

The effect of public funding on Swedish innovation, 1970-2001

Johanna Fink* and Sara Torregrosa-Hetland[†]

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Abstract

Governments in most Western countries spend significant amounts on innovation policy, including public support of private innovation activities conducted by firms. To evaluate these policies, the concept of additionality is crucial: good public policy should entail a positive change in some outcome that we are interested in. If this change is not found (i.e., if there is no additionality), we may conclude that the policy was not effective and that public resources might have been put to better use elsewhere.

Additionality has been approached in different ways, by looking at inputs, outputs, or behaviors in the innovation process. For inputs, the usual question has been whether public funds crowd out or complement private R&D spending. Behavioral additionality has dealt with how firms innovate. Our paper is located in the second stream of this literature, which analyzes outputs – the result of the innovation process. We ask whether we can detect additionality in the public funding of Swedish innovation projects between 1970 and 2001.

*Corresponding author. Department of Economic History, Lund University. johanna.fink@ekh.lu.se

[†]Department of Economics, Public University of Navarre, and Department of Economic History, Lund University. sara.torregrosa@unavarra.es

Previous related studies have looked at the effects of public funding on firm outcomes, like sales, profitability, or employment levels. Other have considered whether firms with access to public funding support are more likely to patent their products. In this paper, we look at actual innovations, i.e. new products developed and introduced in the market by the considered firms.

The main contribution of the paper is the combination of a robust control group with the use of innovations themselves as an output indicator. We follow recent work in constructing our control group from a pool of rejected public funds applicants, thus, tackling important selection effects in applying for funding. We link the project applications with a database of Swedish innovations that gathers the most significant new products introduced in the Swedish economy in 1970-2021 (SWINNO).

SWINNO was constructed using the Literature Based Innovation Output (LBIO) method. This method collects information on innovations from a sample of trade journals. For the innovations in SWINNO, we have detailed descriptions, data on the commercialization year, the company introducing the product, the existence of any collaborators, product codes, etc. Nonetheless, it does not contain much information about the application for, or receipt, of public funding.

Therefore, we combine SWINNO with a newly assembled public funding database, which includes applications for public support, both approved and non-approved. The data come from three different Swedish public funding agencies, and amounts to a total of 73,064 applications filed between 1968 and 2001. Similar data for later years cannot be accessed due to data protection regulation. The public funding database includes descriptions of the projects as well as approval status, the amount that was applied for, and the amount that was granted.

Three questions are addressed in the paper: (1) Which SWINNO firms apply for public funding? (2) Are approved public funding projects more likely to translate into significant innovations? (3) How is getting (more) funding translated into innovation quality?

To address the first question, a logistic regression model is applied that analyzes the self-selection of firms included in SWINNO into applying for public support. The results reveal that firms that develop significant, energy, and collaborative innovations are 61%, 60% and 31% more likely to apply for public innovation funding, respectively.

Top innovators are even 12 times as likely to pursue obtaining public financial support.

For the second question, we compare the innovation outputs of firms who obtained public funding to those of firms who applied for such funding but were rejected. Since both groups significantly differ in a whole set of characteristics (for example, the amount that they applied for and the share of firms that had access to public funding in the past), we use propensity score matching to identify suitable matches and generate a control group. We then estimate the average treatment effect on the treated, in terms of the probability of the project being linked to SWINNO and thus being considered a significant innovation output. The results reveal that approved funding projects are 1.2 percentage points more likely to generate significant innovation outputs compared to denied public funding projects. This corresponds to an increase by a factor of 2.

Finally, we address the question whether being granted public funding increases the quality of innovation outputs. For this, the quality of innovations is measured through an indicator based on the perceived novelty and relevance of the innovation, which takes values 1 to 3. An ordered logistic regression model is applied. To account for self-selection into applying for public funding projects, only innovations from firms that applied for public funding prior to commercialization are considered for this estimation. Based on our regression results neither approval of public funding projects nor the ratio between received and applied funding have significant effects on the quality of innovation outputs within SWINNO.