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2014

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Revesz, Peter Z., "Testing Scientific Research Grant Funding Fairness" (2014). *CSE Conference and Workshop Papers*. 263.  
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# Testing Scientific Research Grant Funding Fairness

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**Abstract**—International granting agencies need to show that they award grants to the top researchers and avoid unwarranted regional or country-specific bias. This paper shows a method for testing regional or country-specific bias, even when the countries have greatly different numbers and percentages of top researchers and universities. A case study of the international research grants of the Air Force Office of Scientific Research is used to illustrate the method, which shows that the Air Force Office of Scientific Research has favored, as expected, the higher ranked universities in all countries where it operates with only a slight positive bias for the countries in which it has offices.

**Keywords**—scientific research; grant awards; fairness

## I. INTRODUCTION

The fairness of scientific research grant funding is receiving increased scrutiny [1,2,5] as the competition for research funds intensifies due to a faster growth in the number of scientists and engineers than in the available research funds. Agencies that award research grants internationally, such as the Air Force Office of Scientific Research (AFOSR), have to justify their funding distributions among the numerous worldwide universities and researchers. These international funding agencies need foremost a method to test whether their awarding of scientific research grants shows any regional or country specific bias, which is a common concern of potential principal investigators and policy makers in the countries where they operate. This paper proposes such a bias testing method and applies the method to international grant funding data from AFOSR, which has international offices in Arlington, Virginia, London, UK, Santiago, Chile, and Tokyo, Japan. Prior to this work some researcher were concerned that AFOSR was giving funding preferentially to those countries where it is located. In particular, the Tokyo office was considered to prefer Japanese researchers to other Asian researchers, and the London office was considered to prefer UK researchers to other European researchers.

This paper is organized as follows. Section II describes the data sources and collection. Section III describes our method of testing for country specific bias in grant distributions. Section IV presents some conclusions and direction for further work.

## II. AFOSR INTERNATIONAL RESEARCH GRANTS DATA

From the London office 7,194 international grant records for 3,814 principal investigators (PIs) and 1,942 institutes and from the Tokyo office 11,391 records for 1,564 PIs and 586 institutes, including 322 universities, were collected. Source data conflicts were handled using arbitration principles [4].

## III. ANALYSIS OF FUNDING TRENDS

Intuitively, each of the higher-ranked universities has a greater number of excellent researchers than the lower-ranked universities. Matching this intuition, we found that in both Asia and Europe the universities' number of PIs (x-axis) and Quacquarelli Symonds (QS) ranks (y-axis) show a negative correlation. To test whether there is any location bias favoring countries where the regional offices are located, we mapped separately the Japanese universities (red) and other Asian universities (blue) in Figure 1 (top). Similarly, we mapped the UK universities (red) together with other European universities (blue) in Figure 1 (bottom). Figure 1 shows some location bias regarding the lower ranked institutes. For example, on average, a university ranked about 300 would receive about eight grants in Japan but only five grants in other Asian countries. Figure 1 does not show any significant differences regarding the higher-ranked universities.

## IV. CONCLUSIONS AND FUTURE WORK

While the negative correlation between number of PIs and QS rank seems a natural pattern, it is an open question whether the trend line should be more linear rather than exponential, or whether it should be even more highly exponential. In addition, the bias-testing method could be applied to other grants data, for example, to National Science Foundation data to test distributions within the US states and to other spatio-temporal data mining problems (see [3] for a review).

## ACKNOWLEDGMENT AND DISCLAIMER

This research was done while the author was an AAAS Science and Technology Policy Fellow. The views expressed in this paper are those of the author and do not necessarily reflect the views of the US federal government or its agencies.

## REFERENCES

- [1] D. E. Chubin and E. J. Hackett, *Peerless Science: Peer Review and U.S. Science Policy*, Albany, NY: SUNY Press, 1990.
- [2] J. Mervis, "Peering into peer review," *Science*, vol. 343, pp. 596-598, February 2014.
- [3] P. Z. Revesz, *Introduction to Databases: From Biological to Spatio-Temporal*, New York: Springer, 2010.
- [4] P. Z. Revesz, "On the semantics of arbitration," *International Journal of Algebra and Computation*, vol. 7, no. 2, pp. 133-160, 1997.
- [5] R. Smith, "Peer review: A flawed process at the heart of science and journals," *J. of Royal Society of Medicine*, vol. 99, pp. 178-182, 2006.

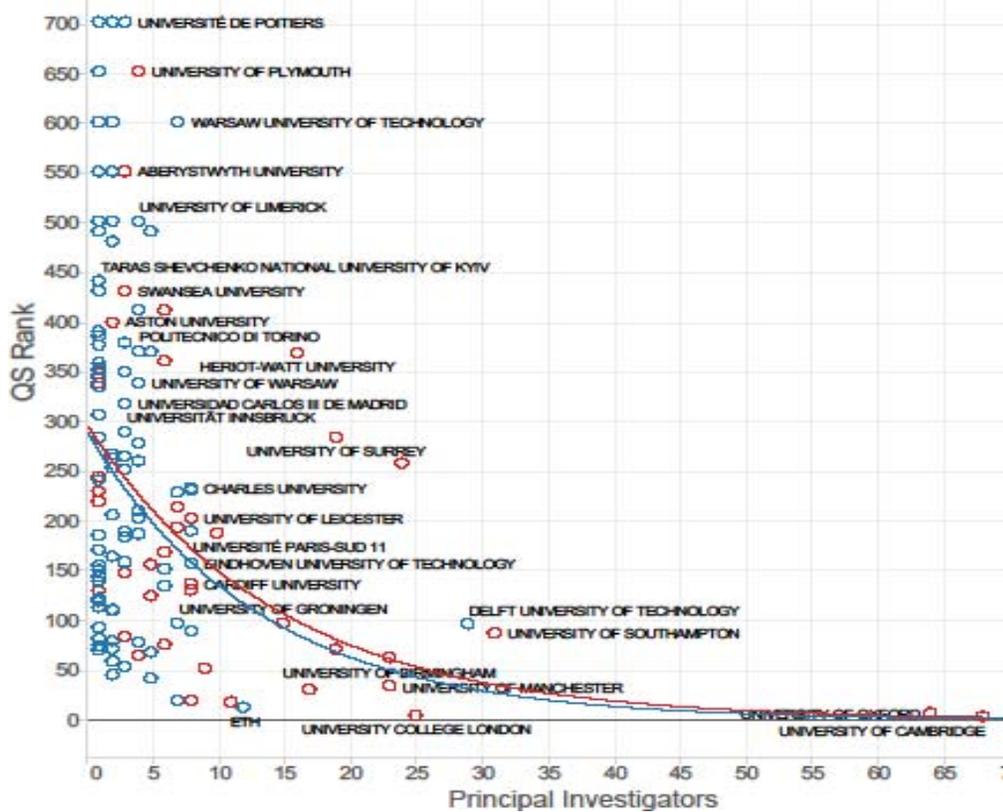
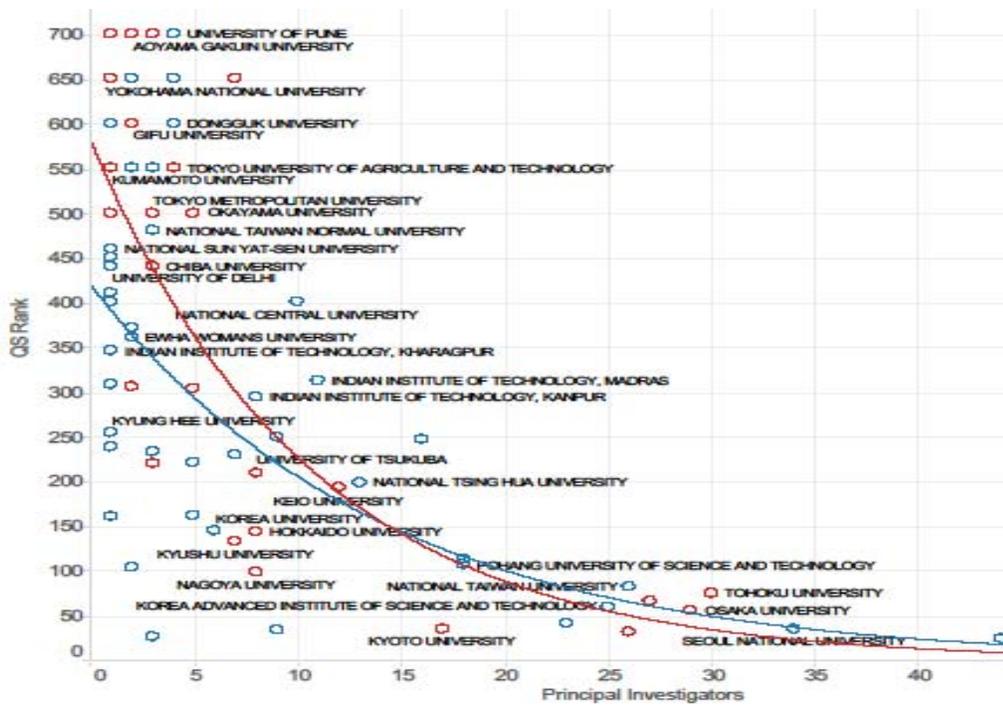


Fig. 1. On top Japanese (red) and other Asian (blue) and on bottom UK (red) and other European (blue) universities compared by QS rank and number of AFOSR principal investigators between 1994 and 2013.