



Executive Summary

This report presents findings from a systematic review of evaluations of policies that aim to support innovation through increased research and development (R&D) – leading to development and diffusion of new products and processes.

It has been split into two parts that consider the policy areas for which we found the most impact evaluation evidence: R & D grants, loans, and subsidies; and R & D tax incentives. It is the ninth in a series of reviews produced by the What Works Centre for Local Economic Growth.

The review considered around 1,700 studies from the UK and other OECD countries (covering all aspects of support for innovation). This report summarises the 42 impact evaluations that covered programmes offering R&D grants, loans and subsidies; and the 21 impact evaluations that covered programmes offering R&D tax credits; and that met the Centre's minimum standards.

For R&D grants, loans and subsidies, the 42 evaluations reviewed looked at one or more of three broad outcomes of interest: R&D expenditure, innovation and economic outcomes. For any one of these broad outcomes, around half of the evaluations that looked at that outcome found positive effects. Eight out of 17 find positive effects on economic outcomes (productivity, employment or firm performance – profits, sales or turnover).

For R&D tax credits, the 21 evaluations reviewed looked at one or more of three broad outcomes of interest: R&D expenditure, innovation and economic outcomes. Of these, 10 of 17 found positive programme impacts on R&D expenditure. Only 1 of the 3 studies looking at economic outcomes (productivity, employment or firm performance – profits, sales or turnover) found consistently positive effects.

Approach

The Centre seeks to establish causal impact – an estimate of the difference that can be expected between the outcome for firms in the programme and the average outcome they would have experienced without the programme (see Figure 1). Our methodology for producing our reviews is outlined in Figure 2. We would like to thank Gabriel Ahlfeldt, Oliver Falck and Ralf Martin for their help in completing this review.

Figure 1: Evaluating impact



Findings: grants, loans and subsidies

What the evidence shows

- R&D grants, loans and subsidies can positively impact R&D expenditure, although effects are not always positive.
- R&D grants, loans and subsidies can raise innovative activity in recipients, although again effects are not always positive. The effects differ across types of innovation, and are weaker for patents than for (self-reported) measures of process or product innovation.
- R&D grants, loans and subsidies can positively impact productivity, employment or firm performance (profit, sales or turnover). There is some evidence that support is more likely to increase employment than productivity.
- R&D grants, loans and subsidies are more likely to improve outcomes for small to medium-size companies than for larger ones. In part this may be because for larger firms, public support makes up a relatively small amount of overall R&D spend, so positive effects are harder to detect. Smaller firms may also be more likely to formalise processes in anticipation of, or response to, a grant, so that some innovation-related spend is reclassified as R&D.
- Programmes that emphasise collaboration perform better than those that just support private firms (as well as those where the programme focus is unclear). Encouraging collaboration might have an additional positive effect on the likelihood that an R&D support programme generates positive effects on outcomes of interest.
- Programmes that target particular production sectors appear to do slightly worse in terms of increasing R&D expenditure and innovation, compared to those that are 'sector neutral'.

Where the evidence is inconclusive

- Evidence on the extent to which public support crowds out private investment is mixed.

Where there is a lack of evidence

- There is little impact evaluation evidence on key aspects of programme design, such as eligibility criteria and targeting programmes by firm size.
- Relatively few evaluations consider the timing of effects. In particular, there is a lack of studies considering long-term impacts of interventions (ten years plus). However, the small number of studies that are able to consider the time profile of effects, do not suggest that programme effects get stronger over time.
- Relatively few evaluations consider more than one element of the ‘chain’ from increased R&D spend, through innovation, to improved firm performance. Results from these studies are mixed.
- Programme spend and operational cost data is rarely available to evaluators. This makes it very hard to assess the cost-effectiveness of public R&D grants and subsidy interventions.

Findings: R&D tax credits

What the evidence shows

- R&D tax credits can positively impact R&D expenditure, although effects are not always positive.
- Impacts may depend on firm size, with small firms slightly more likely to experience positive benefits. Smaller firms may face greater financial constraints, making them more responsive to changes in tax credits. However, as with R&D grants, loans and subsidies, smaller firms may also reclassify informal innovation-related spending as ‘formal’ R&D.
- We only have three studies that compare the impact of R&D grants, loans and subsidies with that of tax credits. The limited evidence from these is supportive of featuring both approaches in the policy mix.

Where the evidence is inconclusive

- It is hard to reach any strong conclusions on differences between the different programme types in terms of effectiveness.

Where there is a lack of evidence

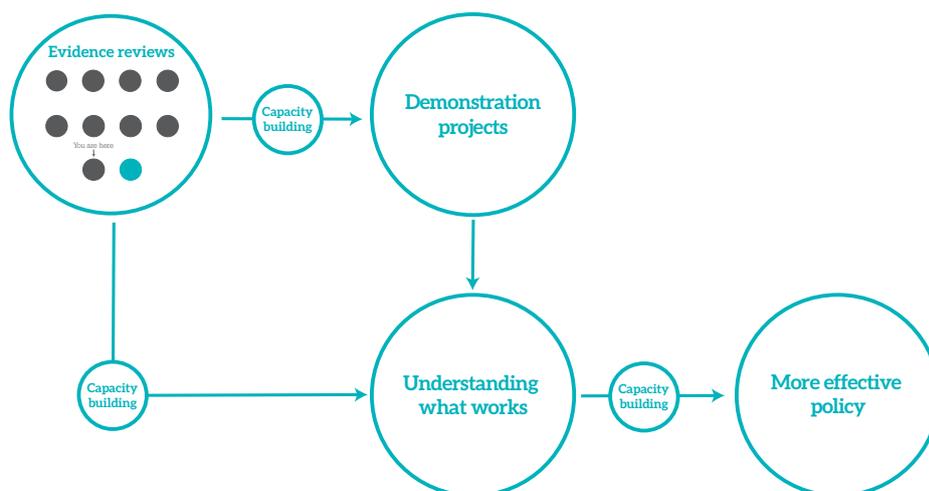
- Most shortlisted studies focus only on R&D effects of tax credits, and there is surprisingly little evidence on the impact of R&D tax credits on innovation (as measured by patents or self-reported innovative activity, for example). The studies we do have, suggest that tax credits can have a positive impact on innovation, both at firm and area level.
- There is surprisingly little evidence on the effect of R&D tax credits on wider economic outcomes (such as firm productivity, employment or profit) and it is hard to draw firm conclusions on impact for these outcomes.
- Relatively few evaluations consider more than one element of the chain from increased R&D spend, through innovation, to improved firm performance. Results from these studies are generally positive.
- None of the shortlisted evaluations consider the timing of effects.

How to use these reviews

To determine policy priorities

The Centre's reviews consider a specific type of evidence – impact evaluation – that seeks to understand the causal effect of policy interventions and to establish their cost-effectiveness. The Centre has now produced a range of evidence reviews that can help local decision makers decide the broad policy areas on which to spend limited resources. Figure 2 illustrates how the reviews relate to the other work streams of the Centre.

Figure 2: What Works Centre work programme



Grants, loans and subsidies v tax credits

The different R&D support tools we discuss here can be run in parallel: grants, loans and subsidies are provided to individual researchers, universities and labs as well as to firms, who are the focus of R&D fiscal incentives such as tax credits. Larger firms may also be more likely to bid for R&D grants than smaller businesses, who may be better targeted by tax credits.

For firms, we only have three studies that compare the impact of R&D grants, loans and subsidies with that of tax credits. The limited evidence from these is supportive of featuring both approaches in the policy mix.

Supporting and complementing local knowledge

This evidence review does not address the specifics of 'what works where' or 'what will work for a particular locality'. An accurate diagnosis of the specific local challenges policy seeks to address needs to be the first step in understanding how the overall evidence applies in any given situation.

However, while detailed local knowledge and context will be important in undertaking that analysis, as in most policy areas we have considered, the evidence presented here doesn't make the case for local over national delivery (or vice-versa).

The evidence does urge caution on the role that more localised innovation policy could play in driving local economic growth. Local decision makers need to think carefully about their desired objectives. For example, our review shows that tax credits have a pretty good success rate in raising R&D spending (particularly for smaller / younger firms). Equally, R&D grants programmes which include a collaboration element seem effective at raising R&D activity. But in both cases we know much less about whether or how this increased R&D activity feeds through to greater innovation, better firm performance or longer

term economic growth, particularly at the local level. These broader outcomes are the things most local economic decision makers ultimately care about.

There are also good reasons to think that many of these broader economic benefits are likely to ‘spill over’ beyond the immediate area in which the policy is implemented. This might still result in a net benefit for the place implementing the policy, but such spillovers reduce the economic benefits to individual areas and strengthen the case for national policy.

Local R&D support programmes could also result in inefficiently high levels of support if footloose firms are able to extract more generous support from competing local areas regardless of any net beneficial impact. Any moves to devolve policy in the UK would need to test for these issues.

Overall, then, it is important to remember that evaluation of the impact of innovation policy is still limited and this review raises as many questions as answers. The limited evidence base, particularly in terms of the impact on local economic outcomes, highlights the need for realism about the capacity and evidence challenges of delivering innovation policy at a more local level.

Helping to fill the evidence gaps

Given the importance of R&D support programmes in the innovation policy mix – and in wider policy agendas such as industrial strategy – it is important to think how we might generate further high quality impact evaluation evidence. Study 1208, which evaluates the UK R&D tax credit, is one example of best practice, which combines detailed administrative data (from HMRC) with scheme performance data, and exploits a change in scheme design to evaluate impact.

Government could help evaluate other policies by releasing similar datasets, including cost data, to researchers. Policymakers should also think about how to implement policies in ways that facilitate evaluation – for example, through competitive application processes, or by staggering programme rollout across locations and/or time.

Very few studies look at economic effects of R&D support beyond immediate impacts on R&D spend, to consider patents or reported innovation, or wider firm or area-level outcomes, such as productivity or concentrations of star scientists. If the ultimate aim of R&D support policies (especially at the local level) is to influence innovation and growth, it is crucial that we evaluate future policies against these wider objectives.

We need a much better sense of how different forms of R&D support perform against each other (grants, loans and subsidies vs tax credits), and against other aspects of innovation policy (such as those covered in NESTA’s Compendium of Evidence on Innovation Policy).

Similarly, we need more evidence on the appropriate policy mix, including whether regional or urban-level policy is appropriate. Innovative activity tends to cluster, and local ‘ecosystems’ often have unique characteristics. This implies that local policy could have a role to play. But as we discussed above, the benefits of innovation is not always spatially bounded, and traditional local cluster programmes have a very poor success rate.

To work with the Centre

The Centre's longer term objectives are to ensure that robust evidence is embedded in the development of policy, that these policies are effectively evaluated and that feedback is used to improve them. To achieve these objectives we want to:

- work with local decision makers to improve evaluation standards so that we can learn more about what policies work, where
- set up a series of 'demonstration projects' to show how effective evaluation can work in practice.

Interested policymakers please get in touch.

This work is published by the What Works Centre for Local Economic Growth, which is funded by a grant from the Economic and Social Research Council, the Department for Business, Innovation and Skills and the Department of Communities and Local Government. The support of the Funders is acknowledged. The views expressed are those of the Centre and do not represent the views of the Funders.

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