and provides for an interpretation of the concept of State aid in certain R&D&I-typical situations. Hence, research

¹²⁰ Other elements, such as market-related factors, political stability, quality of infrastructure, ecosystem of suppliers, quality of labour needed and IPR-protection standards may carry more weight than investment incentives for the choice of a specific location; ECSIP Report, p.88.

¹²¹ OECD Report 'Government R&D Funding and Company Behaviour', 2006, p.60. In this context, it can be noticed that R&D&I activities are arguably subject to different location considerations than manufacturing activities (or productive investment in general).

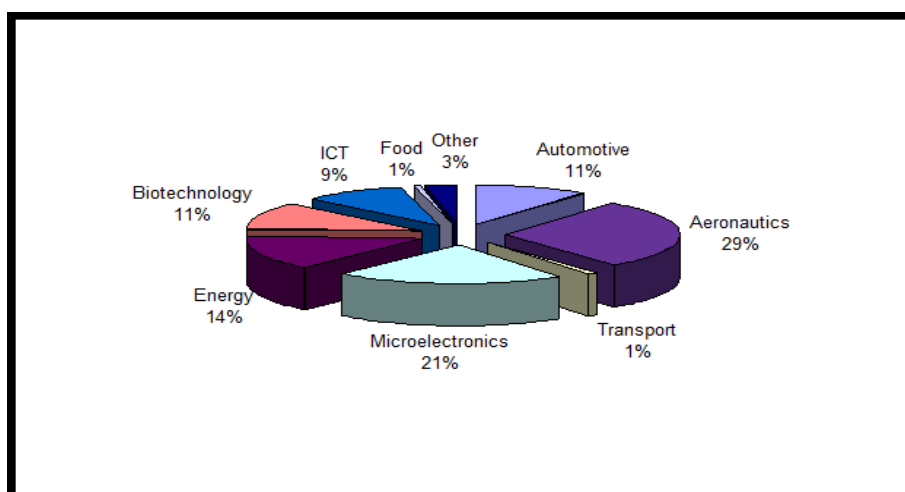
¹²² See *Flett et al.*, "The Relationship between WTO subsidies and EC State aid law", in "EC State aid law", Chap. 21, p. 442-467.

¹²³ In essence, the Commission, after the initiation of the formal investigation procedure, may request any Member State, undertaking or association of undertakings to provide all market information necessary to enable the Commission to complete its assessment of a State-aid measure.

organisations and innovation intermediaries that receive public support are affected by the R&D&I State aid rules.

Undertakings (e.g. public and private enterprises) of all sizes and sectors may receive State aid for R&D&I activities, and are therefore affected by the R&D&I State aid rules and their revision. In particular, the Framework affects undertakings that carry out large -projects in need of aid amounts in excess of block-exemption limits. Potentially, the suppliers of beneficiary undertakings (in case they make substantial contributions to the project) and subcontractors (including research organisations) may be also indirectly affected.

Figure 3: Sectoral distribution of R&D aid¹²⁴



R&D&I aid approved under the Framework was granted to a wide variety of sectors, in particular aeronautics, microelectronics, energy, biotechnology, automotive and ICT.¹²⁵ About 80% of such aid can be attributed to the development of KETs such as micro and nanoelectronics, advanced materials, industrial biotechnologies, advanced manufacturing systems and, to a lesser extent, nanotechnologies. R&D areas promoted by larger aid measures were diverse, e.g. nanosubstrates, engine components, new composite materials for airplanes structures, intelligent energy management, automatic processing of multimedia data, high fields magnetic resonance imaging, CMOS derivative processes for system-on-chip technologies, fuel cell power modules and new methods for the production of biofuels.¹²⁶

Apart from the above mentioned sectors, the shipbuilding sector (incl. shipbuilding, ship repair and ship conversion) is also directly concerned, insofar as specific rules for innovation aid are laid down in the Shipbuilding Framework¹²⁷, which expires on 30.6.2014¹²⁸. Given that shipbuilding is already fully eligible under the existing R&D&I Framework, there are however no indications that the revision's impact on this sector would be stronger than on others.

The revision of the rules may have an indirect effect on *consumers* as well insofar as R&D&I aid may affect both the price and the quality of goods and services. While in the short term a competitive advantage provided through State aid can enable an undertaking to offer lower prices, the distortion of competition can cause other undertakings to withdraw from the market and thereby in the longer term lead to increased prices.

¹²⁴ Source: DG COMP. Data referring to the period 2007-2011.

¹²⁵ Available data only represents larger individual aid measures above EUR 3 million, which has either to be notified individually or reported to the Commission pursuant to point 10.1.3 of the Framework respectively Art. 9.4 of the GBER. Cf. also Commission Staff Working Paper - Mid-Term Review of the R&D&I Framework, of 10.8.2011, p.6.

¹²⁶ See Commission Staff Working Paper on the Mid-Term Review of the R&D&I Framework, p.6.

¹²⁷ OJ C 364 of 14.12.2011, p. 9.

¹²⁸ OJ C 357, 6.12.2013, p. 1.

Finally, *third countries and international competitors* of aid beneficiaries are also potentially, if indirectly, affected.

3.4. EU action: right to act (principle of subsidiarity)

The establishment and functioning of the internal market is an EU objective enshrined in Article 3(3) of the Treaty on the European Union. Article 107 TFEU defines the notion of State aid and a general prohibition thereof. Article 107 however also provides for exceptions from the general prohibition of State aid. Such exceptions are laid down in secondary legal acts that provide for specific compatibility criteria. The R&D&I Framework is such secondary legal act. It lays down compatibility rules whereby the Commission can test R&D&I State-aid measures against Treaty provisions, in particular by balancing the positive effects of aid against its negative effects, in accordance with the principles enshrined in Article 107(3)(c) TFEU.

Article 108 TFEU sets out the Commission's exclusive competence over State aid control.¹²⁹ The EU has exclusive competence to establish the competition rules necessary for the functioning of the internal market, pursuant to Article 3(1)(b) TFEU. Hence, the EU has the right/obligation to act in the domain of State aid (including in the field of R&D&I). Therefore, the principle of subsidiarity cannot be applied.

In the absence of any action by the Commission in this context (i.e. without the adoption of a new Framework and GBER after the current ones have lapsed), the compatibility of State aid for R&D&I would have to be assessed directly on the basis of the TFEU. Apart from the provisions of the TFEU, the only legal texts that could be, directly or indirectly, relevant for the assessment of R&D&I State aid would be the risk finance rules and the regional aid rules.

The risk finance guidelines apply to State aid in the form of equity, quasi-equity, loans and guarantees for SMEs and small and innovative mid-caps in their early development stages (seed, start-up and expansion stages). Although "R&D&I activities" or "innovativeness" are not an eligibility criteria for compatible risk finance aid, the risk finance guidelines focus on investments in innovative SMEs and mid-caps with a high growth potential. Consequently, it is quite likely that risk finance aid may also be used to support R&D&I activities, albeit through financing of a company rather than financing of a project. Given in particular that the risk finance rules (guidelines and GBER provisions) exclude aid to large enterprises they will however not be instrumental at targeting aid at larger R&D projects.

An option for R&D&I financing in certain regions would be to assess the aid on the basis of the regional aid rules. However, this would mean that R&D&I projects would have to be carried out in such regions, which is not always optimal from other perspectives than regional development (i.e. closeness to research society, infrastructure, upstream and downstream players). Moreover, aid to large enterprises would only be allowed in Article 107(3)(a) regions and, to a very limited extent, in Article 107(3)(c) regions. Last but not least, the compatibility criteria (e.g. aid levels, treatment of IPR) would not be necessarily adapted to the specificities of R&D&I activities.

Thus being, a very important part of R&D&I aid would have to be assessed in direct application of the TFEU, on a case-by-case basis. This situation would lead to vastly reduced legal certainty and predictability. It would also likely result in longer procedural durations, since there would be no established assessment criteria. Consequently, the option of not replacing the R&D&I State rules after they lapse on 30.6.2014 by any dedicated legal act was discarded, and will therefore not be further discussed in this report.

¹²⁹ With the exception of the very limited circumstances when the Council may act.

4. GENERAL OBJECTIVES

4.1. Coherence and integration of relevant EU policy objectives

In order to ensure an effective contribution of the revised R&D&I State aid rules to the EU 2020 strategy, and avoid unnecessary administrative burden, the Commission intends to take into account possible synergies with other EU policies, in particular with Horizon 2020, which is the EU's main financial instrument for implementing the Innovation Union Flagship Initiative, and specific industrial policies, such as industrial competitiveness¹³⁰ and industrial innovation,¹³¹ and further with EUREKA projects and projects implemented under Joint Undertakings on the basis of Articles 185 and 187 TFEU.¹³² In the context of resource-efficient Europe, Horizon 2020 includes a section on Climate Action, Environment, Resource Efficiency and Raw Materials¹³³, as an element to address societal challenges.

4.2. State aid policy objectives and State aid modernisation (SAM)

The objective of State aid control policy, as enshrined in the Treaties (see section 3.4 above), is to ensure that government interventions do not distort competition and trade in the internal market.

As was outlined above in sections 1 and 3.1.3, the revision of the Framework and of the GBER are parts of the overall SAM initiative aiming at fostering growth in the internal market by encouraging effective and efficient design of aid measures, focusing enforcement on cases with the biggest impact, streamlining rules and ensuring faster decisions. In essence, modernised EU State-aid rules should facilitate the treatment of ‘good aid’ and prevent the granting of ‘bad aid’ through a coordinated approach based on common assessment principles to ensure consistency between different legal acts.¹³⁴

5. SPECIFIC OBJECTIVES

The specific objectives of the revision are meant as responses to the specific problems discussed in sections 3.2.2 (scope, design and architecture of the rules) and 3.2.3 (IPCEI and international dimension) above, and aim in particular at ensuring that State aid rules sufficiently cater for R&D&I activities that are close to the market (research infrastructures, demonstration and pilot projects and innovation, including non-technological innovation), whilst at the same time providing the necessary explanations on the presence of State aid in typical R&D&I situations and streamlining and increasing predictability of common assessment principles. In this context, EU State aid rules should also provide for assessment criteria – based on those common assessment principles – that allow for measuring the specific funding needs and positive effects of IPCEI that may reach beyond the scope of R&D&I.

¹³⁰ In this policy area, the initiative primarily concerning R&D&I support is the KET Strategy. EU KET support is described in section 2.3 of the Innovation Union Communication, and further outlined in the Communication from the Commission of 26.6.2012, A European strategy for Key Enabling Technologies – A bridge to growth and jobs, COM(2012) 341 final.

¹³¹ In this policy area, the initiative primarily concerning R&D&I support is Pre-commercial Public Procurement. According to section 2.2 of the Innovation Union Communication, support for the development of more innovation friendly markets can be achieved through demand side measures, such as smart regulation, customer information, standardisation or increased public procurement of innovative solutions.

¹³² Such as the platform for Electronic Components and Systems for European Leadership (ECSEL).

¹³³ http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-climate_en.pdf.

¹³⁴ Such horizontal principles would clarify how the Commission would assess common features that are presently not treated in the same manner across the different guidelines and frameworks; those principles would have to be as operational as possible and could deal with the definition and assessment of genuine market failures, the incentive effect and the negative effects of public interventions, possibly including considerations on the overall impact of aid.

5.1. Explanations on the presence of State aid in R&D&I situations

The revised rules should provide clear and comprehensive explanations on the presence of State aid, in particular as regards the concepts of economic activity, market price, R&D collaboration, and the presence of State aid in public procurement of R&D and innovation. At the same time, explanations on the applicability of State aid in situations of very limited ('ancillary') economic activities of research organisations and research infrastructures should also be provided. Such explanations would address the lack of clarity on the existence of State aid, as noted in the public consultations as well as in the workshop, multilateral meeting and advisory committees with Member States.

5.2. Streamlining and increasing predictability of common assessment principles

As explained in section 3.1.3 above, the revised Framework should appropriately set out the common assessment principles which the Commission adopted for its overall SAM initiative and further detailed in the regional aid and risk finance guidelines. According to these principles, an aid measure must satisfy each of the following criteria: 1) contribution to a well-defined objective of common interest, which in the case of R&D&I aid is to promote research and development and innovation activities undertaken in the EU; 2) need for State intervention, meaning that an aid measure must be targeted towards a situation where it can bring about a material improvement that the market cannot deliver itself; 3) appropriateness, meaning that the proposed aid measure must be an appropriate policy instrument to address the objective of common interest; 4) incentive effect, which requires that the aid must change the behaviour of the undertaking(s) concerned in such a way that it engages in additional activity, which it would not carry out or would carry out in a restricted or different manner without the aid; 5) proportionality, meaning that the amount and intensity of the aid must be limited to the minimum needed to induce the additional R&D&I activity by the undertaking(s) concerned; 6) avoidance of undue negative effects on competition and trade between Member States, which in practice leads to the exclusion of certain types of measures or beneficiaries as well as to the identification of cases where the negative effects are likely to outweigh any positive effects; 7) transparency, meaning that the public must have easy access to all relevant acts and to pertinent information about the aids granted.

Although these principles do not significantly differ from those which are already part of the detailed assessment of the current Framework, they should be streamlined and clarified in order to increase predictability and make stakeholders (in particular Member States) more aware of what information is needed for the Commission's assessment. Moreover, where appropriate, it should be ensured that aid for projects which are also receiving funding from the EU is not scrutinised twice by the Commission for the same compatibility criterion (e.g. regarding the contribution to a common objective).

By fully integrating and adapting the abovementioned common principles to the specific requirements of R&D&I-aid, the Framework would become an integral part of an overall coherent body of State aid rules.

6. POLICY OPTIONS

For both the presence of State aid in specific R&D&I interactions (the Framework), and the compatibility of State aid for R&D&I objectives (the Framework and the GBER), three different ways forward are possible: (i) the prolongation of the existing rules with only minor amendments (in particular those announced in the Mid-term Review); (ii) limited revision to the R&D&I State aid rules without any substantial modification of their overall structure and principles, or (iii) complete revision of the R&D&I State aid rules, structure and principles.¹³⁵

¹³⁵ The option of a mere lapse of the rules on 30.6.2014 was discarded up-front, as described above.

These policy options are examined in the following sections and presented in an overview table demonstrating more exactly the envisaged changes (see Annex 10.4).

6.1. Option 1: Baseline scenario: prolongation of the R&D&I State aid rules with only minor amendments

The baseline scenario would mean that all things remain equal or only very limited alterations to the Framework are made. With the R&D&I State aid key provisions being equal, the shortcomings identified in the problem definition would persist.

Under this option, Member States would be allowed to continue granting State aid for R&D&I, and some interpretational issues established in the Mid-term Review (as explained in section 2.2 above) would be resolved in a slightly amended and prolonged version of the rules¹³⁶. This option would require a very limited administrative effort during the revision, given that only those matters identified in the Review would have to be accommodated, and that a prolongation of (substantially unaltered) rules would be proposed.

6.2. Option 2: Limited revision of the R&D&I State aid rules without any substantial modification of their structure and principles

Limited revision means that the guidance on the presence of State aid in typical R&D&I situations that are already addressed in the Framework would be further elaborated. Moreover, compatibility rules for aid to research infrastructures, pilot and demonstration projects and innovation would be revised. The thresholds beyond which individual aid is to be notified and assessed under the Framework would also be revised. The principles of substantive assessment, i.e. the detailed criteria applicable to individual aid notifications would be modified in order to provide guidance on the use of the most appropriate aid instrument and on how to assess and demonstrate the proportionality of aid.

The overall structure of the rules would however not be modified, i.e. the future R&D&I Framework would still contain criteria for both the standard assessment and the individual assessment of aid, as well as criteria for the assessment of aid for IPCEI, on the basis of Article 107(3)(b) TFEU. This option would address the first and second questions raised in section 3.2.3.1 (last paragraph), since it could raise awareness of Member States and increase their willingness to rely more often on Article 107(3)(b) and at the same time make the relevant rules more operational. It would however not cover any aid for IPCEI beyond the scope of R&D&I.

6.3. Option 3: Complete revision of the R&D&I State aid rules including their structure and principles

Under this option, comprehensive material amendments to the Framework would be made in order to address all problems and objectives outlined above. The revised R&D&I Framework would provide new, respectively more elaborate explanations on the presence of aid, including with regard to pre-commercial procurement and the ancillary nature of economic activities. It would moreover provide criteria applicable only to aid that is not eligible for block-exemption, and provide for new, respectively streamlined compatibility criteria, as well as for more elaborate criteria to individually assess the positive and negative effects of aid. In particular, as would be the case also under option 2, the explicit introduction of a net extra costs approach¹³⁷ would improve the control of both the proportionality and the incentive effect of aid in cases where the beneficiary would have carried out part of the project, or a similar project even

¹³⁶ The prolongation of the R&D&I State aid rules without any amendments at all was not retained as an option, since this would not even allow for incorporating those interpretational issues.

¹³⁷ In essence, this approach implies that the aid should be limited to the amount needed to ensure that the expected profitability of the project matches the expected profitability of its counterfactual, or that the beneficiary's financial exposure is reduced to the one incurred under the counterfactual.

without aid, or when the aid is needed to accelerate the very same project or decrease its financial risk.

Thus, like option 2, this option would help directing aid at activities that are in the interest of the EU's growth policies. However, option 3 would go a step further: given this improved proportionality assessment, which would also allow for global competition to be better taken into account in the detailed assessment of large individual aid, maximum aid intensities could be increased, as they need no longer be the measurement of proportionality but rather a cap. Also, option 3 would shape the Framework to become an integral part of State-aid rules based on common assessment principles. Moreover, under this option, criteria for the assessment of aid for IPCEI would be 'spun out' from the Framework into a self-standing secondary legal act, allowing in particular for the possibility to grant aid up to 100% of the projects' funding gap on the basis of a large set of eligible costs. This would entail that the relevant rules could cover also areas outside of the scope of R&D&I (including those related to the first production of new products or processes). It would thus respond to the issues raised in section 3.2.3.1 and, in addition to the benefits highlighted for option 2, would also ensure the consistency of the application of Article 107(3)(b) in different areas.

7. ANALYSIS OF IMPACTS

The assessment of the most likely impacts of each option focuses on economic and social impacts, impacts on EU policies as well as impact in terms of administrative burden.

7.1. Economic impacts

Economic impacts comprise the impact on R&D&I investments and competition in the internal market (in particular as regards the potential of R&D&I aid to either mobilise or crowd out private investment), on competitiveness (in particular as regards the potential to enable the development of new or improved products and services) and on R&D collaboration and knowledge transfer.

7.1.1. *Impact on competition (mobilisation and crowding out of R&D&I investments)*

The main objective of the R&D&I State aid rules is to improve economic efficiency, i.e. to direct State aid to improve the functioning of markets where these cannot deliver R&D efficiently in terms of prices, output and use of resources. Given that it is almost impossible to measure a market failure in a precise manner,¹³⁸ intermediate indicators, such as raising private investment in R&D and innovation, are considered for this assessment. R&D&I aid can lead to both *input*¹³⁹ and *output*¹⁴⁰ additionality, as well as to *behavioural*¹⁴¹ additionality. Its potential of either mobilising or crowding out private investment is however difficult to measure, too.¹⁴²

As regards R&D&I subsidies, available literature concludes that overall, aid tends to induce some additional activity that would not materialize in its absence. However, there are many

¹³⁸ The problem of measurability is discussed in: point 2.5.2 of the Report "National State aid in support of Innovation and SME's: Strengths and weaknesses of the EU State aid control system" (IDEA consult et al, 2013), and in p. 89 of the Report 'The Impact of R&D State aid and its appraisal on the level of EU research expenditure in the context of the Barcelona European Council objectives' (CERES, 2005).

¹³⁹ *Input additionality* in essence means that the beneficiary of aid spends more of its own resources on the intended activities due to the aid.

¹⁴⁰ *Output additionality* in essence means that the beneficiary of aid increases its outputs due to the aid (e.g. the number of innovations, patents, jobs, start-ups created).

¹⁴¹ *Behavioural additionality* in essence means that the beneficiary of aid permanently changes its behaviour due to the aid and thus transforms inputs into outputs more efficiently (e.g. accelerating the completion of R&D projects, expanding their scale and scope, conducting more challenging research, engaging in collaboration).

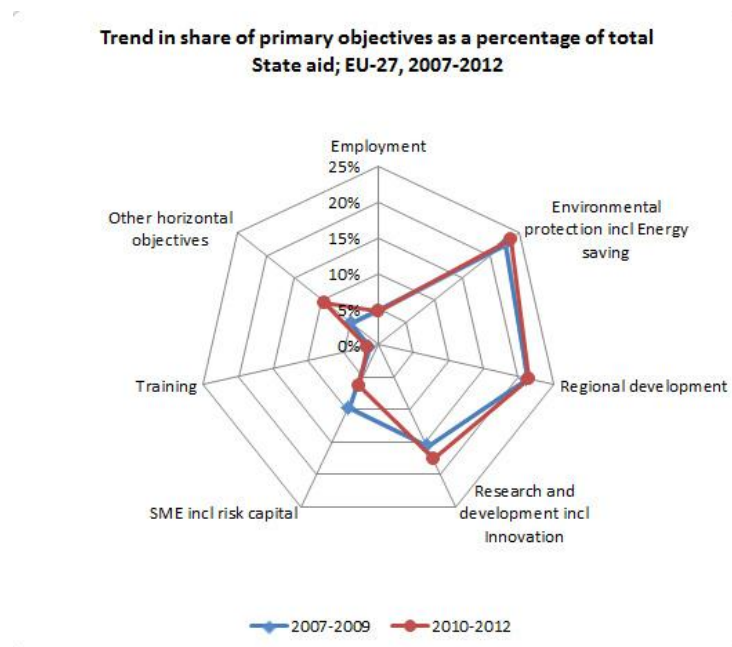
¹⁴² Cf. discussion in the aforementioned Report by CERES (2005), p.90 *et seq.*

cases where the aid has no or only a very small effect.¹⁴³ Furthermore, studies show that the effects of aid on R&D&I outcomes differ for firms of different characteristics, such as firm size. A significant body of evidence supports the claim that R&D&I aid granted to larger firms is often less effective than that granted to smaller firms (see Annex 10.5 for a brief survey of economic literature on the effectiveness of R&D&I aid).

The Commission has by end 2013 authorised 55 large individual/*ad-hoc* R&D&I measures on the basis of the Framework's detailed economic assessment criteria, which it has applied both with regard to the aid's ability to address market failures and to have an incentive on the beneficiary to change its behaviour. That assessment has established that compatible aid addresses market failures and has an incentive effect on the beneficiary, and thus is complementary to private R&D&I investment.¹⁴⁴ The negative effects on competition of compatible R&D&I aid were found to be outbalanced by the positive effects.

As recalled in section 3.1.1 above, gross domestic public and private expenditure on R&D in the EU represented 2.06 % of GDP in 2012. Public R&D&I investment in the form of State aid was ca. EUR 9.7 billion, or 0.07 % of EU GDP in 2012¹⁴⁵, representing almost a fifth of total horizontal aid to industry and services (excluding crisis-related aid for the financial sector).

Figure 4: *Trend in State aid earmarked for horizontal objectives*¹⁴⁶



Under **option 1** (baseline scenario), undertakings would continue being eligible for R&D&I aid in accordance with the existing rules; some issues of legal uncertainty would be cleared up. Hence, this option would maintain the same level of State aid control of the efficiency of aid. It would however not correspond fully to the present EU 2020 strategy, in particular the

¹⁴³ For example, a survey in 2012 found that out of 57 results reported in studies on the effectiveness of EU R&D&I subsidies, eight find a crowding out effect: in these cases the firms appear to have achieved the subsidised outcome even absent support. Ten results show no significant effect on the outcome, whereas the rest of results point towards additionality. See Zúñiga-Vicente, Alonso-Borrego, Forcadell, and Galán, (2012), "Assessing the effect of public subsidies on firm R&D investment: a survey", Journal of Economic Surveys, <http://e-archivo.uc3m.es/handle/10016/14386>.

¹⁴⁴ The assessment was based on measurable indicators of the profitability of a given R&D project: internal rate of return, net present value, risk premiums in the weighted average cost of capital (WACC), standard WACC associated with probability scenarios, cf. Issues Paper, point 6.2.2.

¹⁴⁵ European Commission, State Aid Scoreboard - Autumn 2012 Update, 21.12.2012, COM(2012) 778 final, p.8, http://www.ec.europa.eu/competition/state_aid/studies_reports/2012_autumn_en.pdf.

¹⁴⁶ Source: DG COMP.

aforementioned Flagship Initiatives, which are highly relevant for R&D&I State aid (as described in section 3.1.1). More specifically, this would be due to persisting legal uncertainty in several Horizon 2020 related areas, namely public funding for research organisations, research infrastructures and innovation intermediaries, public-private R&D collaboration and knowledge transfer, and also the treatment of commercial revenues from close-to-market activities such as prototyping, pilot and demonstration projects. In addition, the assessment criteria applicable to large individual aid, and in particular of its proportionality and incentive effect, would not be improved. Given that maximum aid intensities would not be increased, overall R&D&I investment would very likely continue its current trend.

Option 2 would, in addition to existing aid objectives, facilitate aid for research infrastructures, pilot and demonstration projects and innovation activities. The strengthening of legal certainty could lead to more aid in these areas. As set out in section 6.2 above, additional guidance on appropriate aid instruments and explicit criteria on the assessment and demonstration of proportionality (in particular the net extra costs approach) would be provided. In turn, this means on the one hand that potentially very distortive windfall profits would be avoided, and on the other hand that the same amount of available resources can trigger a higher number of R&D&I activities. Also, the fact that there would be a requirement to perform evaluation of the effectiveness of large aid schemes could increase the awareness of Member States of potential needs to redesign a measure in order to make it more effective. However, due to aid intensities acting as a cap, the overall impact on close-to-market activities would still be limited.

Option 3 would (in combination with existing aid objectives and new, respectively streamlined aid objectives) provide for more elaborate criteria for the assessment of the magnitude of market failures, and of the incentive effect as well as of the negative effects of aid. Like option 2, this option would allow Member States to achieve more with the same amount of available resources. However, by allowing increased aid intensities for close-to-market activities, it would more effectively contribute to EU 2020 objectives and in particular to the Flagship initiatives mentioned in section 3.1.1 above. The fact that EU centrally managed funding would fall outside the scope of cumulation rules could *de facto* lead to a higher level of total public financing of R&D&I activities, when this proves necessary. Hence, this option is most likely to enhance the effectiveness of State aid control, and at the same time direct its focus towards EU 2020 priorities and thus boost the efficiency of aid. Moreover, as is the case under option 2, the evaluation of large aid schemes could increase the awareness of inefficiencies and point to the need of their redesign. This option would therefore very likely have a more pronounced impact.

7.1.2. *Impact on competitiveness (development of new or improved products and services)*

Where R&D&I aid addresses market failures and has an incentive effect on the beneficiary, it increases its ability to develop new or improved products and services and thus its competitiveness. Such impact can be assessed at two levels: the market or the company which carries out a given project. Given that, first, R&D&I projects per definition have not yet reached the commercialisation phase when aid is notified to the Commission for assessment, and second, there is no *ex-post* monitoring that in a structured way would follow up commercial success, assessing the impact on the market is very difficult. Available evidence also suggests that the impact of an R&D project on the company is not straightforward.¹⁴⁷

As mentioned in point 7.1.1, the Commission has authorised 55 large individual/*ad-hoc* R&D&I measures. In general, the Commission found that the aid had a positive impact on both the market and the beneficiary's competitiveness, in the sense that if the project concerned was

¹⁴⁷ Based on a sample of 11 projects, two of which did not receive aid; a positive impact of the project on the company was demonstrable in 6 out of 11 projects; the impact of the remaining 5 projects being still unknown; cf. point 6.2.2 of the Report 'National State aid in support of Innovation and SMEs: Strengths and weaknesses of the EU State aid control system' (IDEA et al, 2013).

a success, it would open a new market,¹⁴⁸ or that the aid would contribute to sustaining the growth dynamics of the sector concerned by facilitating the introduction and further development of innovative technologies,¹⁴⁹ or enable the beneficiary to develop a new product¹⁵⁰ or technology which, if successful, would enable an entire industry to overcome a technological barrier and thus pursue its roadmap.¹⁵¹

In general, there is a link between R&D investment and innovation performance, and between total factor productivity of a country and its level of R&D investment. Available data seem to indicate a correlation between the change of the total factor productivity in a given period and the average level of R&D intensity for the corresponding period. The countries that have achieved higher levels of R&D intensity and are leaders in innovation performance also achieved higher levels of productivity.¹⁵² The positive effect of the aid on the beneficiary's ability to develop new products or services and on the market at large can however be considered to be closely linked to the aid's incentive effect (additionality).

Given that, under **option 1**, the additionality of R&D&I aid may be limited or even absent in a number of cases (cf. point 7.1.1 above), this option would not allow an improved assurance with respect to an aid's ability to increase a beneficiary's potential to develop new products or services. Such improved assurance is however helpful in determining whether or not a certain aid instrument is the appropriate policy instrument to deliver the desired outcome, and whether the magnitude of any likely increase of competitiveness would warrant that a given project is undertaken with less aid, or even without any aid.

As for **option 2**, insofar as the criteria for the assessment of appropriateness and proportionality of aid would remain unchanged, its impact would not be different from that of option 1.

Under **option 3**, more elaborate criteria for the detailed assessment of appropriateness and proportionality of aid would be developed. Hence, this option is most likely to ensure that R&D&I aid is limited to the minimum necessary to enhance the potential of beneficiaries to develop new products and services and therefore improve their competitiveness. In addition, it could increase the competitiveness of European companies by allowing more flexibility with regard to aid for IPCEI, which could cover the entire funding gap of a specific project. This option would therefore have a stronger positive impact than the preceding two options.

7.1.3. R&D collaboration and knowledge transfer

R&D&I activities are often done in collaboration with other firms and/or with research organisations. In general, whilst collaboration is important for innovation at all stages of knowledge production¹⁵³, it can be hampered by market failures such as the difficulty to find the right partner (high search costs), the existence of high transaction costs, imperfect and asymmetric information about partners and their expertise (resulting in for example adverse selection), and difficulties in coordinating R&D.¹⁵⁴ Therefore, the Commission considers top-

¹⁴⁸ E.g. Commission decision in the mentioned case N 602/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme MaXSSIMM*, recital (128).

¹⁴⁹ E.g. Commission decision in State aids N 4/2010 and N 7/2010 – ES – *Individual R&D aid to ALESTIS Aerospace SL*, recital (148).

¹⁵⁰ E.g. Commission decision in case N 195/2007 – DE – *Individual R&D-aid for Rolls-Royce Deutschland – BR725 project*, recitals (109), (147).

¹⁵¹ E.g. Commission decision of 29.9.2010, in State aid NN 39/2010 – the Netherlands, *Individuele O&O-steun aan "Mapper"*, recital (178).

¹⁵² European Commission, Innovation Union Competitiveness Report 2011, p. 300-400.

¹⁵³ For a discussion of international scientific collaboration, see OECD, *Measuring Innovation: A New Perspective*, 27.5.2010, section 5.1.

¹⁵⁴ Coordination and network failures as explained in point 1.2.2 of the R&D&I Framework. See also discussion in the Report *National State aid in support of Innovation and SMEs: Strengths and weaknesses of the EU State aid control system* (IDEA et al, 2013), point 2.2.4.

ups on basic aid intensities justified for collaboration.¹⁵⁵ In general, R&D collaboration can in particular be induced by innovation clusters¹⁵⁶ and research infrastructures¹⁵⁷, and facilitating collaboration and knowledge transfer will bring long-term economic and social benefits.¹⁵⁸

In a number of cases where the Commission assessed aid to R&D projects that involve collaboration with firms and/or research organisations, it found that the aid enabled collaboration¹⁵⁹, which would not take place (at least to the same extent) absent the aid.

Under **option 1**, several issues that concern R&D collaboration would remain unchanged: first, top-ups of basic aid intensities, intended to help overcome coordination issues and positive externalities in the form of knowledge spill-over would be maintained; second, investment aid and operating aid for innovation clusters would continue supporting spaces that induce public-private and private-private collaboration. In spite of some clarifications on the presence of aid in public-private R&D collaboration being added, no specific rules on research infrastructures would however be introduced. For the following reasons, the effectiveness of R&D&I aid in enabling collaborative activities would thus remain sub-optimal: first, the existing innovation cluster objective has not been used much by Member States¹⁶⁰; second research infrastructures that perform economic activities would not benefit from any clear compatibility criteria, thus becoming probably less likely to be financed by targeted aid where necessary; third, some legal uncertainties concerning public-private R&D collaboration would persist.

Option 2 would allow for improvements on innovation cluster aid, and provide for a new category of research infrastructure aid, as well as for more elaborate clarifications on the presence of aid in public-private R&D collaboration. Nevertheless, criteria for the assessment of the appropriateness and proportionality of large R&D aid to overcome coordination and network failures that affect collaboration, and for the assessment of the incentive effect to engage in more collaborative interactions would not be revised. Hence, this option would still fall short of addressing all the previously identified problems in a sufficient manner.

Under **option 3**, the Framework would be amended to include, besides those elements identified above for option 2, more elaborate criteria for the individual assessment of the potential of large R&D aid to enable collaboration. This option would therefore have a stronger positive impact than the preceding two options.

¹⁵⁵ Cf. section 1.5 of the R&D&I Framework.

¹⁵⁶ Innovation clusters are defined in section 2.2 m) of the Framework. In general, the Commission found that innovation clusters facilitate intense interaction and cooperation amongst different interlinked innovation actors such as universities, businesses and public authorities; see European Commission Staff Working Document *'The concept of clusters and cluster policies and their role for competitiveness and innovation: Main statistical results and lessons learned'*, 17.10.2008, SEC(2008)2637, p.8.

¹⁵⁷ For a discussion of the potential of research infrastructures to induce intensive scientific collaboration, explained with concrete examples: European Strategy Forum on Research Infrastructures (ESFRI), 'European Research Infrastructures with Global Impact – some examples from the ESFRI-roadmap', 2012, http://www.ec.europa.eu/research/infrastructures/pdf/esfri_brochure_0113.pdf#view=fit&pagemode=none.

¹⁵⁸ Innovation Union Flagship Communication, p. 18, as regards promoting openness and capitalising on Europe's creative potential (section 3.3).

¹⁵⁹ E.g. Commission decisions in cases SA.32263 (2011/N) – SE – *Aid for the development of a demonstration plant for wave energy* (recitals 3.4.1.4 and 3.4.1.5), OJ C 76, 15.3.2012; NN 39/2010 – the NL, *Individuele O&O-steun aan "Mapper"* (recitals 23, 95 and 178) OJ C 147, 18.5.2011; N 602/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme MaXSSIMM* (recital 45), OJ C 177, 12.7.2008; N 5/2009 – FR, *Soutien d'OSEO INNOVATION au PISI "CARMAT"* (recital 67), OJ C 176, 29.7.2009; N 193/2010 – SE – *R&D aid for the LignoBoost project*, recital (50), OJ C 196, 5.7.2011; N 144/2010 – NL, *'Rekkof', Individual aeronautics R&D-aid* (recital 74), OJ C 47, 15.2.2011.

¹⁶⁰ In practice, only two notified aid schemes aimed specifically at innovation clusters (N 525/2001 – IE – *Cluster Incubator Scheme*, OJ C 136, 3.6.2005, and N 301/2010 – DK – *Green Labs*, OJ C 131, 3.5.2011).

7.2. Social impacts

While the R&D&I State aid rules do not have a direct social, or cohesion objective, they are likely to produce an indirect social impact on employment in the EU, as regards both highly skilled and other labour. First of all, as confirmed by the EU Industrial R&D investment Scoreboard 2012, R&D investment has a positive effect on employment.

Figure 5: Positive effect of R&D investment on employment¹⁶¹

Rank	Company	Sector	Country	Annual Sales Growth 2011/2002, (%)	Annual Employment Growth 2011/2002 (%)	Annual R&D Growth 2011/2002 (%)	R&D 2011 €m	Profitability 2011 (%)
1	Alexion Pharmaceuticals	Biotechnology	US	75.5	19.5	7.4	106	31.2
2	Cubist Pharmaceuticals	Biotechnology	US	64.4	11.4	14.9	143	19.0
3	Google	Internet	US	48.6		47.5	3989	32.0
4	Gameloft	Software	France	40.8	50.1	51.5	87	12.8
5	Celgene	Biotechnology	US	40.1	23.8	34.1	1131	26.9
6	HTC	Telecommunications equipment	Taiwan	37.5		33.8	407	14.9
7	Nuance Communications	Software	US	35.2	36.8	25.5	139	7.4
8	Apple	Computer hardware	US	34.6	20.1	18.4	1877	31.2
9	Gilead Sciences	Biotechnology	US	32.1	13.7	25.5	929	45.8
10	IMMSI	Automobiles & parts	Italy	31.8	6.2	6.3	69	5.2
11	Salix Pharmaceuticals	Pharmaceuticals	US	29.0	15.4	17.5	81	26.4
12	Red Hat	Software	US	28.2	23.3	25.5	159	17.6
13	F5 Networks	Telecommunications equipment	US	27.7		23.9	107	30.4
14	Biogen Idec	Biotechnology	US	27.7	8.5	25.3	943	34.3
15	Amazon.com	General retailers	US	27.6	21.7	24.5	1637	1.8
16	Pou Chen	Personal goods	Taiwan	25.9		24.1	141	7.4
17	Bruker	Health care equipment & services	US	25.6	21.7	20.3	133	9.8
18	Medicines	Pharmaceuticals	US	25.0	10.7	11.4	85	12.0
19	Juniper Networks	Telecommunications equipment	US	23.8	21.5	21.5	794	14.8
20	SanDisk	Semiconductors	US	23.0	20.8	22.0	357	27.0
21	Hologic	Health care equipment & services	US	23.0	23.8	25.4	90	21.0
22	ANSYS	Software	US	22.5	15.2	18.1	83	38.4
23	eBay	General retailers	US	22.4	18.7	27.1	1118	20.4
24	Garmin	Leisure goods	Switzerland	21.8	19.7	26.9	231	20.4
25	Finisar	Telecommunications equipment	US	21.4	17.2	9.1	113	4.1

Future growth in R&D investment might amplify this effect and is estimated to create employment for an additional one million researchers by 2020, thanks to an increase of GDP and R&D intensity.¹⁶² Overall, investing 3% of EU GDP on R&D by 2020 could create 3.7 million jobs and increase annual GDP by EUR 795 billion by 2025.¹⁶³

The assessment of R&D&I State aid under the current Framework confirms this effect. As a rule, business plans underlying projects eligible for large individual aid, and examined by the Commission, show a higher number of employees working in R&D activities than in the absence of aid.¹⁶⁴ All individual positive decisions also concluded that the aid will not unduly affect the competitors' dynamic incentives to invest, and will not keep inefficient market structures. Hence, compatible aid to a beneficiary was not found to reduce employment elsewhere or to help maintaining unstable employment. The wider impact of R&D intensive activities is further illustrated by the employment potential of KETs in the EU. For instance, in

¹⁶¹ Joint Research Centre, European Commission, The EU Industrial R&D-investment Scoreboard 2012, p.41.

¹⁶² European Commission, Innovation Union Competitiveness report 2011 – Analysis, Part I: Investment and Competitiveness report, p.90. This estimation does not include the additional need of researchers to substitute those leaving their employment for retirement.

¹⁶³ Innovation Union Communication, p.3-4, with reference to P. Zagamé (2010) The Cost of a non-innovative Europe.

¹⁶⁴ E.g. Commission decisions in cases N 195/2007 – DE – *Individual R&D-aid for Rolls-Royce Deutschland – BR725 project*, recital (133), N 602/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme MaXSSIMM*, recitals (78) *et seq.*, and NN 39/2010 – NL – *Individuele O&O-steun aan "Mapper"*.

the area of industrial biotechnology, it is estimated that every euro invested into research and innovation will result in a tenfold return.¹⁶⁵

Pursuant to the R&D&I State aid rules, the increase in the number of staff assigned to eligible activities, compared to a situation without aid, is an indicator of an aid's incentive effect.¹⁶⁶ Moreover, they explicitly recognise the difficulties faced by SMEs in recruiting and keeping highly qualified personnel.¹⁶⁷ Furthermore, the potential of large R&D aid to bring about social improvements was confirmed in at least one large individual aid case, where the project demonstrably generated significant positive externalities for public health at large.¹⁶⁸

Under **option 1**, first, the assessment of the proportionality and appropriateness of the aid to bring about the positive employment effects would not be made more robust or precise. Second, innovation aid objectives would remain unaltered and therefore the eligibility of non-technological innovation would not be emphasized; the underutilisation of innovation aid due to the perceived restrictiveness of the current rules would possibly prevent aid that is targeted at social innovation. Thus being, the potential volume of employment sketched above would in all likelihood not be fully tapped under this option.

Under **option 2**, innovation aid objectives would be materially improved as regards the streamlining and simplification of aid intensities and eligibility criteria; the perceived bias towards "technological innovation" would be reduced. Although the principles for assessing large aid would not change, it has to be noticed that to date, no large individual aid above the notification thresholds for innovation aid has been notified to the Commission. Therefore this option would not result in a sub-optimal situation as regards innovation aid.

Under **option 3**, the R&D&I Framework would better suit the individual assessment of the potential of large R&D aid to create additional and stable employment. This option would therefore produce a stronger positive social impact than the preceding two options.

7.3. Impacts on EU policies

As explained in section 4 above, the revision of the R&D&I State aid rules should contribute both to the EU's growth policy (in particular research and innovation policy) and to State aid control policy (to ensure that government interventions do not unduly distort competition and trade in the internal market).

The trends in R&D&I investment depend on many factors. In the Innovation Union Flagship, these factors are categorised into five main 'system components', all of which are fed by an additional 'finance' component. The policy issues typically associated with these domains are presented in figure 6. To the extent that public funding constitutes state aid, it is affected by R&D&I state aid rules, which consequently will have an effect on the level of R&D&I investments in the EU ('competition policy' in the figure below). However, there seems to be no studies (other than the present Impact Assessment) which attempt to predict in any detailed manner the consequences of each of the three options. Given the numerous factors on which the level of R&D&I activities rely, it however does not seem possible to estimate the magnitude of R&D&I investment triggered in each scenario in any precise manner.

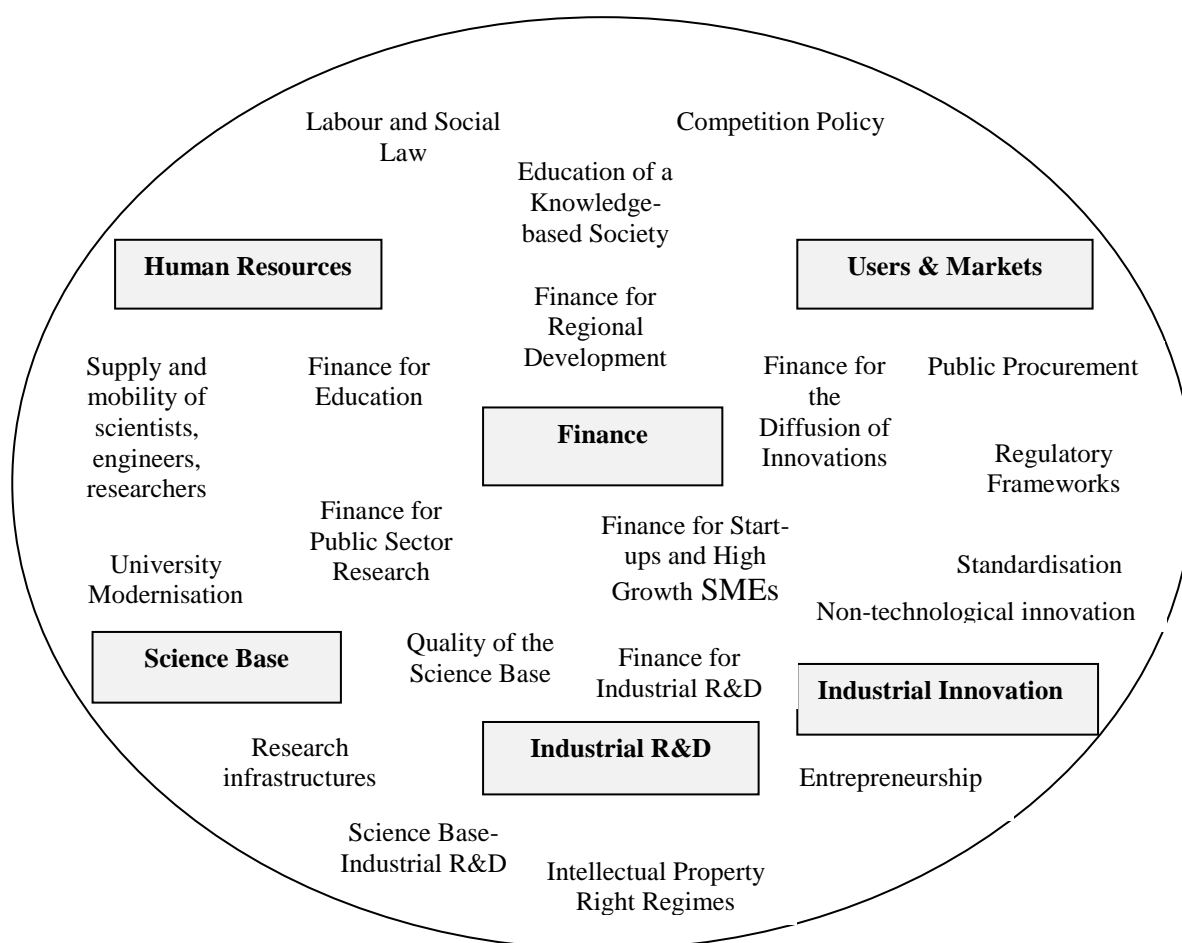
¹⁶⁵ Communication from the Commission of 26.6.2012 COM(2012) 341 final, A European strategy for Key Enabling Technologies – A bridge to growth and jobs, point 2, <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0341:FIN:EN:PDF>.

¹⁶⁶ Cf. Chapter 6 of the Framework.

¹⁶⁷ Both the Framework and the GBER provide for the category of aid for the loan of highly qualified personnel.

¹⁶⁸ Commission decision of 17.6.2009 in State aid N 5/2009, France, *Soutien d'OSEO INNOVATION au PISI "CARMAT"*, recitals (55)-(65).

Figure 6: Research and Innovation System Components and Policy concerns¹⁶⁹



Option 1 would rather maintain the same level of State aid control and of eligible aid objectives. Overall, R&D&I investment would very likely continue its current trend. The clearing of some interpretational issues would slightly improve the regulatory environment and thus result in more effective public support. Its overall impact would however be neutral, given that no new aid objectives or other material criteria would be proposed that contribute both to the EU 2020 strategy and State aid policies.

Option 2 would clarify the concept of State aid, help targeting aid to research infrastructures, pilot and demonstration projects, and facilitate innovation. Therefore, Member States would in all likelihood be in a better position to direct public support to the EU's growth and innovation policy objectives. Given however, that neither the Framework's structure nor the detailed assessment criteria applicable to individual aid would be modified, the overall positive impact would very likely be limited.

The more elaborate amendments envisaged under **option 3**, including on ancillary economic activities that are non-separable from non-economic activities, would, firstly, allow further directing public support to growth and innovation policy objectives, and secondly better pursue SAM objectives; State aid control, in particular of large and distortive aid, would be enhanced as compared to the present situation. Hence, this option is most likely to have a more pronounced positive impact.

¹⁶⁹ Source JRC-IPTS, cited in Commission Staff Working Document of 6.10.2010, SEC(2010) 1161 final, p. 19., available at: http://ec.europa.eu/research/innovation-union/pdf/rationale_en.pdf.

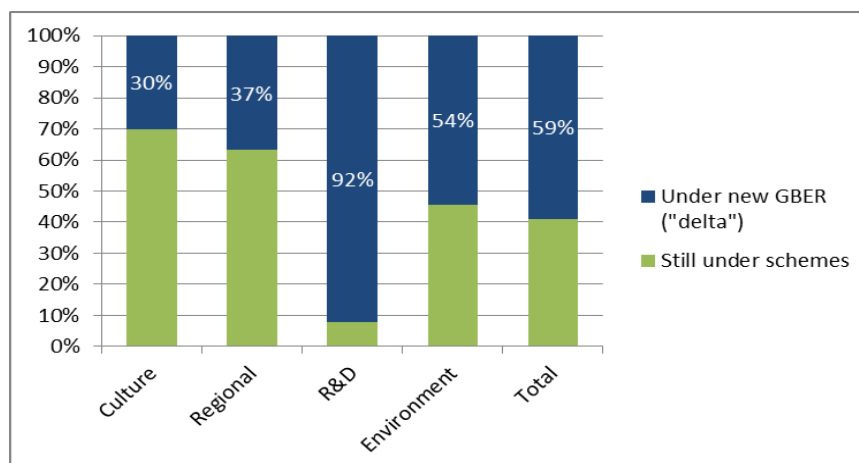
7.4. Administrative burden

For the purposes of this report, administrative burden is defined as obligations placed on undertakings and (non-EU) public administration, which entail financial costs. These are in particular obligations arising from Article 108 TFEU and the R&D&I Framework adopted on its basis: notification, information, monitoring and reporting obligations, and obligations to take appropriate measures concerning existing aid schemes in order to comply with the provisions of a revised Framework.

None of the 3 options presented in this report will have an impact on the obligation *as such* to notify State aid to the Commission, pursuant to Article 108(3) TFEU.

However, further guidance on the existence of State aid in R&D&I situations would lead to an increased level of legal certainty, reducing the need for pre-notifications of cases for reasons of legal certainty. Also, any expanded scope of the GBER (increase of notification thresholds or inclusion of additional aid measures) would reduce the administrative costs stemming from the formal notification: in particular, the widening of the scope of the GBER is expected to lead to a substantial decrease in notifications to the extent that more than 90% of all R&D&I aid measures would be covered by the new GBER rules.

Figure 7: *Estimated impact of extended scope of GBER*¹⁷⁰



¹⁷⁰ Source DG COMP (analysis based on aid amounts in 2012, aid measures notified or block-exempted and in force in 2012). Block exempted schemes have represented some 2/3 of all R&D&I measures put into force during the period 2007-2013.

Hence, any impact on the related administrative burden could only arise from the quality and amount of information needed for a notification to be complete. Available data on the existing Framework suggest that a lack of clarity on the detailed assessment criteria could result in more time-consuming and difficult notification procedures.¹⁷¹ The streamlining and clarification of these criteria would therefore lead to a decrease in the administrative burden of Member States and a shortening of the duration of cases.

Reporting obligations consist e.g. of obligations to submit annual reports pursuant to Article 21 of the Procedural Regulation, as well as Article 5(2) of the Implementing Regulation¹⁷². Such annual reporting obligations, as well as other information, monitoring and reporting obligations are spelled out in the form of compatibility criteria in the Framework.¹⁷³ Under none of the 3 options presented in this report, annual reporting obligations would be substantially altered. Hence, no administrative burden would arise from the revision in this respect.

Furthermore, Member States are required to submit certain information on aid grants exceeding EUR 3 million per project and per beneficiary.¹⁷⁴ Any ease of this reporting obligation would naturally decrease the administrative burden. Additional reporting/transparency obligations could also be revised even if the public consultations showed a mixed result in this respect: respondents are divided between considering the reporting to be acceptable or burdensome.

For aid granted on the basis of a scheme, there is currently also an obligation on Member States to verify and document the incentive effect of aid to large undertakings¹⁷⁵. Any change in these provisions would have a direct impact on the administrative burden of Member States.

The Framework moreover has the quality of an "appropriate measure" pursuant to Article 108(1) TFEU together with Article 18 of the Procedural Regulation. The administrative burden arising from appropriate measures depends on the scope of the revision.

The EU has a general better-regulation objective¹⁷⁶, and one of the objectives of State Aid modernisation is simplification¹⁷⁷. Therefore, each of the proposed options will be assessed also for coherence with these objectives.

7.4.1. Administrative burden arising from the quality and amount of information needed for a notification to be complete

Option 1 would have an impact in so far as the amendments introduced could address the perceived lack of clarity. Such impact would however be limited, given the limited scope of clarifications considered by the Mid-term Review.

Under **option 2**, the positive impact would be significant, given the introduction of clearer guidance on the presence of aid, of new or revised compatibility rules for aid to research infrastructures and innovation aid and the limited period during which future revenues of pilot

¹⁷¹ Cf. Logotech report 'Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: R&DI State Aid Study, 2012', p.117.

¹⁷² Commission Regulation (EC) 794/2007 of 21.4.2004, implementing Council Regulation (EC) 659/99, OJ L 140 of 30.4.2004, p.1.

¹⁷³ Obligations become effective when the Member State concerned has committed to fulfil them: annual reports (point 10.1.1); information sheets on individual aid granted on the basis of aid schemes without falling under the duty for individual notification, and exceeding EUR 3 million (point 10.1.3 1st subparagraph); maintaining detailed records for 10 years from the date on which the aid was granted (point 10.1.3 2nd subparagraph).

¹⁷⁴ Cf. point 10.1.3 1st subparagraph of the R&D&I Framework.

¹⁷⁵ See section 6 of the Framework and Article 8 of the GBER.

¹⁷⁶ Inter-institutional Agreement on better law-making, OJ C 321 of 31.12.2003, p.1; cf. also numerous other documents on the Better-Regulation Strategy, http://www.ec.europa.eu/governance/better_regulation/key_docs_en.htm#_br.

¹⁷⁷ See points (19) and (20) lit. b of COM(2012) 209 final.

and demonstration projects would have to be considered. In particular, administrative costs could be reduced as research infrastructure aid would now have a clear basis for compatibility assessment.¹⁷⁸ The information needed for the substantive assessment corresponds largely to what is required under option 1. According to case practice, aid subject to a substantive assessment is normally provided to large companies¹⁷⁹, which already have the necessary financial information available since it forms part of their decision-making process when choosing which projects to pursue. Therefore, the proposed changes in the common assessment principles are not expected to lead to a higher administrative burden. On the contrary, since most notification thresholds would be vastly increased, the overall administrative burden will significantly decrease, in particular since a number of cases which would be subject to a detailed assessment in the baseline scenario will in the future be block-exempted.

Although the requirement of evaluation of large aid schemes could somewhat increase the administrative burden, the responses to the first public consultation on the Framework indicated that this is already done in some form in most Member States. Given also that the definition of large aid schemes will catch only a few of the largest schemes in the EU, this requirement is not expected to significantly impact the administrative costs.

Option 3 is likely to have an even more important impact on administrative burden. This option would be instrumental in ensuring both speedier disbursement of R&D&I aid (in particular following modifications of the GBER, including an enlargement of its scope of application and an increase of individual notification thresholds) and faster assessment of those fewer cases that would still need to be notified.

In addition to the positive impact of option 2, a further simplification of the treatment of pilot and demonstration projects under the GBER, as well as improvements to criteria applicable to individual notifications of large aid could clear away the perceived lack of clarity that according to Member States results in complex documentation needs and also make the rules more predictable for the beneficiaries to collect the necessary level of evidence.¹⁸⁰ Moreover, the fact that EU funding would be exempted from cumulation rules would further decrease the number of cases that would be subject to a substantive assessment¹⁸¹, which would ease the administrative burden. Also for EU funded projects subject to such an assessment, the administrative burden would be further eased by the fact that the fulfilment of certain assessment principles/criteria (common objective, market failure and appropriateness of aid) would be presumed.

7.4.2. *Administrative burden arising from reporting obligations and appropriate measures*

Option 1 would not result in any change of the administrative burden as reporting obligations would remain unaltered and the clarifications proposed would not materially alter any compatibility criterion.

Option 2 could result in a reduction of administrative costs as annual reporting obligations could be reduced as regards the level of detail to be provided, in particular by abolishing the requirement for demonstration of an incentive effect for large undertakings. At the same time, appropriate measures would not impose any additional burden, since compatibility rules for aid

¹⁷⁸ Other than R&D project aid, innovation cluster aid, *de minimis* aid or regional investment aid.

¹⁷⁹ Only in 5 cases out of 55 large individual/*ad-hoc* measures authorised after detailed assessment, the beneficiary was an SME.

¹⁸⁰ Cf. Logotech report 'Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: R&DI State Aid Study, 2012', p.117.

¹⁸¹ On the basis of past practice, it is expected that the combination of changes considered under this option would decrease the number of such cases by at least 1/3. Retrospectively, this means that some 20 out of those 55 large individual/*ad-hoc* measures authorised after detailed assessment would have been block-exempted.

to research infrastructures, pilot and demonstration projects and innovation would in general be less restrictive than at present.

Under **option 3**, the positive impact is generally identical to option 2, but could be reinforced by discontinuing the obligation to report on individual aid exceeding EUR 3 million.

7.4.3. Simplification and better regulation

Option 1 would have very limited positive effects, if any, as only few clarifications would be introduced on those interpretational issues identified in the Mid-term Review. The Framework's definition of legal terms, explanations on the presence of State aid and its material compatibility provisions would not be simplified.

Under **option 2**, the positive effects in terms of simplification and better regulation would be more pronounced than under the previous option: first, the perceived complexity of applying existing rules to research infrastructures would be eliminated by the introduction of a dedicated aid objective; second, rules on aid for demonstration and pilot projects would be simplified with future revenues only being taken into account for a limited period under the GBER; third, innovation aid rules would be streamlined and simplified, doing away with most of the requirements that were perceived as too restrictive in the first public consultations on the Framework and the GBER; fourth, since the criteria for aid to IPCEI would be further outlined in the Framework, the applicable rules would become more transparent, predictable and operational.

Option 3 would, first, like option 2, allow introducing clearer guidance on the presence of state aid and a dedicated aid objective for close-to-market aid (aid for research infrastructures, demonstration and pilot projects and innovation). However, this option would go further in this direction since the treatment of demonstration and pilot projects would be further simplified and explicit rules on ancillarity would be included both in the Framework and the GBER. Second, this option would allow full coherence and complementarity between the GBER and the Framework, as the latter would only contain criteria for aid that is ineligible for block-exemption and subject to individual assessment. Third, the common principles for substantive assessment under the Framework would be clarified and streamlined. Fourth, a separate Communication on aid for IPCEI would ensure that all such aid is treated consistently across different areas (such as R&D&I, energy, transport and broadband).

8. COMPARING AND RANKING THE OPTIONS

R&D&I State aid rules, both in the Framework and the GBER, will be subject to changes under both Options 2 and 3, however to a variable extent. In particular, whilst Option 2 implies only limited material changes, Option 3 will generally go further in a number of key aspects. Whilst a detailed comparison of the changes proposed under each Option is provided in Annex 10.4, a number of important elements can be underlined in this context.

First, insofar as the GBER sets out pre-defined criteria corresponding to those cases where it can be reasonably presumed that aid is compatible with the internal market, it makes possible for Member States to grant aid without prior notification: for cases below the notification thresholds, proportionality of the aid can be presumed if it does not exceed the maximum aid intensities (expressed as a percentage of eligible costs), which are modulated according to the potential contribution of the aid towards increasing R&D&I activities and its closeness to the market. To the extent that aid will undergo a substantive assessment under the R&D&I Framework when its compatibility cannot be presumed (i.e. when its amount exceeds the thresholds laid down in the GBER), notification thresholds should thus be set at the same level under the envisaged options (other than the baseline). In the same vein, there are no material differences between Options 2 and 3 with regard to the changes of scope of the GBER which, following the adoption of the new Enabling Regulation, would in both cases be enlarged to

encompass all types of innovation aid and thus include those categories that are not restricted to SMEs (aid for process and organisational innovation and for innovation clusters). Likewise, the extension of its scope to ad hoc aid as well as to a new category of aid for research infrastructures would also apply uniformly under Options 2 and 3. However, those Options clearly differ with regard to maximum aid intensities for notifiable R&D projects or research infrastructures: in particular, whilst the same aid intensities as laid in the GBER would apply under Option 2, it is envisaged under Option 3 to allow higher rates insofar as the Commission will establish, on the basis of its own assessment, that such higher rates are required to enable those projects to be carried out and remain nonetheless limited to the minimum necessary.

Second, as concerns the definition of economic activity and market price, as well as the general applicability of State aid rules, it needs to be recalled that the notion of State aid is defined directly by the TFEU, as interpreted by the relevant EU case-law. Thus being, Options 2 and 3 are to a large extent comparable insofar as they detail those aspects that are of particular importance for increasing legal certainty in the area of R&D&I, such as with regard to the distinction between economic and non-economic activities in situations where collaboration between research organisations and undertakings (or contractual R&D) are involved. This notwithstanding, Option 3 would go further than Option 2 by complementing practical guidance with the introduction of the concept of ancillary economic activities for research organisations and research infrastructures, in that their entire funding would be regarded as being provided for non-economic activities (and thus falling outside State aid rules) when economic activities are purely ancillary, i.e. directly related to and necessary for their operation or intrinsically linked to their main non-economic use, and remain limited in scope. At the same time, Option 3 would also extend such guidance and clarifications to situations where public procurement is used to foster R&D&I activities, thus answering concerns raised by a majority of stakeholders in the first public consultation.

The following table summarises the impacts of the policy options. Since the baseline scenario involves some minor changes, its estimated impact is not always set to zero.

Figure 8: Summary of comparison of the options against the baseline scenario

	Option 1 Baseline scenario	Option 2	Option 3
Economic impact (overall)	-	+	++
– on R&D&I investment	0	+	++
– on the potential to enable the development of new or improved products and services	0	0	++
– on R&D collaboration and knowledge transfer	-	-	+
Social impact	-	+	++
Impacts on EU policies	0	+	++
Administrative burden (overall)	-	+	+
– arising from the quality and amount of information needed for a notification to be complete	0	+	++
– arising from reporting obligations and appropriate measures	0	+	++
– simplification and better regulation	--	+	++

Legend: -- markedly negative impact; - limited negative impact; 0 no impact; + limited positive impact; ++ markedly positive impact.

The following table provides an overview of the main arguments leading to the ranking of the options, in view of the objectives described in sections 4 and 5 above. Options have been assessed against the following criteria:

- Effectiveness in relation to the objectives;
- Efficiency in achieving the objectives;
- Coherence with overarching EU objectives, strategies and priorities.

Figure 9: Ranking of the options against the objectives

	Effectiveness	Efficiency	Coherence
<p>Option 1:</p> <p><u>General observation:</u> The public consultations showed that Member States as well as stakeholders call for a revision that is reaching further than clearing interpretational issues. This baseline option would not address the regulatory gap related to aid for research infrastructures, would not eliminate legal uncertainties as regards the presence of aid in R&D-typical situations and public procurement, and would not bring about any substantive modifications of other compatibility provisions.</p>	<ul style="list-style-type: none"> – State aid objective (4.1.) not attained – SAM-objective (4.2) not attained – Specific objectives (5) only partially attained (guidance on the presence of aid only marginally improved; common assessment principles not transposed into Framework; research-infrastructure objective; innovation aid; pilot- and demonstration projects not provided for) – State aid as an appropriate policy instrument attained – Incentive effect attained – Proportionality partially attained (net extra costs approach not provided for; aid intensities not increased) – Limiting negative effects attained <p>In summary, this option maintains the status quo and therefore only partially attains the policy objectives of this revision process.</p>	<p>No impact on resources needed to achieve the objectives described</p>	<p>Consistency with other EU policies (4.1) not attained (EU 2020, Horizon 2020)</p> <p>Coherence with overall EU State aid rules (4.2) based on common assessment principles not attained.</p>
<p>Option 2:</p> <p><u>General observation:</u> This option would be more in line with EU 2020 objectives, as legal certainty on the presence of State aid in R&D&I-typical interactions would be improved, and as EU 2020 related aid objectives (research-infrastructure, innovation, demonstration and pilot plants) would be subject to specific and clear rules and individual notification thresholds would be adapted. However, parallel rules (standard criteria in both the Framework and the GBER) would persist. Consequently, this option would not pursue the objective of streamlining State aid rules as well as specific R&D&I State aid policy objectives which require more developed individual assessment criteria (better targeting the aid, appropriateness, incentive effect, proportionality, limiting negative effects).</p>	<ul style="list-style-type: none"> – State aid objective (4.1) attained – SAM-objective (4.2) partially attained – Specific objectives (5) only partially attained – Targeting aid at objectives of common interest attained (research infrastructure objective; innovation aid; pilot and demonstration projects) – State aid as an appropriate policy instrument attained – Incentive effect attained – Proportionality partially attained (net extra costs approach not provided for; aid intensities not increased) – Limiting negative effects attained <p>In summary, this option provides for some alterations but the overall structure and approach of the R&D&I-State aid rules would remain unchanged. Therefore, this option only partially attains the policy objectives of this revision process.</p>	<p>Limited positive impact on resources needed to achieve the objectives described (the Framework's overall structure and approach would remain unchanged)</p>	<p>Consistency with other EU policies (4.1) partially attained (EU 2020, Horizon 2020)</p> <p>Coherence with overall EU State aid rules (4.2) based on common assessment principles partially attained.</p>
<p>Option 3:</p> <p><u>General observation:</u> Under this option, comprehensive material alterations to the Framework would address all problems and all objectives outlined above: explanations on the presence of aid, full alignment and complementarity of the</p>	<ul style="list-style-type: none"> – State aid objective (4.1) attained – SAM-objective (4.2) attained – Specific objectives (5) fully attained – Targeting aid at objectives of common interest attained (research-infrastructure objective; innovation aid; pilot and demonstration projects) – State aid as an appropriate policy instrument attained – Incentive effect attained – Proportionality attained (net extra costs 	<p>Limited overall positive impact on resources needed to achieve the objectives described.</p>	<p>Consistency with other EU policies (4.1) attained (EU 2020, Horizon 2020)</p> <p>Coherence with overall EU State aid rules (4.2) based on common assessment principles fully attained.</p>

Framework and the GBER, new respectively streamlined compatibility criteria, more elaborate criteria applicable to large individual aid that falls under the notification obligation.	approach; aid intensities increased) – Limiting negative effects attained In summary, this option attains all policy objectives.		
Overall comparison	Option 3 is the only option that fully attains all policy objectives	Options 2 and 3 both have a positive impact. Option 3 however would achieve more policy objectives.	Only Option 3 is fully consistent with overall EU policies (including State aid).

In conclusion, **Option 3 (complete revision of the R&D&I State aid rules including their structure and principles)** is the preferred option.

9. MONITORING, TRANSPARENCY AND EVALUATION

Monitoring, transparency and evaluation are important elements of the common principles on which the compatibility of aid is based and are applicable to all parts of the SAM initiative.

Pursuant to Article 108 TFEU, "*the Commission shall, in cooperation with Member States, keep under constant review all systems of existing aid in those Member States*". Therefore, as described in section 7.4 above, both the Framework and the GBER impose certain reporting obligations on Member States. All Member States must submit annual reports on R&D&I aid measures, containing all information necessary to establish that the conditions regarding eligibility and maximum aid amounts have been fulfilled. Records must be maintained for 10 years from the date of the aid award and must be provided to the Commission upon request. As set out above, none of the three options include a dramatic change in this regard.

The Commission is and will (regardless of the option pursued) continuously monitor aid on the basis of notifications, information and reporting. In addition, monitoring is and will be done on the basis of annual random *ex post* control of existing aid schemes. Moreover, the Commission maintains a State aid scoreboard where the situation in each Member State is summarised.¹⁸²

Both under options 2 and 3, it is considered under the umbrella of SAM to set up a general transparency obligation to publish information on all aids granted above EUR 500,000. Member States would be required to publish on the internet a summary of each aid measure (the full text of the measure, including amendments, or a link providing access to it) and the information on each individual aid award.

The current State aid rules focus more on the *ex ante* authorisation of aid than on the evaluation of the actual, measured impact of aid schemes. In order to enable an assessment of the effectiveness and efficiency of an aid measure and the design of appropriate modifications where necessary, the Commission will, under the umbrella of SAM, evaluate the effectiveness and efficiency of aid. Such evaluation will primarily be required for large aid schemes both under options 2 and 3 (see section 7.1 and Annex 10.4) and should build on concrete result indicators to capture quantified information about their direct impact at the level of aid beneficiaries (e.g. additional R&D&I expenditure, number of new researchers employed or new patents registered, number of enterprises supported to introduce new products or services to the market), as well as indirect impact on policy objectives (e.g. overall increase in productivity and gross value added, number of enterprises collaborating with research organisations or having access to research infrastructures) and negative effects on competition and trade (e.g. possible bias towards incumbents or low productivity companies, changes in market power of a dominant player, foreclosure of emergent markets).

In turn, the results of those evaluations, which are to be carried out by independent experts on the basis of a common methodology, are expected to provide valuable input for the monitoring

¹⁸² http://www.ec.europa.eu/competition/state_aid/studies_reports/studies_reports.html.

and evaluation of the R&D&I Framework rules themselves (as opposed to the aid granted thereunder), which the Commission may decide to review or amend at any time, should it be necessary for reasons associated with competition policy or in order to take account of other union policies and international commitments or for any other justified reason.

10. ANNEXES

10.1. Key events of the revision of the R&D&I State aid rules

10.8.2011	Publication of Mid-term Review
20.11.2011- 24.2.2012	First public consultation on the Framework (based on questionnaire)
20.6.2012- 12.9.2012	First public consultation on the GBER
12.12.2012	Publication of the Issues Paper
9.1.2013	Workshop with Member States and stakeholders
8.5.2013- 28.6.2013	Public consultation on the draft GBER (main)
1.7.2013	Advisory committee on the GBER
15.7.2013- 1.8.2013	Inter-service consultation on the draft R&D&I Framework
24.7.2013- 10.9.2013	Public consultation on the draft GBER (additional measures)
5.9.2013	Advisory committee on the additional categories in the GBER
18.12.2013- 12.2.2014	Public consultation of the draft GBER
20.12.2013- 17.2.2014	Public consultation on the draft R&D&I Framework
28.1.2014- 28.2.2014	Public consultation on the Communication on aid for IPCEI
21.2.2014	Advisory committee on the GBER
4.3.2014	Multilateral meeting with the Member States on the R&D&I Framework and the Communication on aid for IPCEI

10.2. List of key studies and external expertise

- Monitoring Study regarding the State Aid Framework for Research, Development and Innovation: *R&DI State Aid Study*, 2012, report prepared for DG Research and Innovation by LOGOTECH in cooperation with National and Kapodistrian University of Athens, IDEA Consult NV and Advansis Ltd (not published)
- Report '*National State aid in support of Innovation and SME's: Strengths and weaknesses of the EU State aid control system*', 2013, Draft Report by IDEA Consult, ECORYS NL and the Danish Technological Institute¹⁸³
- Report '*The Impact of R&D State aid and its appraisal on the level of EU research expenditure in the context of the Barcelona European Council objectives*', 2005, Report by Centre for Economic Research and Environmental Strategy (CERES)¹⁸⁴
- Report '*Impact de l'encadrement communautaire des aides d'état à la recherche et développement et innovation sur la compétitivité de l'Union européenne*', 2008, Study carried out by Technopolis on behalf of Direction générale des Entreprises (DGE)¹⁸⁵
- The EU Industrial R&D-investment Scoreboard 2012, European Commission, Joint Research Centre¹⁸⁶
- Report '*Innovation market failures and state aid: developing criteria*', prepared by Oxera for DG for Enterprise and Industry of the European Commission, November 2005¹⁸⁷
- *Study on the international market distortion in the area of KETs: A case analysis*, 13.5.2013, Final Report prepared by the ECSIP Consortium for DG Enterprise and Industry of the European Commission¹⁸⁸
- OECD report '*The OECD Innovation Strategy*', OECD 2010¹⁸⁹
- OECD report '*Government R&D Funding and Company Behaviour*', OECD 2006¹⁹⁰
- OECD, *Measuring Innovation: A New Perspective*, 27.5.2010¹⁹¹
- European Commission, *Innovation Union Competitiveness report 2011*¹⁹²
- *Research Infrastructures and the Europe 2020 Strategy (ESFRI)*¹⁹³
- The European Techno-Economic Policy Support Network (ETEPS) study '*Analysis of the evolution of the costs of research – trends, drivers and impacts*'¹⁹⁴

¹⁸³ http://ec.europa.eu/enterprise/policies/industrial-competitiveness/documents/files/state-aid-in-support-of-innovation_en.pdf.

¹⁸⁴ http://ec.europa.eu/competition/state_aid/studies_reports/2005_study_state_aid_rd_en.pdf.

¹⁸⁵ <http://archives.dgcis.gouv.fr/2012/www.industrie.gouv.fr/innovation/etude-complete-aides-etat.pdf>.

¹⁸⁶ <http://iri.jrc.ec.europa.eu/scoreboard12.html>.

¹⁸⁷ http://www.pedz.uni-mannheim.de/daten/edz-h/gdb/06/innovation_market_failures_and_state_aid.pdf.

¹⁸⁸ http://ec.europa.eu/enterprise/sectors/ict/files/kets/kets_market_distortion_pdf_report_july_2013_en.pdf.

¹⁸⁹ <http://www.oecd.org/sti/inno/theoecdinnovationstrategygettingaheadstartontomorrow.htm>.

¹⁹⁰ http://www.oecd-ilibrary.org/science-and-technology/government-r-d-funding-and-company-behaviour_9789264025851-en.

¹⁹¹ http://www.oecd-ilibrary.org/science-and-technology/measuring-innovation_9789264059474-en.

¹⁹² http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/part_1.pdf#view=fit&pagemode=none.

¹⁹³ http://ec.europa.eu/research/infrastructures/pdf/esfri/publications/esfri_inspiring_excellence.pdf.

¹⁹⁴ <http://eteps.gopa-cartermill.com/wp-content/uploads/COST-Study-Final-Report-Dec-20111.pdf>.

10.3. Experience with the implementation of the R&D&I-Framework

Overview of case practice

NUMBER OF DECISIONS under the R&D&I Framework	
Number of decisions adopted between 1.1.2007 and 31.12.2013	289
Average number of decisions per year	41.3
Decisions on schemes (standard assessment)	226
- R&D aid schemes	138 (61%)
- Innovation aid schemes	24 (11%)
- Mixed aid schemes (both R&D and innovation)	64 (28%)
Decisions on individual aids	63
Decisions with detailed assessment ¹⁹⁵	56
- Industrial research	12 (21%)
- Experimental development	44 (79%)
Openings of the Article 108(2) procedure ¹⁹⁶	6
Negative decisions	0
No aid decisions	15
Withdrawals of notifications ¹⁹⁷	9
Number of monitoring cases	25
Number of analysed R&D sheets (aid > EUR 3 million)	561
DISTRIBUTION OF DECISIONS between Member States	
Decisions with detailed assessment	56
- France	31 (55%)
- Spain	7 (13%)
- Sweden	6 (11%)
- Germany	3 (5%)
- United Kingdom	3 (5%)
- Netherlands	3 (5%)
- Italy	2 (4%)
- Belgium	1 (2%)
NUMBER OF MEASURES implemented under the GBER¹⁹⁸	
Fundamental research	248
Industrial research	575
Experimental development	577
SMEs costs of IPR	201
Young innovative enterprises	100
Innovation advisory and support services	159
Loan of highly qualified personnel	69

¹⁹⁵ One case was withdrawn following the Commission's decision to open the Article 108(2) procedure.

¹⁹⁶ One individual case and one aid scheme were withdrawn following an opening decision.

¹⁹⁷ Of which seven during preliminary examination and two following an opening decision.

¹⁹⁸ Most schemes contain several aid measures.

Examples of cases with detailed assessment (Chapter 7 of the Framework)

In applying the current rules, the questioning of the necessity and proportionality of the aid has in some cases led to the withdrawal of notifications, changes in the aid instrument or reductions of the aid amount, limitation of eligible costs, application of more stringent conditions for reimbursable advances, or introduction of clear commitments on dissemination of knowledge and access to intellectual property. Insofar as the current rules are based on a large number of heterogeneous elements, without any precise indication as to some elements that should facilitate the notification process and the Commission's assessment (e.g. appropriate aid instruments), such results have however only been achieved through an intensive and time-consuming "persuasion exercise".

For illustrative purposes, DG COMP has compiled a non-exhaustive overview of case practice with a view to *i)* provide some examples of the application of key compatibility criteria in the detailed assessment of individual R&D cases, *ii)* give a concise idea of the particularities of R&D projects, and *iii)* highlight certain issues that could have been resolved quicker and easier, if more refined and operational tests had been in place.

Market failures

The precise determination of a market failure has proven of outermost importance, not only because it is the primary justification and necessary condition for aid, but also because the extent to which Member States structure their interventions according to the nature and magnitude of the identified market failure necessarily affects the assessment of the aid. For example, in the case of a coordination failure the aid should be limited to providing the necessary stimulus to collaboration between e.g. a heterogeneous group of companies, thereby leading them to effectively participate in a specific project and share its risks and benefits. However, in such cases the analysis of the incentive effect at the level of the main beneficiary has to take into account this heterogeneity, and a simple consideration of profitability elements may not provide an accurate picture of the positive effects of the aid.

Issues: *i)* assessing the existence and magnitude of market failures; *ii)* distinguishing between failures that could be structurally inherent to a specific industry and those which are at least partially attributable to the specificities of the beneficiary of aid.

- *CARMAT*¹⁹⁹ (artificial heart): the aid helped a SME to overcome the effects of information asymmetry (as demonstrated by negative answers received from venture capitalists that have been approached by the beneficiary) by activating the financing chain and reducing financial exposure. The project should bring about unquantifiable but significant positive externalities in the entire EU, namely in the form of knowledge dissemination and for public health at large.
- *MAXSSIM*²⁰⁰ (new-generation SIM card): the project required the involvement of all actors in the value chain, but its technical and commercial risks would have rendered coordination costs unattractive for the main aid beneficiary. Positive externalities (knowledge dissemination) were confirmed on the basis of disclosure agreements with industry, although companies may in some situations have a strong interest in disseminating knowledge, e.g. in order to guarantee product interoperability.
- *GKN*²⁰¹ (aeronautics): knowledge spill-over to other sectors was confirmed by expert reports, as well as by technology-sharing agreements with suppliers, other industry actors

¹⁹⁹ State aid case N 5/2009 – FR - *Soutien d'OSEO INNOVATION au PISI "CARMAT"*, OJ C 176, 29.7.2009.

²⁰⁰ State aid case N 602/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme MaXSSIMM*, OJ C 177, 12.7.2008.

²⁰¹ State aid case N 357/2009, UK, *Individual R&D aid to GKN ASL*, OJ C 305, 16.12.2009.

and universities, although without any quantification as to e.g. its impact on the profitability of the project. The company's ability to obtain financing on the market was assessed with regard to its specific characteristics as well as the very nature of the project (high up-front investment, technological risks, and long-time path for return on capital).

Incentive effect

The analysis of the incentive effect of large R&D aid mainly relies on the identification of a counterfactual scenario, the evaluation of the profitability of the envisaged project, and the assessment of its risks. Insofar as a credible counterfactual (including its absence) can be identified, the profitability of the project becomes a central question, especially when the identified market failure is asymmetry of information (e.g. non-availability of funding from the market). In practice, the projects' internal rate of return (IRR) and net present value (NPV) have been the indicators most frequently used in assessing profitability, but were regularly complemented by other criteria since profitability indicators are often not used by companies in their evaluation of R&D projects. Technological risks have been taken into account either by incorporating a risk premium into the weighted average cost of capital (WACC) of the beneficiary or using its standard WACC associated with probability scenarios, preferably benchmarked by historical data (high level of occurrences and reasonable assumptions). This notwithstanding, in the absence of any operational test to determine the private value of a project for the beneficiary enterprise, the assessment of the incentive effect is rather contingent on the plausibility of the narrative submitted in the notification.

Issues: *i)* identifying and quantifying the incremental "change of behaviour"; *ii)* applying tests/criteria to the beneficiary's financing capabilities and strategies; *iii)* measuring the importance of a more rapid deployment of the final product.

- *Volvo Aero*²⁰² (aeronautics): The existence of a market failure and incentive effect were questioned in a formal investigation procedure (decision to grant aid was taken when the project was almost complete, even if the aid request had been duly submitted prior to the start of the project). Ultimately, it was accepted that interim project financing from the beneficiary's own resources was exceptional to its financial policy and not sustainable, and that the aid (of which the amount was however reduced) was of critical importance in this regard.
- *VHD*²⁰³ (automotive hybrid-diesel engine): A strong strategic motivation to carry out the project seemed to be present even in the absence of aid, and the putative beneficiary could in principle have brought its suppliers to develop the necessary components just as quickly without the aid. Profitability indicators were not provided. Notification was withdrawn after opening of the formal procedure.
- *EXEPT*²⁰⁴ (semiconductors lithography): The project largely shared technical and economic characteristics with the counterfactual, and mainly consisted in increasing the speed of some, otherwise necessary research activities. The incremental project costs that were attributable to the incentive effect were only a small fraction of total project costs. The aid amount was reduced with a view to enable the use of the GBER, and the notification was withdrawn.

²⁰² State aid case C 33/2008 (ex N 732/2007) – SE – *State aid to Volvo Aero Corporation for R&D*, OJ L 301, 17.11.2009.

²⁰³ State aid case C 51/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme VHD*, OJ C 189, 26.7.2008.

²⁰⁴ State aid case N 29/2010 – NL – *R&D aid to ASML for the EXEPT project (withdrawn)*.

Proportionality and appropriateness

Once the presence of a market failure and the existence of an incentive effect have been established, the analysis of the proportionality and appropriateness of the aid mainly rests on two elements: the eligible costs and the aid instrument (compared to other aid instruments, rather than compared to other e.g. regulatory means). To the extent that the categorisation of eligible costs has been validated by and that, in most cases, industrial research activities are supported through grants, whilst repayable advances are used for experimental development, the scope for assessing whether or not aid is limited to the minimum is to a large extent contingent on the outcome of a profitability analysis.

Issues: *i)* setting the aid amount at the minimum necessary; *ii)* establishing the significance of the aid in view of the identified market failure and incentive effect; *iii)* catering for particularities of prototypes and demonstration projects.

- *Mapper*²⁰⁵ (semiconductors lithography): The aid consisted in both soft loans and direct grants for experimental development undertaken by a SME (start-up company), and was granted in instalments depending on the project advancement. Any prototypes developed were to be sold to enable the company to continue financing the project. Internal documentation showed that aid was limited to the minimum necessary.
- *Genesis*²⁰⁶ (carbon nanotubes): Albeit without any precise quantification, some scenario-based evaluation of commercial and toxicological risks of the project was provided. The role of the aid as a risk-mitigation factor could be derived *inter alia* from the willingness of the beneficiary to bear a relatively high interest rate on repayable advances. The aid amount has been reduced to take account of a possible overlap between eligible costs of the counterfactual and the aided project.
- *ADNA*²⁰⁷ (gene-based therapeutic vaccines and immunotherapy products): Without aid the beneficiaries would carry out the counterfactual scenario, that was less risky, more profitable and with a lower pay-back time. Although technological risks could only be assessed from a qualitative point of view, conditions applying to repayable advances (e.g. interest rate) have been tightened as a result of the assessment.
- *Seabased Industry*²⁰⁸ (wave-energy demonstration plant): Although the beneficiary was a small enterprise that would develop the technology and own all resulting patents, it had to collaborate with a large electricity company who had the necessary concession rights and would own and run the demonstration plant. While the project as such was not profitable, the beneficiary and the energy provider seemed to have an incentive to jointly undertake it due to potential profitability from ensuing projects in the long-term. In view of the difficulties in quantifying any possible strategic advantage, the aid was considered acceptable insofar as it was limited to those costs borne by the SME.

Negative effects

The difficulties of assessing possible market distortions are compounded by the recurrent need to perform an analysis of multiple markets (which are sometimes geographically segmented), especially since R&D projects tend to translate into the development of new technologies and

²⁰⁵ State aid case NN 39/2010 – NL – *Individual R&D aid to 'Mapper'*, OJ C 147, 18.5.2011.

²⁰⁶ State aid case N 603/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme Genesis*, OJ C 35, 12.2.2009.

²⁰⁷ State aid case N 709/2007 – FR – *Soutien de l'Agence de l'innovation industrielle en faveur du programme mobilisateur industriel ADNA*, OJ C 35, 12.2.2009.

²⁰⁸ State aid case SA.32263 (2011/N) – SE – *Aid for the development of a demonstration plant for wave energy*, OJ C 76, 15.3.2012.

thus entirely new market opportunities. In practice, the main reasons for a positive outcome have been a limited market share of the beneficiaries, the existence of countervailing buyer power, the potential for developing competing end-products in a market with significant growth potential, and the presence of high exit barriers that lock in competitors in alternative R&D paths with high up-front investments.

Issues: *i)* assessing the significance of possible distortions of competition, in particular in technology markets; *ii)* limiting the scope for distortions of dynamic incentives and creation of market power.

- *GAYA*²⁰⁹ (biomethane production): The relatively modest level of fixed costs was seen as stimulating the entry of possible competitors in the relevant market. However, in view of the potential dominant position of the aid beneficiary in adjacent markets, some commitments on knowledge dissemination and open access to the technologies developed within the project were deemed necessary.
- *Rekkof*²¹⁰ (aeronautics): The project related to the establishing of a completely new supply network for the development and later production of a regional jet, where necessary future investments are highly uncertain. The decision highlights that a judgement on long-term negative effects in a market that is subject to significant changes are necessarily hypothetical and of limited accuracy.

²⁰⁹ State aid case N 493/2009 – FR – *Soutien de l'ADEME en faveur du programme GAYA*, OJ C 213, 6.8.2010.

²¹⁰ State aid case N 144/2010 – NL – *Rekkof, Individual aid - aeronautics R&D aid*, OJ C 47, 15.2.2011.

10.4. Overview of policy options for the revision of R&D&I State aid rules

Notion of aid in typical R&D situations	Option 1 (Baseline scenario)	Option 2	Option 3
	Guidance on absence/existence of aid in typical R&D situations (distinction between economic and non-economic activities undertaken by research organisations).	<ul style="list-style-type: none"> • Clarifications on conditions under which research organisations and research infrastructures are subject to state aid control with clearer distinction between economic and non-economic activities. 	<ul style="list-style-type: none"> • Clarifications on conditions under which research organisations and research infrastructures are subject to state aid control with clearer distinction between economic and non-economic activities. • Introduction of the concept of ancillary economic activities for research organisations or infrastructures (not subject to state aid rules if limited to a small share of total capacity).
	Guidance on indirect aid to undertakings through public funded research organisations (market price or full cost coverage in the case of contract research and 'due compensation' for IPR in the case of collaboration).	<ul style="list-style-type: none"> • Clarifications on the calculation of market prices and 'due compensation', for both research organisations and research infrastructures, including the possibilities to rely on arm's length negotiations and to charge entry prices in specific cases. 	<ul style="list-style-type: none"> • Clarifications on the calculation of market prices and 'due compensation', for both research organisations and research infrastructures, including the possibilities to rely on arm's length negotiations and to charge entry prices in specific cases.
	No guidance on public procurement.	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • New guidance on absence/existence of aid to undertakings through pre-commercial procurement procedures.

Scope and articulation <i>Framework/GBER</i>	Option 1 (Baseline scenario)	Option 2	Option 3
Scope	<i>GBER</i> : covers most R&D&I measures, except for <i>ad hoc</i> aid, process and organisational innovation and innovation clusters.	<ul style="list-style-type: none"> • Inclusion of all existing R&D&I aid measures and <i>ad hoc</i> aid in <i>GBER</i>. • Inclusion of new R&D&I aid category (aid for research infrastructures). 	<ul style="list-style-type: none"> • Inclusion of all existing R&D&I aid measures and <i>ad hoc</i> aid in <i>GBER</i>. • Inclusion of new R&D&I aid category (aid for research infrastructures).
Structure	<i>Framework</i> : divided between standard assessment based on <i>per se</i> rules (largely taken over in <i>GBER</i>), and detailed assessment for larger amount of aid.	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • Clear distinction between standard compatibility criteria (<i>per se</i> rules) which are laid down in the <i>GBER</i> and criteria for substantive assessment which are only included in the <i>Framework</i>.
	Aid exceeding certain individual thresholds must be notified and assessed under the <i>Framework</i> . Union funding taken into account.	<ul style="list-style-type: none"> • Increased notification thresholds for R&D projects (fundamental research, industrial research and experimental development); further increase in case of EUREKA or Joint Undertakings (Articles 185 and 187 TFEU) projects, and/or use of repayable advances. 	<ul style="list-style-type: none"> • Increased notification thresholds for R&D projects (fundamental research, industrial research and experimental development); further increase in case of EUREKA or Joint Undertakings (Articles 185 and 187 TFEU) projects, and/or use of repayable advances. • Union funding not taken into account.
	Maximum aid intensities apply uniformly under the <i>Framework</i> and <i>GBER</i> . Union funding taken into account.	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • Higher aid intensities for R&D projects and research infrastructures subject to notification and substantive assessment (<i>Framework</i>). • Union funding not taken into account.

Definitions	Option 1 (Baseline scenario)	Option 2	Option 3
Demonstration and pilot projects	Definition included as experimental development in <i>GBER</i> and <i>Framework</i> . However, only covered by the definition if revenues from subsequent commercial use are deducted <i>ex ante</i> from eligible costs.	<ul style="list-style-type: none"> • Pilots at laboratory scale considered part of industrial research, allowing higher aid intensity. • <i>GBER</i>: the period during which revenues from subsequent commercial use have to be taken into account is limited to 5 years (previously unlimited). • <i>Framework</i>: revenues from subsequent commercial use taken into account through net extra costs approach. 	<ul style="list-style-type: none"> • Pilots at laboratory scale considered part of industrial research, allowing higher aid intensity. • <i>GBER</i>: the requirement to deduct revenues from subsequent commercial use of demonstration and pilot projects is abolished. • <i>Framework</i>: revenues from subsequent commercial use taken into account through net extra costs approach.
Research infrastructures	No definition.	<ul style="list-style-type: none"> • Definition of research infrastructures (from Regulation 723/2009 on the EU legal framework for European Research Infrastructure Consortium (ERIC)). 	<ul style="list-style-type: none"> • Definition of research infrastructures (from Regulation 723/2009 on the EU legal framework for European Research Infrastructure Consortium (ERIC)).
Innovation clusters	Definition only included in <i>Framework</i> .	<ul style="list-style-type: none"> • Definition modified to allow for more flexibility and explicitly cover knowledge and dissemination and non-for-profit organisations. 	<ul style="list-style-type: none"> • Definition modified to allow for more flexibility and explicitly cover knowledge and dissemination and non-for-profit organisations. • Requirement of sectoral or regional link of the cluster is abolished, as is the reference to balance of SMEs and large undertaking.

Compatibility criteria	Option 1 (Baseline scenario)	Option 2	Option 3
Research infrastructures	Not covered on a 'stand-alone' basis (only if the aid concerns R&D activity or innovation clusters).	<ul style="list-style-type: none"> • Compatibility rules for aid for the construction and upgrade of research infrastructures (e.g. requirement of open, transparent and non-discriminatory access and use of market price for renting out). 	<ul style="list-style-type: none"> • Compatibility rules for aid for the construction and upgrade of research infrastructures (e.g. requirement of open, transparent and non-discriminatory access and use of market price for renting out). • Introduction of the concept of ancillary economic activities (not subject to state aid rules if limited to a small share of total capacity).
Innovation clusters	<i>Framework</i> : covered.	<ul style="list-style-type: none"> • Modification of eligible costs to align with R&D projects and other infrastructures. • Widened activities so that information sharing can be more widely supported. 	<ul style="list-style-type: none"> • Modification of eligible costs to align with R&D projects and other infrastructures. • Widened activities so that information sharing can be more widely supported. • Abolished requirement of analysis of technological specialisation.
Innovation aid	<p><i>GBER</i>: 4 innovation measures, mostly with the same conditions as under the <i>Framework</i>.</p> <p><i>Framework</i>: definition and compatibility conditions for a set of 6 measures.</p>	<ul style="list-style-type: none"> • Merging of most innovation measures with streamlined compatibility conditions and uniform aid intensities. • Enlargement of scope to non-technological innovation. • Including all 6 innovation measures in the GBER. 	<ul style="list-style-type: none"> • Merging of most innovation measures with streamlined compatibility conditions and uniform aid intensities. • Enlargement of scope to non-technological innovation. • Including all 6 innovation measures in the GBER.

Maximum aid intensities	Option 1 (Baseline scenario)	Option 2	Option 3
Fundamental research	100%	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • No change.
Industrial research	50% for large companies (65% if collaboration or dissemination of results), plus 10% or 20% for SMEs (up to 80%).	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • No change in <i>GBER</i>. • Higher aid intensities (60% to 90%) for notifiable projects (<i>Framework</i>).
Experimental development	25% for large companies (40% if collaboration), plus 10% or 20% for SMEs.	<ul style="list-style-type: none"> • 25% for large companies (40% if collaboration or dissemination of results), plus 10% or 20% for SMEs. 	<ul style="list-style-type: none"> • 25% for large companies (40% if collaboration or dissemination of results), plus 10% or 20% for SMEs. • Higher aid intensities (60% to 90%) for notifiable projects (<i>Framework</i>).
Feasibility studies	40% for large companies (65% if industrial research), plus 10% for SMEs.	<ul style="list-style-type: none"> • 50% 	<ul style="list-style-type: none"> • 50%, plus 10% or 20% for SMEs.
Research infrastructures	No such aid objective.	<ul style="list-style-type: none"> • 50% 	<ul style="list-style-type: none"> • 50% • Higher aid intensities (60%) for notifiable projects (<i>Framework</i>).
Clusters (investment aid)	15% basic, 30% to 50% for Article 107(3)(a) regions (with specific bonuses for outermost regions - which can have further bonuses of 10-20% - and statistical effect regions), plus 10% or 20% for SMEs.	<ul style="list-style-type: none"> • 50% 	<ul style="list-style-type: none"> • 50%
Clusters (operating aid)	50% over 5 years.	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • 50% over a first period of 5 years. • 25% over a second period of 5 years.

Process and organisational innovation	15% for large companies (if collaboration), plus 10% or 20% for SMEs.	<ul style="list-style-type: none"> No change for large companies. 50% for SMEs. 	<ul style="list-style-type: none"> No change for large companies. 50% for SMEs.
Loan of highly qualified personnel	50% over 3 years.	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>). 	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>).
Innovation advisory and support services	75% or 100% (according to nature of service provider). Absolute limitation to 0.2 MEUR over 3 years.	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>). 	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>) or maximum of 0.2 MEUR over 3 years.
IPR costs for SMEs	40% to 65% (according to the type of research that first led to IPR).	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>). 	<ul style="list-style-type: none"> 50% (<i>under "innovation aid for SMEs"</i>).
Young innovative enterprises	Maximum amount of 1 MEUR (1.25 MEUR for Article 107(3)(c) regions and 1.5 MEUR for Article 107(3)(a) regions).	<ul style="list-style-type: none"> From 0.8 to 6 MEUR depending on type of aid instruments and regions (<i>under "aid for start-ups"</i>). 	<ul style="list-style-type: none"> From 0.8 to 6 MEUR depending on type of aid instruments and regions (<i>under "aid for start-ups"</i>).
IPCEI	Option 1 (Baseline scenario)	Option 2	Option 3
	<i>Framework</i> : general eligibility conditions for important projects of common European interest (IPCEI) with implicit application of 'normal' compatibility rules (including in the case of substantive assessment).	<ul style="list-style-type: none"> No or only limited change (of clarifying nature). 	<ul style="list-style-type: none"> Separate IPCEI communication to be developed. Explicit application of 'funding gap approach' without limitation of aid intensities, introduction of notion of 'integrated projects', and coverage of costs related to first industrial deployment.

Substantive assessment	Option 1 (Baseline scenario)	Option 2	Option 3
Contribution to common objectives and need for aid (market failure)	<p>Presumed under both <i>GBER</i> and <i>Framework's</i> standard assessment.</p> <p>For cases falling under detailed assessment, identification of objective of common interest and proof of market failure must be provided by MS.</p>	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: identification of objective of common interest and demonstration of market failure by MS for all notified cases, e.g. through sectoral comparison. • <i>Framework</i>: Presumption of presence of market failure for EU funded projects.
Appropriateness of aid	<p>Presumed under both <i>GBER</i> and <i>Framework's</i> standard assessment.</p> <p>For detailed assessment, verification of appropriateness of aid vs. other policy measures.</p>	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: Guidance to MS on the appropriateness of the use of the main aid instruments (grants, loans, repayable advances) in order to address a specific market failure. 	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: Guidance to MS on the appropriateness of the use of the main aid instruments (grants, loans, repayable advances) in order to address a specific market failure. • <i>Framework</i>: Presumption of appropriateness of aid for EU funded projects.
Incentive effect	<p>Formal requirements under the <i>GBER</i> and <i>Framework's</i> standard assessment, plus reporting for large undertakings.</p> <p>Substantive analysis for cases falling under detailed assessment (counterfactual scenario, evaluation of the profitability of the project, assessment of risks).</p>	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: abolished reporting requirement regarding incentive effect of aid to large undertakings. 	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: abolished reporting requirement regarding incentive effect of aid to large undertakings. • <i>Framework</i>: MS may support the counterfactual analysis of the incentive effect with company-specific but also industry-specific elements.

Proportionality of aid	<p><i>GBER</i> and <i>Framework</i>: maximum aid intensities calculated on full project costs.</p> <p>In detailed assessment, additional substantive analysis mostly based on the beneficiary's business plan.</p>	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: net extra costs approach with maximum aid intensities (as set in <i>GBER</i>) as a cap. 	<ul style="list-style-type: none"> • <i>GBER</i>: maintain full project costs with maximum aid intensity. • <i>Framework</i>: net extra costs approach with maximum aid intensities (as set in <i>GBER</i>) as a cap. • <i>Framework</i>: higher intensities can be allowed after substantive assessment.
Matching clause	<p><i>Framework</i>: aid ceilings may be exceeded if competitors outside the EU receive equivalent aid (never invoked).</p>	<ul style="list-style-type: none"> • No change except for addition of reference to possible use of market information tools. 	<ul style="list-style-type: none"> • Addition of reference to possible use of market information tools. • International dimension taken into account through other provisions²¹¹.
Negative effects of aid	<p>Presumed limited negative effects under both <i>GBER</i> and <i>Framework's</i> standard assessment.</p> <p><i>Framework's</i> detailed assessment: verification of distortion on product market (crowding out, market power and inefficient market structure).</p>	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: same focus as before, with introduction of manifest negative effects, in particular if violation of EU law.
Balancing positive and negative effects	<p>Automatic by complying with <i>per se</i> rules in the <i>GBER</i> and <i>Framework's</i> standard assessment.</p> <p><i>Framework's</i> detailed assessment: explicit balancing.</p>	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • <i>GBER</i>: no change. • <i>Framework</i>: aid is compatible if all conditions under each common assessment principle are met.

²¹¹ E.g. amendment of definition of industrial research so that it includes lab-scale demonstrators and pilots, increase of notification thresholds, non-consideration of Union funding for cumulation purposes, application of higher aid intensities for large projects which are subject to detailed assessment, possibility to consider alternative locations in counterfactual analysis..

Other issues	Option 1 (Baseline scenario)	Option 2	Option 3
Transparency and reporting	Annual reports (including demonstration of incentive effect for large undertakings).	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: abolished requirement of demonstration of incentive effect in the annual reporting. 	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: abolished requirement of demonstration of incentive effect in the annual reporting.
	Publication of the full text of aid schemes.	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: requirement of publication of information on all aids granted above EUR 500,000. 	<ul style="list-style-type: none"> • <i>GBER</i> and <i>Framework</i>: requirement of publication of information on all aids granted above EUR 500,000.
	Information sheets for aid above EUR 3 million.	<ul style="list-style-type: none"> • No change. 	<ul style="list-style-type: none"> • Abolished information requirement.
Large aid schemes and evaluation	No distinction on the basis of size in the treatment of aid schemes.	<ul style="list-style-type: none"> • <i>GBER</i>: Exclusion of "large aid schemes" (annual budget above EUR 150 million), which have to be notified and assessed under the <i>Framework</i>. 	<ul style="list-style-type: none"> • <i>GBER</i>: Exclusion of "large aid schemes" (annual budget above EUR 150 million), which have to be notified and assessed under the <i>Framework</i>.
	No evaluation of the efficiency/effectiveness of aid measures.	<ul style="list-style-type: none"> • <i>Framework</i>: evaluation may be required for aid schemes with large budgets, containing novel characteristics or when significant market, technology or regulatory changes are foreseen. 	<ul style="list-style-type: none"> • <i>Framework</i>: evaluation may be required for aid schemes with large budgets, containing novel characteristics or when significant market, technology or regulatory changes are foreseen.

10.5. Brief survey of economic literature

The effectiveness of R&D&I aid in economic studies

Whether public support to R&D activity shows an *incentive effect* is a crucial question for state aid policy. In the economic literature the *incentive effect* is often referred to as "*additionality*." The question whether state support induces *additional* activity to what the beneficiary would carry out absent the support has been subject to significant research. In general, related studies tend to distinguish between two main types of additional activities that can be expected to arise in the shorter run, namely input additionality (i.e. firms invest more own resources²¹² into R&D&I as a result of public support) and output additionality (i.e. R&D&I output²¹³ increases as a result of public support).

Comparing the results emerging from the literature on the effectiveness of R&D&I support is made difficult by the fact that the studies adopt widely different methodologies and focus on different levels of aggregation, countries, industries, time periods and support measures. The key challenge studies evaluating the impact of R&D&I aid must tackle in order to reliably establish a causal relationship between state aid and economic outcomes is to define a reasonable counterfactual to receiving the aid: what would have happened in the absence of aid and how did the aid change the outcome? Or put in a different way: Are the observed changes in the outcome all attributable to participating in the support programme?

The main difficulty for answering these questions roots in the fact that it is never possible to observe both states (participation and non-participation) for the same enterprise at the same time: one of the states is "counterfactual." This is why finding a well-suited control group is necessary to enable a comparison. This is not a trivial task in most cases, because firms benefitting from a subsidy usually differ in more ways than just participation. A naïve comparison of the average outcomes observed for participants with non-participants will in most cases be of no use, because it will not allow attributing all observed changes in outcomes alone to participating in the measure. Unfortunately, the counterfactual cannot be observed and is a purely hypothetical scenario. However, it can be approximated provided sufficient data about the firms and the process in which the state aid is allocated is at disposal. The major challenge the evaluators face is to ensure that the observed differences between the performances of the firms who benefit from aid and those who do not (or to a lesser extent) can be fully attributed to the receipt of the aid. For the purpose of statistical assessment of the effects of aid, the ideal situation is that whether a firm receives aid is determined purely by *exogenous* factors which neither the potential recipients nor the grantors can influence.²¹⁴ This is rarely the case: firms usually apply for support and granting authorities give support based on information that is unlikely to be directly available to the evaluator. This gives rise to an *endogeneity* problem, due to which one may obtain biased estimates on the effects of the policy. For example, some authors (eg Czarnitzki and Toivanen 2013) argue that in order to stay on the safe side the civil servants involved in an R&D support program may choose to grant aid to projects that are more likely to have high R&D spending anyhow. It is also possible that firms apply with projects

²¹² Inputs are usually measured in capital invested into R&D&I or persons employed in these activities.

²¹³ R&D output is typically measured among other things in terms of patents, innovations, or research jobs created.

²¹⁴ For example, if the grantor for some reason tends to systematically favour firms with higher R&D intensities in its decision on whom to support, than simply comparing the R&D intensities of aid recipients with non-recipients would yield a biased (in this example overly optimistic) estimate for the effect of aid on R&D intensity: this is because subsidised firms have higher R&D intensities by selection and not only due to the aid itself.

that maximize their chances of getting a subsidy. These effects are difficult to take full account of, but if they are left ignored they can show up as an artificial *causal* effect of the subsidy generating additional activity.

A further factor that makes it difficult to compare the results of studies is that "*additionality*" can refer to different concepts and studies differ in how they define it. At least two approaches are worth mentioning, we illustrate these on an example where R&D outcomes are measured in terms of R&D investment by the firm receiving aid. We refer to a scenario whereby the total R&D investment, i.e. the private contribution plus the subsidy, increases due to the aid compared to the investment the firm would carry out absent the aid. We can call this scenario as "*total additionality*" (see for example Cerulli and Poti 2008 for a study that assesses whether aid shows total additionality). For total additionality although the total level of investment increases the private component may actually decrease. This is not the case in the second scenario which we call "*private additionality*." The aid is said to show private additionality if the R&D investment increases by more than the aid amount compared to what the firm would have done absent aid. An example illustrates this issue. Let Y denote the level of R&D investment a firm would carry out absent aid. If this firm receives state aid of amount S , its resulting R&D investment is $Y+\alpha\times S$, where α is related to the effectiveness of aid. In particular, we can have the following scenarios depending on the value α takes²¹⁵:

	Value of α	Investment without aid (Y)	Investment with aid ($Y+\alpha\times S$)	Effect of aid on private investment incentives	Explanation
1	$\alpha=0$	Y	Y	Full crowding out	The private R&D, compared to what the firm would have done absent aid, remains the same with the aid.
2	$0<\alpha<1$	Y	$Y+\alpha\times S$	Partial crowding out	The private R&D investment, compared to what the firm would have done absent the aid, increases by a fraction of the aid amount.
3	$\alpha=1$	Y	$Y+S$	Neutral effect	The private R&D investment compared what the firm would have carried out absent the aid increases only by the aid amount.
4	$\alpha>1$	Y	$Y+\alpha\times S$	Private additionality	The R&D investment increases by more than the aid amount compared to what the firm would have done absent aid.

In case 1 the aid clearly shows no additionality. Regardless of the aid amount received, the R&D outcome is the same with and without aid. This implies a particularly wasteful spending of public funds, where the aid fully replaces the private contribution. Case 2 in contrast shows some additionality, in the sense that total R&D investment increases with

²¹⁵ We ignore cases, where $\alpha<0$. This would correspond to situations where the total R&D investment of the firm with aid would actually be lower than without aid.

aid. However, every Euro of aid granted buys less than one Euro worth of additional R&D investment. For example, this would be the case when without subsidy the firm would invest $Y=1000$ Euro, while after receiving a subsidy of $S=500$ the total investment amounts to 1200 Euro.²¹⁶ The total R&D investment increased only by 200 Euro, which is less than the 500 Euro of subsidy granted. Case 3 corresponds to a situation where the firm maintains the level of private effort and adds the subsidy fully on top of it. Although the private contribution remains the same, there is additionality in total because total investment increases by the amount of subsidy. Finally, in case 4 the subsidy also increases the private contribution of the firm. In summary, we have no additionality in scenario 1, have "*total additionality*" in scenarios 2-4 and have "*private additionality*" in scenario 4 only. In general, total additionality can be seen as the minimum requirement aid should fulfil, while private additionality as the ideal case. In the studies cited in this note we do not discuss in detail which type of additionality the authors of the cited studies focus on.

Studies differ a lot in their approach and format. The following considerations drive our thinking when we assess the weight we attach to certain studies when using them as evidence for policy making. In general, we are sceptical towards studies that do not provide a convincing way to identify a reasonable counterfactual to the aid. Relatedly, we have more confidence in studies adopting careful econometric techniques based on actually observed outcomes than in "industrial survey" techniques where managers at a sample of firms having received aid are asked to give their subjective assessment of what the counterfactual situation would have been had they not received the aid (see for more detail Criscuolo et al 2012, p. 2).

This note provides an overview of studies that assess the effectiveness of public support for R&D&I, summarizes their key results and derive claims that the available evidence appear to support in a robust manner.

Claim 1: A significant share of the R&D&I aid granted has either no significant effect on research outcomes or even crowds out private investment.

Support in the surveyed literature: In the majority of cases R&D&I support appears to successfully induce some additionality. However, there is very clear evidence in the literature that in a significant share of cases aid has no additional effect or may even contribute to reducing R&D outcomes.

Keeping the above caveats in mind, based on the surveyed literature it appears in general fair (and comforting) to say that overall most studies do indeed find some complementarity between public and private R&D&I investments. However, there is also a significant body of evidence where public support simply crowds out private investment incentives. It is important to take this evidence seriously and design policies that allow filtering out instances of poorly spent public resources.

The academic literature on the effect of R&D&I subsidies has been surveyed among others by David, Hall and Toole (2000), Garcia-Quevedo (2004), Cerulli (2010), and Zúñica-Vicente et al. (2012). Hall and van Reenen (2000) and Parsons and Phillips (2007), and Mohnen and Lokshin (2010) provided surveys with respect to R&D tax incentives. Most recently, Zúñica-Vicente et al. (2012) list 118 studies of which 57 have focused on European countries. Manchester Institute (2011) provides an extensive literature survey on the effectiveness of various innovation policy measures, including fiscal incentives and grants.

The table below reproduced from Zúñica-Vicente et al. (2012) is particularly useful for taking stock of the main results of a large body of existing surveys. The survey summarizes the results in 77 studies. The total number of surveyed results is 118, higher than the number

²¹⁶ This corresponds to $\alpha=0.4$.

of studies because some studies have multiple results. Out of these 118 results 57 focus on European subsidies, which are perhaps the most relevant for EU policy making. From these 57, eight find a crowding out effect: in these cases the firms appear likely to have achieved the subsidised outcome even absent support. Ten results related to European subsidies show no significant effect on the outcome, whereas the rest of results on European subsidies point towards additionality. This means that nearly a third (18 out of 57) of the results in the surveyed European R&D&I subsidies show no clear positive effect and some even indicate a negative impact of the support. This confirms earlier results from a similar meta-analysis of related literature by García-Quevedo (2004, p.92), who argues that out of 74 studies overviewed, 38 displayed complementarity where the public funding induced additional private investment, 17 showed substitutability (i.e. public funds replaced private financing) and insignificant results were found in 19 studies. In general, it appears to hold across surveys that in a considerable share of the surveyed cases no clear positive effect of the subsidy could be identified.

Table 2. Summary distribution of econometric studies of the effect of R&D subsidies on private R&D spending according to the aggregation level and data source

Aggregation level	'crowding-in hypothesis'	'crowding-out hypothesis'	Non-significant effects	Total number of studies
<i>Firm or lower^(*)</i>	48 (63.15%)	15 (19.74%)	13 (17.11%)	76 ^(**) (64.41%)
Based only on US data	10	8	4	22
Based only on EU	33	6	7	46
Based on R. of the W. data	5	1	2	8
<i>Industry</i>	10 (50%)	5 (25%)	5 (25%)	20 (16.95%)
Based only on US data	4	3	2	9
Based only on EU data	4	1	1	6
Based on R. of the W. data	2	1	2	5
<i>Country</i>	13 (59.09%)	3 (13.63%)	6 (27.28%)	22 (18.64%)
Based only on US data	6	0	2	8
Based only on EU data	2	1	2	5
Based on R. of the W. data	5	2	2	9
Total number of studies	71 (60.17%)	23 (19.49%)	24 (20.34%)	118 ^(**)

^(*) Lower refers to studies performed at business unit- and plant-level or below.

^(**) The total number of studies finding crowding-in, crowding-out or non-significant effects is 118. This number is greater than the number of reviewed studies (77) because there are several studies that find divergent results depending on the different assumptions and/or methods considered. Moreover, in most studies performed at country-level it is possible to confirm the crowding-in hypothesis in the case of some countries, but also the crowding-out hypothesis in the case of other countries, or even non-significant effects in some countries.

Several studies assess the performance of national R&D support programs. Of papers relying on data on the firm level as opposed to sectoral or country level, Falk (2007) did not find project additionality in around 30% of cases in the Austrian FFF Programme. Other evaluation studies reached a similar result: 42% of projects may have taken place without the Japanese National Research and Development Programme for Medical and Welfare Apparatus (PREST, 2003). The evaluation of the UK SMART scheme to support close-to-market research and development projects by SMEs found that 85% of the supported projects in 2001, 53% in 2003 and 70% in 2009 would have happened anyway. (PACEC, 2001, 2003, 2009) The same was argued for 25% of the projects that participated in the French ANVAR scheme (De Laat et al., 2001) and for 33% for programs of the Austrian Industrial Research Promotion Fund (FFF) (KOF et al., 2004). Gonzalez et al (2005) find in a sample of Spanish manufacturing firms that while R&D subsidies do increase the overall R&D expenditure, most subsidies go to firms that would have performed R&D anyway. Also for Spain, Busom (2000) cannot rule out full crowding-out effects for nearly 30% of subsidised firms: this means that for these firms each euro worth of subsidy received was fully offset by a reduction of private effort.

In summary, while there is clear evidence for additionality induced by public support to R&D&I activity, there are notable exemptions to this. State aid control can ensure that public support is geared towards projects where they give rise to activities that would otherwise not occur.

Claim 2: R&D&I support granted to larger firms are often less effective than those granted to smaller firms.

Support in the surveyed literature: There is a strong body of evidence supporting Claim 2, but counter-examples exist as well.

Several academic studies have found that R&D support is typically more effective for smaller firms than for larger firms, see e.g. González, J. Jamandreu, and C. Pazó (2005 for Spain), Bronzini and Lachini (2010 for Italy), and Gorg and E. Strobl (2007 for Ireland), Lokshin and P. Mohnen, (2011). For example, the latter evaluates the Dutch WBSO tax incentive scheme. While the authors find that overall the program led to some additionality it was only significant for smaller firms, not to larger ones.

Alecke et al. (2011) report that in 2003, East German firms in Thuringia increased their R&D spending with public subsidies whilst micro-firms showed the largest increases. For Israel Lach (2002) reports no significant effect of subsidies overall but shows increased R&D spending for small firms and decreases for large firms. Results in González et al. (2005), Özçelik and Taymaz (2008) and Paunov (2012) are positive overall on subsidies, and the effect is more significant for small firms. Lenihan and Hart (2006) report a higher amount of subsidies that would have been financed by the firm anyway for larger domestic firms.

Klette and Moen (1998) cite the (Norwegian language) report of Hervik and Wago (1997), who find based on interviews conducted with Norwegian manufacturing firms that large firms typically have a portfolio of projects, will seek to obtain public support for those projects they have already decided to undertake. Since small firms are more credit constrained, provided they have a matching project subsidies are more likely to induce the extension of the project and achieve increased R&D spending.

In a study prepared for the European Commission, Czarnitzki and Toivanen (2013) evaluate R&D&I subsidies to firms in the Belgian region of Flanders and in Germany. The authors find no significantly positive effect of the received support on R&D&I spending intensity for large firms compared to a matched control group consisting of otherwise similar firms who have not received public support. In fact, in the German sample firm size has a

significant negative treatment effect: larger firms (with more employees) that received subsidies show lower R&D&I intensities than non-subsidised counterparts. This may be some indication for a potential crowding out effect of public R&D&I support for larger firms.²¹⁷

It is worth noting that the observation of aid to larger firms often generating less additional activity than those offered to smaller firms is not confined to R&D&I aid. Ramboll (2012) finds in an ex-post assessment of 28 regional aid projects by large companies in innovative industries that a considerable share of these projects would have been implemented in disadvantaged regions even without the aid. Similarly, Mouque (2012) concludes in the review of counterfactual analysis for different enterprise support measures that for larger enterprises studies tend to show no positive impacts, and sometimes even point towards a negative effect. A similar result emerges from the study of Criscuolo et al (2012) as well, assessing regional policy measures in the UK.

Some counter-evidence exists as well. Cerulli and Potì (2012) argue for Italian firms that the largest additionality is seen for firms that are larger, more oriented towards patenting and with a lower reduction of fixed capital accumulation. In their results other firms tend to experience a crowding-out of private investment by subsidies. Gorg and Strobl (2007) study R&D subsidies in Ireland and find that for domestic firms, small subsidies lead to additionality while large ones may crowd out private investment. Subsidies to foreign firms cause neither additionality nor crowding out. Lee (2011) looks at the effects of different types of public support on firm R&D intensity in six North American and Asian countries and finds no robust differences in the effectiveness of the measures based on firm size.

Claim 3: R&D&I subsidies to closer-to-market activities are less effective than aid to more fundamental type of research.

Support in the surveyed literature: Claim 3 is firmly supported by empirical studies.

The long-standing argument in economics is that firms are likely to under-invest in research: the benefits appear as positive externality to the society and are inherently difficult to appropriate. The economic case for aid being necessary loses strength the closer we move from fundamental type of research towards activities that are closer to the market. This has several reasons. First, the appropriability problem of the benefits of investing into research seems larger for fundamental research than for more applied research. Second, uncertainty – often mentioned as motivation to call for public support to R&D – is larger for more fundamental research than for closer to market activities. Fundamental research is more often on a theoretical level, with no or few precise plans on how to commercialize results. It also takes more time to turn a fundamental research result into a marketable product than applied research, implying higher costs for the former.

As for empirical evidence on additionality on various levels of the 'innovation ladder,' in his survey-based analysis Rye (2002) found a larger effect for projects further away from the market than for those closer to it in 2624 Norwegian subsidies. The author explains this observation with a higher level of uncertainty for further-to-market activities: "*R&D projects that are further from the market are usually characterized by a higher degree of uncertainty / imperfect information and therefore experience larger difficulties finding external financing than projects closer to the market.*" Overall uncertainty is argued to decline by moving closer to commercialization, which in turn boils down in lower input additionality.

²¹⁷ The authors note that the negative effect of size on R&D&I spending may have to be an artefact of measuring R&D&I input as intensity (i.e. ratio to sales) and not as levels. Unfortunately, the authors do not verify in their data whether this is indeed the case and provide no detailed discussion on the role of size determining the effectiveness of public support.

A study by Khan and Luintel (2011) looking at R&D support in ten OECD countries estimates the impact of spending on basic/applied R&D as well as experimental development on total factor productivity (TFP). The estimated TFP impact of spending an extra dollar on basic/applied R&D is about 2.7 times larger than spending an additional dollar on experimental development.

Czarnitzki and Toivanen (2013) look at data on innovation subsidies and company innovation outcomes in Flanders, Belgium. Supported projects are categorized as basic research projects, mixed projects, and experimental development projects that are closest to the market, with the categories not being mutually exclusive. The authors find no significant differences in the level of additionality the innovation support would induce for the various project types. This result is somewhat in contrast to the results of Czarnitzki et al. (2011), who using mainly the same Flemish data source find that "research" projects (i.e. further from market) are more subject to financial constraints than "development" (closer to market) projects. In other words, everything else equal, firms are more likely to cut investment into "research" than into "development" if they have to allocate internal funds to serve a debt.

Clausen (2009) looks at firm level data from Norway to analyse whether R&D subsidies stimulate or substitute private expenditure on R&D. His data can distinguish between two kinds of projects depending on their phases in the project cycle, namely "far from the market" (i.e. involving research), and "close to the market" (i.e. involving development) activities. The author applies instrumental variable estimation to see how the amount of close- and far-to-market subsidies affected various measures of actual and planned private and external expenditures as well as the quality of research conducted. The latter is measured by the number R&D man labour years performed by PhDs and employees with Master's degrees. The data distinguishes between expenditures on research and expenditures on development/innovation. The results showed that "far from the market" subsidies stimulate mainly private R&D spending on research activities, not spending on development/innovation. This type of subsidy also has a positive impact upon the quality of R&D done at the firm level and upon firms' future commitment to R&D. "Close to the market subsidies" in turn do not show any positive and significant impact upon the same set of performance indicators. Actually, this latter type of subsidy seems to "crowd out" private R&D spending, mainly by reducing the amount spent on development.

Heijs (2003) presents a questionnaire-based study to assess the impact of the Spanish low interest credits for R&D projects of individual firms. The study calls firms "*free riders*" who indicated one of the following: (1) they reduce their own R&D as a result of financial support, (2) it was not difficult to obtain other forms of finance for the research project, or (3) the importance of the quantity of the credit provided by the support scheme was not important. In the language of the study, "free riders" are firms for which the support scheme did not generate any additional effect on their technological development and innovative activities. The survey found that 34% of the firms showed indications for a lack of additionality based on at least one of the three indicators (p.451). In the data financial support comes from two sources: one program focuses on basic (further from market) R&D projects, the other is tailored for "closer to the market" projects. The survey results showed that the former was associated with a lower percentage of free-riding firms and therefore a higher chance of inducing additional activity that would not have occurred absent the support. In contrast, the R&D scheme catering for "closer to the market" projects supported a higher number of "free-riders."

Claim 4: Risk sharing instruments such as loans are more apt than grants if risk is perceived as main barrier to R&D.

Support in the surveyed literature: Very few studies investigate directly this issue. No clear view.

An argument often made to support the idea that it is socially desirable to devote public funds to support firm R&D is the riskiness of these activities: the planning horizon of research projects can be long, with significant uncertainty surrounding whether research will boil down in results that are eventually taken up by the market. It is important to note however, that the presence of risk in itself does not automatically imply that public intervention in a market is necessary. First, risk is a usual part of business, and is inherent to every economic activity. The case for state intervention with the main objective to reduce risk is strongest if there is a market failure in credits. If this is the case, it is reasonable to ask whether aid granted in some form of risk finance may outperform other types of aid. Unfortunately, studies that would compare the performance of risk finance types of support with other forms of aid are in general rare and even more so specifically for the R&D&I domain. A reason for this may be that risk finance schemes are usually not geared towards innovation as such and more often have as goal to enable (smaller) firms getting a credit. Ramlogan and Rigby (2012, Chapter 4.3) provide a very comprehensive overview of the studies that look at some form of the additionality aspect of credit guarantee schemes, including in other terms than inducing R&D.

One of the few studies known to us that looks directly at the effectiveness of credit guarantees on innovation (and other) outcomes is by Oh et al. (2009). The authors evaluate the impact of two Korean schemes on firms that received funding compared to a matched sample of non-funded firms in the period 2000 to 2003. Their results suggest that the credit guarantees had a significant effect on firms' ability to maintain their size, and increase their survival rate, but they did not significantly increase firm R&D and investment. Moreover, due to an adverse selection problem, the guarantees tended to be allocated towards firms with lower productivity.

Ramlogan and Rigby (2012) conclude in their survey of related literature that credit guarantee schemes appear to effectively relax the credit constraints SMEs face, and seem to help these firms grow. The limited available evidence however also indicates that some schemes did not impact firm productivity, R&D or investment intensity.

Claim 5: Tax credits and other tax incentives are more apt to boost R&D&I than direct grants.

Answer based on surveyed literature: Although there is some evidence pointing towards direct grants inducing less additionality than tax credits, other studies cast doubt on whether tax-based incentives really reach a broad range of firms.

Various forms of tax incentives are often used as alternatives (or complements) to direct grants to boost R&D&I incentives. The main distinction between subsidies and tax incentives is that while the former can be tailored to be project-specific, tax incentives apply to a broader range of firms. The latter offer a lesser degree of project-specificity, but its reach may be higher than that of subsidies. The uptake of different forms of R&D&I support is not yet well understood. Czarnitzki and Toivanen (2013) argue that among Spanish SMEs, 43% use subsidies, but only 37% tax incentives. Spanish large firms use tax incentives more often (46% versus 37% using subsidies).

The precise design of the incentive is crucial both for tax schemes as well as for subsidies. Tax incentives are often designed so that firms can deduct their R&D&I expenditure from their corporate tax base. A related concern is that this design may create scope for artificially inflating R&D expenses, in the worst case through simple "relabeling" of costs, i.e., by claiming that some expenses are R&D related when they in reality are not. A recent study of the Norwegian R&D tax credit scheme (Haegeland and Moen 2007) finds some evidence for this: the authors compare figures obtained from the tax scheme to those obtained from the Norwegian R&D survey and find that the R&D expenses are on average 34% higher, and

R&D personnel costs, on which the Norwegian R&D tax credit are based, 74% higher in the figures reported to the tax credit scheme than in the figures reported in the survey.²¹⁸ Cappelen et al (2010) report evidence that especially small firms seem to substantially inflate the R&D expenses they report in relation to the tax credit.

Lee (2011) compares the effect of different types of public R&D support measures on inducing R&D expenditures in a sample of 1500 firms from North America and Asia. The author finds that tax credit has a greater and statistically more significant complementarity effect than R&D grant and loans.

A particular issue related to tax incentives is whether these are best designed as incremental or level-based. Under incremental tax credits, firms are only eligible for tax reduction for the additional R&D effort they make, compared to an earlier period. Level-based R&D tax incentives apply based on the absolute level of research effort. Incremental tax credits are a tool to incentivize a continuous improvement in research effort. In their recent survey of the empirical literature on the effects of R&D tax credits, Mohnen and Lokshin (2010) report that typically there is additionality²¹⁹ for incremental R&D tax credits, and crowding out for level-based R&D tax credits.

The main benefit for tax-incentives compared to subsidies is the easier uptake of the former: tax benefits are almost automatic as long as the firm invests into R&D, while for subsidies the final decision on selecting projects to support is with the granting authority. The related empirical evidence however is somewhat puzzling. In particular, a study by Busom, Corchuelo and Martinez Ros (2011) relies on data from Spain to analyse the determinants of firms using tax credits, subsidies, both of these or neither. The authors report that only 12% of SMEs and 20% of large firms investing R&D use both subsidies and tax credits. The rest of the firms invest in R&D with help of either only subsidies (23% of SMEs and 17% of large firms) or only tax credits (17% and 26%), and 47% and 36% invest without either form of support. In the data used by Takalo, Tanayama and Toivanen (2010) only around 10% of firms apply for a subsidy in a given year. These results point at a relatively low level of uptake for R&D support measures. This insight is particularly surprising especially for tax credits, where benefitting from the scheme is almost exclusively up to the decision of the firm: as long as it invests into R&D, tax credits are usually available.

Conclusions

This note reviews the evidence in the economic literature related to the ability of R&D&I support to induce additional activity that would not take place absent the support measure. The aim is to assess the evidence from existing studies for a series of claims on R&D&I support. The following conclusions emerge:

First, in the majority of cases R&D&I support appears to successfully induce some additionality. However, there is very clear evidence in the literature that in a significant share of cases aid has no additional effect or may even worsen R&D outcomes. Second, a strong body of evidence supports the claim that R&D&I aid granted to larger firms is often less effective than that granted to smaller firms, although counter-examples exist as well. Third, firm empirical support is found for the claim that R&D&I subsidies to closer-to-market activities have the potential to be more distortive than aid to more fundamental type of research. Fourth, mostly due to the lack of studies devoted specifically to the issue, no clear empirical support could be found for the claim that risk finance type of aid was more

²¹⁸ They also provide information that may through some light on the surprising finding that such a small proportion of R&D performing Spanish firms report having used the R&D tax credit. In the Norwegian data, less than half of the firms that received R&D tax credits report in the survey that they have received a tax credit. The reported sums also deviate from the actual sums.

²¹⁹ They call additionality “bang-for-the-buck”, or BFTB.

apt than grants if risk is perceived as main barrier to R&D. Finally, although there is some evidence pointing towards direct grants inducing less additionality than tax credits, other studies cast doubt on whether tax-based incentives really reach a broad range of firms.

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