The causal effects of R&D grants

Pietro Santoleri, Andrea Mina 19 July 2020

Direct public support for business R&D is common practice in many countries, but evidence on its causal effects has been mixed. This column exploits discontinuity in the assignment mechanism of the first large-scale European R&D grant programme to assess the impact of the policy. The results indicate that direct grants have positive and sizable effects on a wide range of firm-level outcomes suggesting that R&D grants are an effective policy tool.

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The use of government funding to stimulate private research and development (R&D) is a broadly accepted remedy to private underinvestment in R&D due to the presence of market failures (Hall and Lerner 2010) which tend to be particularly severe for young and small innovative firms. Among the most common policy instruments designed to overcome these frictions, R&D grants represent the most direct form of support to private innovation efforts.[1] Compared to other policy measures (e.g. R&D tax credits), R&D grants are in principle better equipped to affect both the rate and the direction of technological change and may be deployed to prioritise areas plagued by heavier market failures or address specific societal challenges (Van Reenen 2020). A recent example is the European Commission awarding €166 million in R&D grants – channelled through the very programme we are going to analyse – to help developing technological solutions against the COVID-19 pandemic. However, despite the widespread use of direct grants, the literature does not provide conclusive results on their effectiveness (Bloom et al. 2019).

Against this backdrop, in a recent paper (Santoleri et al. 2020) we provide the broadest quasi-experimental evidence over sectoral and geographical dimensions on the impact of R&D grants available to date. More specifically, the study evaluates the effects of the first European R&D grant initiative (i.e. the SME Instrument) over several aspects of the innovation-to-market process.

The SME Instrument

Established in 2014 as part of the Horizon2020 program, the SME Instrument (recently renamed EIC Accelerator) is the first European large-scale initiative aimed at financing small and medium enterprises (SMEs) with projects of high innovation potential. This programme represents an important step forward to bridge the gap that separates European young innovative firms from their US counterparts in terms of R&D spending, growth, and access to venture capital.

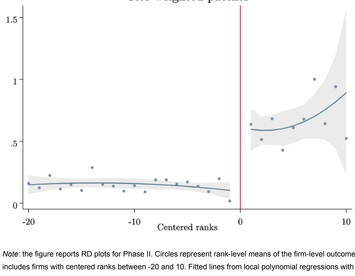
The SME Instrument was designed after the Small Business Innovation Research (SBIR), which over the years has played a significant role in the US innovation system by providing early-stage financing to young firms betting on radical innovations (Mazzucato 2013, Howell 2017).

The SME Instrument is managed by the European Agency for Small and Medium Enterprises (EASME), and for the period 2014-2020 it benefited from a budget of around €3 billion. SMEs can participate in Phase I or Phase II competitions. Phase I winners receive € 50,000 to study the feasibility of an innovative idea, while Phase II winners receive between € 0.5 to 2.5 million to finance R&D.

The effects of R&D grants on firm outcomes

Our empirical study is based on confidential data on all SME Instrument competitions organized by EASME from 2014 to 2017. We link the applicants' data with patent applications, balance-sheets, exit, equity financing information from ORBIS. In order to evaluate the effects of the SME Instrument, we leverage the fact that the projects received by EASME for each competition are ranked by independent experts, and that the winners are exclusively selected based on the budget availability of EASME. We take advantage of this mechanism for assigning grants and adopt a regression discontinuity design (RDD) approach to evaluate the impact of R&D grants on a wide range of firm-level outcomes.

Figure 1 Discontinuity in post-grant outcomes



Note: the figure reports RD plots for Phase II. Circles represent rank-level means of the firm-level outcomes. The sample includes firms with centered ranks between -20 and 10. Fitted lines from local polynomial regressions with a quadratic fit together with 95% confidence intervals.
Source: Santoleri et al. (2020).

In more detail, as Figure 1 shows, R&D grants induce an increase of about 30% on the number of patents filed (weighted for future citations). Sizable positive effects are also observed with regard to investments, notably in intangibles, firm growth in terms of assets, employment and revenues, and the probability of receiving follow-on financing from private investors, while the probability of failure decreases. Overall, these results suggest that direct R&D grants do not trigger 'crowding-out' effects, but rather induce superior performances and lay the foundations for future growth through follow-on private investment.

Who benefits the most from R&D grants?

The unique variety in terms of applicants' characteristics in our data allows us to test for heterogeneous effects over more dimensions (i.e. sectors, countries, and regions) than usually explored in the quasi-experimental literature. In line with the idea that R&D grants ease financial constraints, we find that the effects increase for younger and smaller firms and for those operating in more financially vulnerable sectors. Furthermore, responses are stronger for firms in countries and regions with low economic and financial development. Taken together, these results suggest that direct R&D grants are a useful tool to reduce market frictions and promote innovative capacities in disadvantaged regions, which is important considering the goals of the EU's Cohesion and Smart Specialization policies.

How do the effects materialise?

Given the highly selective nature of the program (only ~5% of competing firms win a Phase II grant on average), the effects could be materialising through certification. That is, the sole receipt of the grant could in itself signal to external private investors the high-quality of the firm, thus decreasing information asymmetries and acting as a catalyst for follow-on equity investments. We provide extensive evidence that pure certification effects not attached to funding play a negligible role in explaining the positive results. This indicates the importance of financing, rather than signaling, in developing technology, preparing it for market launch, and de-risking it for future investments.

Conclusions and policy implications

Overall, the results reported in the study indicate that R&D grants have positive and sizable effects on firm-level outcomes. They tend to alleviate financial frictions and are particularly beneficial for firms in less advanced countries and regions. These findings contribute to a recent stream of literature applying clearer causal identification strategies on the effects of R&D grants (Howell 2017), R&D procurement (Moretti et al. 2019), and R&D tax credits (Dechezlepretre et al. 2016) which together constitute a robust empirical base in favor of government intervention in innovation.

It is important to underline how the positive results of the SME Instrument were obtained despite a substantially lower budget than the American SBIR (roughly 1/5). Closing this gap would also be an important target in view of the recent COVID-19 crisis. In times where bank and equity finance might be difficult to secure for innovative firms (Howell et al. 2020), R&D grants can represent a useful policy tool to sustain long-term growth opportunities.

As already mentioned, the SME Instrument is also interesting as a policy-transfer case since it was modelled after the US SBIR. The outcomes of policy transfers can be highly sensitive to different contexts of application, but this is not the case here. Our study provides the first quasi-experimental evidence that SBIR-type policies are effective in institutional contexts other than the US. Hence, this analysis is timely and relevant for practitioners and policymakers managing or considering this kind of scheme in other countries.

Author's note: This column includes analysis based on data from the Executive Agency for SMEs of the European Commission (EASME), to which we are most grateful. The use of the data does not imply the endorsement of EASME in relation to the interpretation or analysis of the data, and possible errors and omissions are our own. Andrea Mina and Pietro Santoleri gratefully acknowledge funding support from the EU Horizon 2020 research and innovation program under grant agreement No. 822781 - GROWINPRO.

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Endnotes

1 Direct support for private R&D amounts to roughly $50 billion across OECD economies according to the latest available estimates (OECD, 2017). EU-28 economies account for around 1/5 of this figure. For a recent review of policy measures to support innovation, see Bloom et al (2019).

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