

Agenda

Advancing economics in business

State aid and innovation: how can EU rules and practice be improved?

A recent Oxera study prepared for the European Commission examines how state aid can be more effectively targeted in the field of innovation. This is in line with the Commission's desire to achieve 'less and better aid'. For the first time, the study presents criteria for assessing a wide range of market failures—crucial to measuring the likely effects of aid. Gaps in the current rules are identified, and suggestions put forward on how existing practice could be improved

Innovation is a key driver of productivity and growth in the EU. While competition plays a major role in spurring innovation, there are circumstances in which the market, left to its own devices, does not deliver the optimal amount of innovation in the economy. Government intervention might then be appropriate to correct these 'market failures'. However, such intervention can also distort competition and fall within the remit of state aid rules. Many forms of aid need to be notified in advance to the European Commission for approval.

The Commission's 2005 state aid action plan put forward wide-ranging proposals for reform of the state aid rules, with the aim of achieving 'less and better aid'.¹ This emphasises the existence of market failures as an important justification for state aid, albeit as a 'second best' to other more general measures.

Towards an economic framework

Alongside these developments, other commentators have called for a more 'effects-based' (rather than form-based) approach to assessing state aid, using criteria to weigh positive effects (solving a market failure) against negative effects (distortions to competition). For example, the UK Office of Fair Trading (OFT) suggests that an initial assessment should be made of whether there is likely to be a distortion to competition, including whether the aid addresses an identified market failure.² If the aid fails this test, another phase would be applied involving detailed examination of the potential distortion. This might enable minor forms of aid to be approved more readily, with a targeted analysis of more problematic measures. Friederiszick, Röller and Verouden (2005), of the European Commission DG

Key messages from the Oxera study

Market failures hindering innovation

- **Systems versus market failures:** it is possible to identify a limited number of market failures (spillovers, appropriability, coordination and network failures, and financial market failures)
- **Conventional wisdom versus evidence:** support for large company R&D, patents, clusters, incubators and financing gaps are all controversial areas
- **Smaller firms are more affected by market failures and have less information than larger firms.** Indicates tougher assessment approach for large firms; lighter touch for small and medium-sized enterprises
- **Detailed analysis required for large-scale investments**

More effectively targeted state aid

- **Article 87(3)(c) can mean balancing distortions to competition against solving market failures**
- **Broad versus specific state aid rules in the innovation field, but the criteria developed in the Oxera study are relevant to all the rules**
- **Risk capital framework best captures the market failure agenda**
- **R&D framework could be less stringent for smaller firms than larger firms**
- **Vacuum on incubators: specific rules needed**
- **Large-scale investments—Article 87(3)(b) qualification could benefit from a robust economic approach**

This article is based on the Oxera report 'Innovation Market Failures and State Aid: Developing Criteria', prepared for DG Enterprise and Industry European Commission', November 2005.
Available at http://europa.eu.int/comm/enterprise/library/lib-competition/doc/innovation_market_failures_and_state_aid.pdf.

COMP Chief Economist Team, have called for an effects-based approach using three steps: does a market failure exist; does the measure solve it; and what are the distortions to competition?³

While these two recent contributions place the issue of market failures at the top of the agenda, they say little about the criteria practitioners might use for clearly identifying when these are likely to occur. Both contributions focus on competition, and the distortion issue, rather than on market failures per se.

A recent independent study by Oxera may help to bridge this gap. The report analyses what is meant by innovation, when market failures might be expected to occur, and, in turn, when state aid might be justified. The findings of the report may be used to complement the process being undertaken by the European Commission, which has been consulting on improving existing state aid rules in the innovation field.⁴

The Oxera study develops an economic framework, identifying relevant and measurable dimensions of innovation market failures, and puts forward practical criteria, indicators and questions to allow the ex ante identification of these. It draws on an extensive review of the theoretical and empirical literature on innovation and innovation market failures. In relation to these concepts, and, crucially, the current state aid rules, Oxera also explored case studies, and held discussions with Commission case handlers, government departments, firms and venture capitalists.

Step one of the analysis considers what is meant by innovation, and what indicators of innovation should be used when appraising state aid proposals. Step two explores in more detail the market failures that might hinder innovation. Step three considers the extent to which current state aid rules and practice capture these concepts, and how the existing approaches might be changed. The following sections discuss these steps in turn.

Innovation means many things

The Community Innovation Survey (CIS)⁵ defines innovation as changes that deliver either new goods or services (ie, product innovation), or the same goods or services but at lower cost (ie, process innovation). While there is merit in adopting a broad definition when considering whether innovation has occurred (ie, the CIS' focus), since many products and processes can be innovative, this does not lend itself to the ex ante measurement of innovation. Furthermore, the definition's broad nature means that it captures aspects of innovation that are unlikely to suffer from market failures. For example, it may encompass a large textile

manufacturer with substantial cash reserves, which modifies its dyeing processes; yet, it may overlook a small company in a high-tech sector undertaking R&D, which has not yet produced any products, and which is experiencing funding difficulties.

It is therefore necessary to explore aspects of innovation that are relevant to the CIS definition, are measurable ex ante, and, crucially, are likely to be directly associated with innovation market failures. A balance needs to be struck. For example, while the empirical literature on whether small or large firms are more innovative is mixed, there is more evidence that smaller firms have a greater likelihood of suffering from innovation market failures than larger firms (see below). Therefore, this step of the analysis needs to look ahead to step two, which considers market failures in more detail.

However, it is of note that there is considerable debate about what causes or hinders innovation. New theories characterise the innovation process as being particularly complex, and there is thus controversy over whether innovation policy and state aid should seek to tackle specific market failures or broader 'system failures'.⁶ Despite the complexities, for state aid purposes, it is possible (and desirable) to identify a limited number of market failures that hinder the process of innovation, such as the following.

- *Spillovers*—the process of undertaking innovation, or the end result, often generates wider benefits (positive externalities). Left to the market, projects that are unprofitable from a private perspective, but which would generate large social benefits, may not be taken forward.
- *Public goods and appropriability*—knowledge and ideas are often non-excludable—ie, it can be difficult to exclude others from using the innovation and to make them pay for the benefit they receive. Again, firms may give up projects as a result.
- *Coordination or network failures*—firms rarely innovate alone; however, problems may exist that have an adverse impact on companies' ability to coordinate or at least interact, and thereby deliver innovation.
- *Imperfect and asymmetric information*—this affects financial markets in particular. Due to information problems, small and medium-sized enterprises (SMEs) engaged in high-tech innovative projects with good prospects may find it difficult to obtain funding.

Returning to the innovation sphere, five relevant descriptors of innovation can be identified, focusing on

the nature of the firm, the activities involved, or the significance of a project (or scheme).

- Small-scale firms may find it more difficult than larger firms to appropriate knowledge created in the innovation process, are more likely to encounter difficulties attracting capital, and are more likely to face coordination problems.
- Seed or start-up firms are more likely to experience problems in gaining access to risk finance.
- Firms in the high-tech sector are more likely to be affected by coordination failures, financial market failures, and difficulties in appropriating the knowledge they generate.
- R&D activities, particularly at an early stage, are more likely to produce spillover effects, be affected by lack of appropriability, and suffer from coordination and financial market failures.
- Radical innovations new to the EU are more likely to generate significant spillovers, face a higher degree of economic and technical uncertainty, and require more complex coordination between companies.

Market failure controversies

To operationalise the framework, in step two of the analysis, it is necessary to consider in more detail the criteria, indicators and questions that allow *ex ante* identification of when an innovative project or scheme is likely to be affected by innovation market failures. The framework can then be used to explore whether specific state aid schemes are justifiable on these grounds.

An important issue is how detailed the information collected should be in practice. Innovation market failures are more likely to affect smaller firms than larger firms. In addition, whereas assistance to smaller firms is more likely to be in the form of schemes covering many qualifying firms (which may not have a track record or the resources to provide detailed information), assistance to larger firms (which have a track record) tends to concern a specific project or investment. Therefore, higher-level metrics may be sufficient for assessing schemes to assist SMEs; for larger firms or investments, a greater number of metrics should be used, criteria at the project level should be applied, and further questions should be asked on a case-by-case basis.

For each of the four types of market failure, there is both a theoretical and an empirical evidence base covering a diverse body of literature—itsself largely distinct from the competition literature. In many instances, the evidence is underdeveloped. There are also a number of

controversies, which are taken into account in the criteria developed in Oxera's study.

- *R&D spillovers*—the empirical evidence suggests that there are high public returns from R&D, particularly due to 'knowledge spillovers', providing an underlying rationale for government support. However, while both large and small firms generate positive spillovers, government support is biased towards larger firms. The evidence suggests that, for small firms, government support for R&D complements that provided by the private sector; whereas, for large firms, it is more likely to crowd out private R&D. Relevant criteria relating to assistance to all firms include firm size, activity and sector, but more project-level information (eg, the likely degree of innovation and project diffusion) should be required in relation to assistance to larger firms.
- *Appropriability*—patents are often seen as providing a trade-off between encouraging innovation (by securing appropriability) and short-run competition. However, recent evidence shows that patents are neither a necessary nor a sufficient condition for innovation. In sectors generating the most knowledge, much is non-codifiable (ie, 'tacit' knowledge, which cannot be readily written down), and firms may in any case value the benefits of networking more than the potential risks. In the biotech and high-tech sectors, patent activity by larger firms can harm rather than assist innovation, although adequate patent protection is important to start-ups in such sectors. These considerations are reflected in the criteria.
- *Coordination and network failures*—all theories of coordination and network failures have at their heart an assumption that some form of collaboration or interaction is optimal. As regards R&D collaboration failures, problems may arise in firms committing to collaboration due to the sensitivity of individual firms' payoff functions to the effort of others. However, the theory and evidence are underdeveloped. Considerations may be the sector, number of firms involved, number of project stages, and whether the firms intend to undertake 'complementary' R&D.

More generally, firms rarely innovate alone. Instead, they interact with the innovation system or network. Separate criteria are developed to assess clusters and incubators, which are specific forms of network. Lack of geographical clustering of firms is not necessarily symptomatic of a market failure, as the evidence shows that clustering is more relevant to high-tech and science-orientated sectors and to start-ups, and the artificial establishment of clusters can fail. The evidence on the impact of incubators—

intermediaries renting out space and providing support services to start-ups—is sparse. While incubators play a key role in assisting SMEs, government support should be carefully targeted, considering entry/exit criteria and the extent of suitable commercial property in the locality.

- *Financial market failures*—there is a fundamental disjoint between the innovation and finance literature, and it is not always clear if the problems that innovative SMEs face are due to market failures or other factors. In a strict sense, a ‘financing gap’ occurs when projects that have merit do not obtain the desired financing due, for example, to uncertainty, information asymmetry, transaction costs and investor risk aversion. However, financing problems may occur due to a shortage of good projects. Investors may also, quite rationally, be reluctant to invest in sectors that have exhibited poor historical returns. Financing problems can also occur due to institutional factors (eg, insufficient exit routes for venture capital), regulations, or a lack of an equity market culture. The criteria seek to distinguish between the various potential causes.

Criteria regarding each of the above are developed in relation to assistance to small and large companies. However, a separate treatment of large-scale investments is required. There is very little literature on market failures in this area. Large-scale investments might give rise to spillovers that transcend boundaries, and to complex coordination issues. Nonetheless, it is not clear if strict financial market failures occur, since there is extensive evidence that large projects systematically underperform against forecasts. Investors may simply take account of this. A detailed analysis would be required in this area.

What does this mean for state aid rules?

The above needs to be considered in the context of current state aid rules. Step three of the analysis therefore explores the implications for current practice under these rules, such that the Commission can ask Member States the right questions, and Member States can develop robust schemes aimed at tackling innovation market failures in the first instance.

It is useful to set out first what the current state aid rules say. Selective assistance to enterprises that has the potential to distort competition and trade is classed as state aid under Article 87(1) of the Treaty. The rules are complex, and there are none that specifically cover innovation. Nevertheless, not all assistance, including that relating to innovation, is classed as state aid. Very general measures, such as government support to

universities, do not constitute state aid. Assistance to very large pan-EU projects, in which there is one monopoly firm (and thus no distortion), might not be classed as state aid. In addition, under the de minimis regulation,⁷ very small amounts of selective assistance do not constitute state aid.

Furthermore, where a measure is classed as state aid in the innovation field, a variety of frameworks implemented by the Commission provide potential means for exempting the aid. These seek to embody the principles of Article 87(3)(c), which require a balance between any distortion to competition and the necessity and proportionality of the measure in achieving a Community objective. One interpretation of this is that potential distortions to competition should be weighed up against the degree to which a measure might address innovation market failures. Crucially, the frameworks vary in terms of the degree to which they seek to address specifically the objective of resolving innovation market failures (eg, risk capital aid,⁸ and R&D aid⁹), rather than achieving much broader objectives (eg, SME aid¹⁰ and regional aid¹¹). Even if aid cannot be exempted under these rules, it might be exempted with direct reference to Article 87(3)(c) itself or, potentially, under Article 87(3)(b).¹²

In light of its analysis and further discussions with interested parties, Oxera has examined how the existing rules might be complemented or improved, to capture the innovation market failure agenda more effectively.

- *Broad versus narrow frameworks*—some of the state aid frameworks are, by design, more focused on innovation market failures than others. However, the criteria, questions and indicators developed by Oxera could be used alongside any of the existing rules to assist decision-making.
- *Risk capital*—of all the state aid rules, the Risk Capital Communication best captures the innovation market failure agenda, employing a checklist approach. Through transparent guidance, it adopts a number of the criteria and questions developed in the study. It does not appear to place an undue information burden on Member States; however, it might do so if, given the aid intensity, an opening procedure were triggered. Where a Member State has provided sufficient evidence upfront, consideration might be given to adopting a more flexible approach.
- *R&D framework and large versus small firms*—the R&D Framework, which is more form-based and adopts upfront criteria, is consistent with several relevant factors developed by Oxera. However, it is not explicit about the types of market failure that arise, and may not require sufficient detailed analysis in the case of support to large firms. There could be more

scope for approving schemes aimed at small firms based on higher-level metrics, given that smaller firms could be expected to suffer from a wider range of market failures than larger firms, without necessarily changing the R&D Framework.

- *Incubators*—no specific framework exists that recognises the important role of incubators as intermediaries that facilitate small, innovative firms, or which provides guidance on assessing incubators. Reliance on the Regional Aid Framework, SME aid and the de minimis provisions is not ideal. The study identifies guidance that could be used to assess and approve incubator schemes, which might be considered in the context of Article 87(3)(c).
- *Large-scale investments*—in appraising very large-scale investments that might qualify for state aid

under an Article 87(3)(b) exemption, a transparent and robust economic framework supporting this decision-making process is probably required. Detailed questions on innovation market failures could be asked, and the criteria developed might be used. Nonetheless, qualification will often essentially involve a political decision.

Finally, Oxera suggested some specific options regarding the assessment of measures to assist incubators, financial intermediaries, innovative SMEs, larger firms and large-scale investments. Whereas some upfront guidance would be useful in relation to the first three, stricter upfront criteria and indicators, a higher burden of proof, and more detailed analysis could be required for larger firms and large-scale investments.

¹ European Commission (2005), 'State Aid Action Plan—Less and Better Targeted State Aid: A Roadmap for State Aid Reform 2005–2009 (Consultation Document)'.

² OFT (2005), 'European State Aid Control', OFT821, November.

³ Friederiszick, H.W., Röller, L.H. and Verouden, V. (2005), 'European State Aid Control: An Economic Framework', November 18th.

⁴ European Commission (2005), 'Consultation Document on State Aid for Innovation', Communication, September.

⁵ European Commission (2005), 'Third Community Innovation Survey (CIS3)', last updated June 1st.

⁶ 'Non-linear' theories place less emphasis on R&D as a driver of innovation, and highlight the idea that feedback loops exist between the various stages of the process. 'Systems' theories emphasise the idea that many interdependent factors in the 'innovation system' or 'network' are required to facilitate innovation, including the components of the system (eg, institutional and regulatory factors) and the links between them. On the one hand, because of the complexities, identifying exactly when market failures occur can be difficult; on the other, adopting a pure systems-based approach may make policy too broad.

⁷ European Commission (2001), 'Commission Regulation (EC) No 69/2001 of 12 January 2001 on the Application of Articles 87 and 88 of the EC Treaty to De Minimis Aid', OJC 13.1.2001.

⁸ See European Commission (2001), 'State Aid and Risk Capital', OJC 21.8.2001.

⁹ See European Commission (1996), 'Community Framework for State Aid for Research and Development', OJC 045 17.02.1996.

¹⁰ European Commission (2001), 'Commission Regulation (EC) No 70/2001 of 12 January 2001 on the Application of Articles 87 and 88 of the EC Treaty to State Aid to Small and Medium-sized Enterprises', OJC 13.1.2001.

¹¹ European Commission (1998), 'Guidelines on National Regional Aid', OJC 10.3.1998.

¹² Article 87(3)(b) enables projects that are sufficiently large to be 'an important project of common European interest' to qualify for an exemption, although few projects have actually been considered under this provision.

If you have any questions regarding the issues raised in this article, please contact the editor, Derek Holt: tel +44 (0) 1865 253 000 or email d_holt@oxera.com

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