# The Long and Winding Road: The Impact of Funding Proposals' Acceptance or Rejection on the Rate and Direction of Scientific Progress

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The scientific enterprise is a costly endeavour. Academics need funding to run labs, recruit graduate students and postdocs, collect data, buy equipment and materials, etc. As government budgets for science are shrinking around the globe, while costs of research are rising, scientists in universities need to find alternative funding sources. While scholars have extensively analysed the outcome of industry funding of academic research, we still lack a better understanding of the importance of philanthropic funding. This gap needs to be addressed because funding from foundations has been growing, while the contributions of both industry and government funding have generally declined (Feldman & Graddy-Read, 2014). Furthermore, we lack evidence on the possible effects of cuts in government funding to academic research. Economists have examined the effects of large increases in government funding, such as the doubling of NIH or the increase in ARRA funding (Lerchenmueller 2018), yet decreases in government funding tend to be smaller in magnitude and cumulative rather than large and discontinuous, providing a less clean identification of their likely effects; public funding decreases have hence been less explored empirically.

Private charitable foundations play a significant role in Denmark in supporting public research on a competitive grant basis. The main philanthropic foundations accounted for over 1,400 million USD of grants to public research in 2012-14, compared to 600 million USD from the main public funder of "bottom-up" research, the Danish Council for Independent Research (DFF). Our collaborator on this proposal, the Novo Nordisk Foundation (NNF),[1] is the largest private foundation. It granted about 366 million USD for public research during the 2012-14 period.

Recent trends in public and private competitive grants have differed markedly in Denmark. Grants from the philanthropic foundations have increased; the NNF, for example, has increased its grants five-fold from 2014 to 2017. Public research funding, on the contrary, has decreased successively with grants from the DFF being reduced by about 30 per cent over the period.

In this project, we want to examine the dynamics of public and private competitive grants and their possible substitutability or complementarity, e.g. whether public competitive grants work as a type of certification mechanism for private charitable foundation grants. We also want to understand which research is actually conducted after a grant from a certain funder is awarded, and what research instead follows rejected grant proposals. By considering the potentially inter-related nature of different sources of funding, this study will provide useful evidence for an accurate measure of the real impact of different research funding policies, and on the role of funding in determining the rate and direction of scientific advancement.

In order to achieve this objective, we need to put in place three main elements. First, we need data on proposals, both granted and rejected, from the main public funder, DFF, and (at least) the major private foundations operating in the country. These data should contain the name of the Principal Investigator, additional collaborators (if named), title and abstract of the proposed research. Second, we need data on all scientific publications of academics affiliated

[1] http://novonordiskfonden.dk/en

to Danish institutions, having potentially received a grant from a Denmark-based sponsor. Third, we need to develop an algorithm that can match grant proposals to different funders with each other (to understand if applicants submit related applications to multiple funders, and in which order), and with subsequent publications. This algorithm will involve computing indexes of similarities between abstracts, and matching names of PIs and collaborators to those of authors in the publications databases (Lane et al. 2018).

Given the ambitious nature of the project, this application covers the costs of piloting a smaller-scale version of the data collection and involving private foundations in order to pave the way for a subsequent larger-scale project. We already possess basic data (names of PIs, date of application, and title) on all grant proposals submitted to the DFF from 1995 to 2013. Our collaborator, the NNF, has agreed to provide us the information on the proposals they received within the same timeframe. We also own all publication data from authors who had a Danish affiliation from 1970 onwards (data purchased from Elsevier SCOPUS). Denmark allows information on individuals to be linked for research purposes, and to be also linked to administrative registers, e.g. on employment and taxation.

The pilot will involve two phases:

(1) Through the freedom of information act, we will request the abstracts of all proposals submitted to the DFF;
(2) We will run a first attempt at matching proposals from the DFF and the NNF, and to obtain a match with the publications in the SCOPUS database.

Given the high sensitivity of the information, we plan to involve the foundations gradually, by building a stronger relationship and by showing the results we will obtain from the pilot.

We are applying for funds to cover 1) the costs of conducting interviews (1,500 USD) with the major Danish private foundations sponsoring research (around 12 foundations), 2) a workshop to be held at Copenhagen Business School in the second half of 2019 (3,000 USD), and 3) travel and accommodation for academics invited for the workshop from abroad (5,500 USD). The workshop will showcase to the foundations the results from the pilot exercise and our ongoing work in the area. Our plan is to involve in the workshop also some foundations based in the UK and the US.

Our hope is that this funding coming from NBER and the Sloan Foundation will provide legitimacy to our effort and create some "critical mass" for sharing data with us on both grants and rejections within the Danish community of private funders of academic research.

*References:*

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*Lane J., Mairesse J., Pezzoni M. and Stephan P. (2018). "Examining the Returns to Investment in Science," mimeo.*

**Links to CV of applicants:**

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**Valentina Tartari**

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**From:** Thomas Alslev Christensen <TALC@novo.dk>
**Sent:** 28. september 2018 15:58
**To:** H.C. Kongsted
**Subject:** Endorsement of the proposal "The long and winding road: the impact of funding proposals' acceptance or rejection on the rate and direction of scientific progress".

**Endorsement of the proposal "The long and winding road: the impact of funding proposals' acceptance or rejection on the rate and direction of scientific progress"**

As the largest contributor of private support to public research in Denmark, and with our vision to contribute significantly to research and development that improves the lives of people and the sustainability of society, the Novo Nordisk Foundation is indeed very keen to gain new insights into the interactions between public and private sources of funding for research.

We find the proposal entitled "The long and winding road: the impact of funding proposals' acceptance or rejection on the rate and direction of scientific progress" by Valentina Tartari and Hans Christian Kongsted to be both timely and relevant. We support the objective in this proposal of establishing a comprehensive dataset that can firmly support new scientific investigation into the economics of research funding and we offer our collaboration in this endeavor.

Hence, the Novo Nordisk Foundation strongly supports this proposal.

Best regards,
Thomas Alslev Christensen

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