The impact of funding on research collaboration: the case of Quebec researchers

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Introduction

Researchers typically spend a lot of their time writing grant proposals. Surveying 113 astronomers and 82 psychologists in the United States, von Hippel and von Hippel (2015) found that the average time spent on a single grant application is about three weeks for principal investigators and a week and a half for co-investigators.This large amount of time spent applying for grants has many explanations, but perhaps the most common is that research increasingly needs external funding and that the competition for such funding has increased over the recent years (Canadian Association of University Teachers, 2013). Obtaining research funding thus allows scientists not only to produce more research but also to improve the scientific impact of their output (e.g., Campbell & Picard-Aitken, 2010; Gulbrandsen & Smeby, 2005; Leeuwen & Moed, 2012). Also, teamwork has become the norm in contemporary science, and collaboration can also require resources (e.g. salaries, travel expenses, etc.). In this context, we could expect that funding could also increase researchers' collaborative activities. Previous studies found a positive correlation between funding and collaboration intensity and diversity (Bozeman & Corley, 2004; Lee & Bozeman, 2005; Smith & Katz, 2000). Some of the proposed explanations suggest that funding policies often encourage collaboration (Adams, Black, Clemmons, & Stephan, 2005; Defazio, Lockett, & Wright, 2009; Katz & Martin, 1997; Lee & Bozeman, 2005), that researchers seek to collaborate with funded colleagues in order to access resources (Melin, 2000), or that funding can be used to hire more staff (e.g., research assistants, post-docs) or invite visiting researchers. It also allows scholars to attend conferences, where they can meet with potential or actual collaborators (Melin, 2000). This paper aims to provide a better understanding of the relation between collaborative practices and funding, using Quebec university professors as a case study. It investigates the relation between researchers' funding and the size of their network (number of distinct collaborators) and their team size (number of co-authors per paper).

Methods

We retrieved from the Web of Science all publications to which Quebec university professors contributed between 2000 and 2013[1]. We grouped researchers in four disciplines based on the discipline of the journals in which they published most of their papers: social sciences (SS), arts and humanities (AH), natural sciences and engineering (NSE) and biomedical research (BM). Researchers for which no publications were found as well as those with the same number of publications in two or more disciplines were categorized according to their department. Because of the lower coverage of Arts and Humanities in the Web of Science, we decided not to include AH researchers in this analysis. We obtained data on the funding received by researchers between 1998 and 2012 from the Information System on University Research (SIRU). We then calculated the total amount of funding received by each researcher, dividing the total funds attributed for a grant between the applicants. To control for academic age, to eliminate the potential effect of funding received before 1998 and to include all of the researchers' publications we used the subset of researchers who obtained their doctoral degree between 2000 and 2005. This subsample contains

[1] The list of faculty members was provided by the Observatoire des Sciences et des Technologies (UQAM).

81 researchers in Health, 264 in social sciences and 166 in natural sciences and engineering. For each discipline, we ordered researchers from the least funded to the most funded and grouped them in bins of 10[2]. Then we calculated the average funding received, the average number of co-authors per paper (team size), the average number of distinct co-authors in the network (network size) for each researcher and each bin.

Results

Figure 1 shows that the amount of funding received by researchers is positively correlated with their average number of co-authors, suggesting that research funding might indeed allow researchers to hire, invite or attract more collaborators.

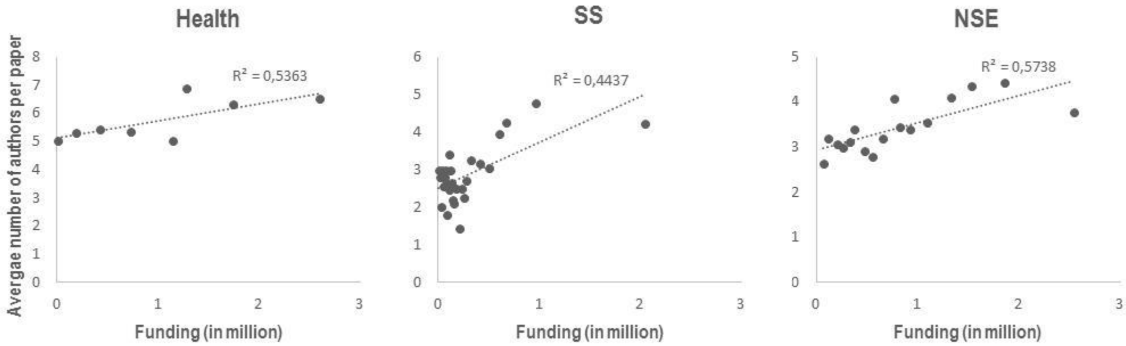

Figure 1. Median team size as a function of the median amount of funding received.

As Figure 2 shows that there is a strong correlation between the amount of funding and the number of distinct collaborators of researchers' network. Thus, it would seem that research funding not only allow researchers to work in bigger teams, but also to work with a higher number of distinct collaborators.

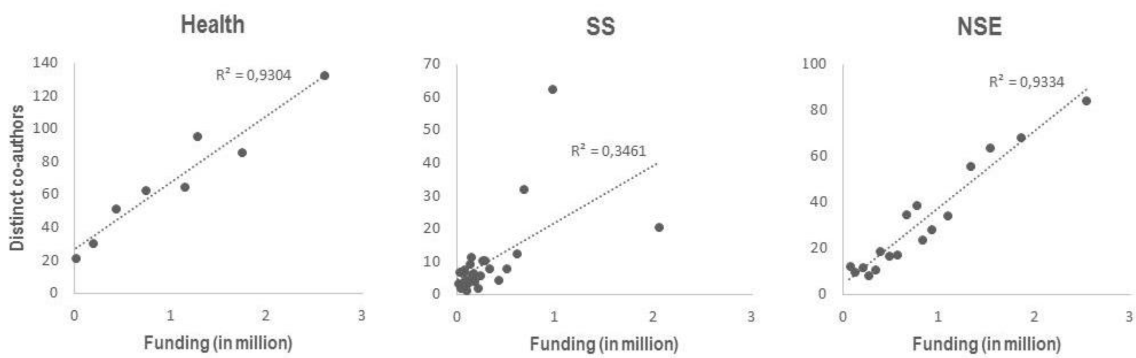

Figure 2. Median network size as a function of the median amount of funding received.

Conclusion

These preliminary results confirm that, for Quebec University researchers, funding is positively correlated with team and network size. Further stages of this research will look at the relation between funding and inter-institutional, international and interdisciplinary collaboration. We will also investigate the way Quebec researchers collaborate with one another and how different elements of this network (e.g., the centrality of nodes) are related to research funding.

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[2] The last bin of each discipline contains less than 10 researchers since the total number of funded researchers is not always divisible by 10.

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