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Rich-Get-Richer: Competitive Funding and Academic-Industry Collaboration

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RICH-GET-RICHER: COMPETITIVE FUNDING AND ACADEMIC-INDUSTRY

TREO Paper

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Abstract

This study embarks on an in-depth analysis of cross-country policy dynamics over the past three decades, with a specific emphasis on the support for academic-industry collaboration versus sole academic or industry funding. Drawing insights from comprehensive datasets and policy trends, our research illuminates the evolving landscape of research funding and collaboration policies. We examine funding by Innosuisse (Swiss Innovation Project Funding) and SBIR (US Small Business Innovation Research), exploring the rates of future grant success for both academic and industry partners. We find strong evidence of rich-get-richer phenomenon in the Innosuisse program for both academic and industry partners. For SBIR we find weaker levels of continued funding to the same partners with most attaining at most a few grants. It is worth considering additional efforts to ensure that novel ideas are supported and that the same partners are not receiving funding time and again to the exclusion of others.

Keywords: Competitive funding, Innovation project, academic-industry collaboration, Rich-get-richer

1 Introduction

In an era of globalized research endeavors, the interplay between government policies, research funding schemas, and their influence on successful research collaborations and grant application success rates has emerged as a critical focus of inquiry. Competitive funding refers to financial support provided to organizations through a process of open calls for proposals. Within science, this type of funding has become standard and is used to support research on or implementation of new technologies or processes. Previous work, such as Fleming et al. (2019) has shown that research which generates knowledge used in patents has historically come from both industry and government, with a recently increasing trend towards industry. Despite this increase in industry spending on research, modern firms appear to be pursuing less basic science (Arora, 2017). While several studies have examined collaborations in published research, less focus has been placed on collaborations in research funding. Among the few works focusing on funding collaborations is Cummings and Kiesler (2005) who demonstrated that funding involving multidisciplinary teams had similar levels of success to single discipline teams. Another work by Ma et al. (2015) studied funded projects in England, showing that a rich-club of elite institutions attains a crucial position within the funding network. Research on funding collaborations between industry and academia have also drawn some attention, such as from Chai and Shih (2016) who studied Danish funding for academic-industry partnerships finding an increase in publications and patents for small businesses. Likewise, Abbas et al. (2019) carried out a study in China showing that government funding and collaboration with research institutes improves innovation for businesses, but university collaboration does not. O'Dwyer et al. (2023) discussed university-industry collaborations

through a conceptual framework and emphasized the importance of government funding for joint academic-industry projects. Here, we build upon these prior works using a unique dataset from the Swiss funder Innosuisse, which funds joint academic industry projects between a research partner (academic) and an implementation partner (industry). We further compare this type of funding in Switzerland, with funding by the US Small Business Innovation Research (SBIR) program, allowing us to compare *support for academic-industry collaboration across different countries.* Our research seeks to address critical questions by examining cross-country differences in research funding success rates, grant amounts, and scientific outcomes.

Research Question 1: *What cross-country differences exist in the success rates of future research funding applications, and how do these differences relate support for research and collaboration?*

Research Question 2: *How has academic-industry collaboration, and government support for such collaborations, changed over time in comparison to sole company funding? How can these collaborations be better supported across country settings?*

2 Discussion and Results

2.1 Probability of next grant-winning success

As stated in the research questions, not only do we seek to determine the success rate of the different partner's success in obtaining new project funding, but also describe the variation of those results in both the Innosuisse and SBIR datasets. As shown in Figure 1 (a), we find that research (academic) partners who achieve an initial grant, often struggle to achieve their second grant (the first data point is under 10%). In contrast, those who have achieved 2 grants have a 72% chance of getting a 3rd grant, and so on. In the case of SBIR data, Figure 1 (b), we find that the research partners struggle to obtain a 2nd grant, but even SBIR applicants who achieve a second grant have only an 11% to obtain a 3rd grant. This rich-get-richer pattern in the case of Innosuisse, leads to a much broader distribution seen in Figure 1 (c), with many partners receiving >50 grants, whereas for SBIR, Figure 1(d), only 2 have over 50 grants.

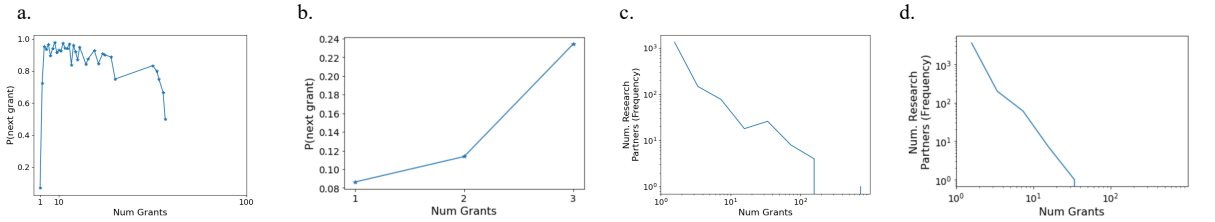

Figure 1. Probability of obtaining a 2nd, and more grants in the case of (a) Innosuisse and (b) SBIR. Distribution of number of grants per partner in the case of (c) Innosuisse, and (d) SBIR.

2.1.1 Impact of network properties on winning grants

To further understand grant success, we analyze several network properties of the collaboration network. We construct a bipartite collaboration network of research and implementation partner institutions. We find that the network contains additional information beyond the number of grants (degree). A partial correlation for the number of grants versus betweenness, controlling for degree, shows that betweenness is more predictive of success.

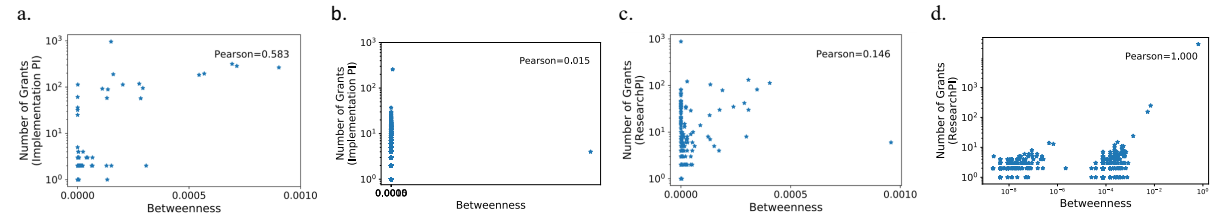

Figure 2. The betweenness centrality of the Implementation PI vs. number of grants for (a) Innosuisse and (b) SBIR. The betweenness centrality of the Research PI vs. number of grants for (c) Innosuisse and (d) SBIR.

We find that for Innosuisse, the betweenness of the implementation partner has a greater impact on grant success versus the research partner (Figure 2). In contrast, in the SBIR dataset, the betweenness of the research partner has a higher impact on grant success than the implementation partner betweenness. In both cases, the role of network position, in addition to degree, highlights that those in key positions, as well as those with many prior grants, are most able to obtain future funding.

2.1.2 Cross-country policies related to academic-industry funding collaborations

As we unravel the intricate interplay between funding schemas and decisions, we aspire to unearth best practices and strategies conducive to enhancing research outcomes and optimizing resource allocation on a global canvas. Below, we present two pertinent points:

1. As observed in Figure 3 (a) and (c), the number and amount of grants awarded by Innosuisse for research or implementation partners alone has decreased significantly prior to 2020, but collaborative project funding (both) has steadily increased (until 2023 when we last obtained data). This is not the case for SBIR, as Figure 3 (b) and (d) shows that funding of collaborative projects and sole company funding have both increased, but more recently plateaued.
2. Given these increases in funding levels, it is worth highlighting that while SBIR funding tends to less often go to repeat recipients, Innosuisse funding continuously goes to the same recipients and partners, raising the important question of if diverse and novel ideas and individuals are being supported. Similar to the prior work of Ma et al. in the UK, who found that elite institutions most benefitted from funding, here for Innosuisse we find that specific PIs most benefit and have become particularly adept at obtaining joint academic-industry funding, possibly to the exclusion of others.

With the increasing prevalence of academic-industry collaborations among both funders, it is worth considering efforts to ensure that the same partners are not receiving funding to the exclusion of others.

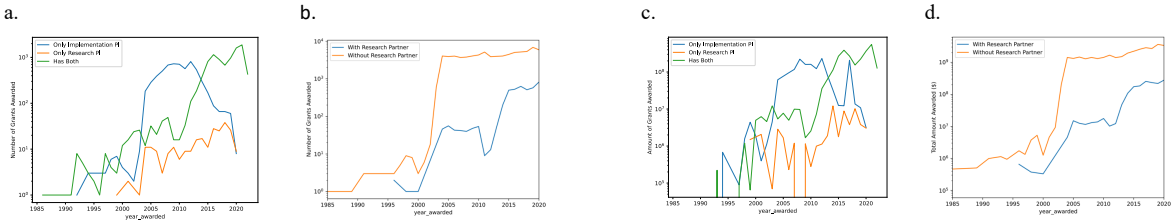

Figure 3. (a) Trend of Innosuisse grants awarded to academic-industry collaborations versus sole funding, (b)Trend of SBIR grant awards, (c) Total Innosuisse amount awarded academic-industry collaborations versus sole funding, (d) Total SBIR amount awarded.

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