



Regular article

The solitude of stars. An analysis of the distributed excellence model of European universities[☆]



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ARTICLE INFO

Article history:

Received 2 November 2016

Received in revised form 4 February 2017

Accepted 7 February 2017

Keywords:

Higher education
Transatlantic gap
Research excellence
Europe

ABSTRACT

The paper addresses the issue of the transatlantic gap in research excellence between Europe and USA by examining the performance of individual universities. It introduces a notion of leadership in research excellence by combining a subjective definition of excellence with an objective one. It applies this definition to a novel dataset disaggregated for 251 Subject Categories, covering the 2007–2010 period, based on Scopus data. The paper shows that European universities are able to show excellence only in a few disciplinary areas each, while US universities are able to excel across the board. It explains this difference in terms of institutional differences in recruitment process and governance of universities. It discusses the European model of distributed excellence in terms of the recent rise of input competition.

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1. Introduction

The issue of research excellence has received high level policy attention in European countries. When research excellence is considered, European universities are lagging behind their counterparts in the US. According to all indicators available, it seems that there is a substantial gap in the ability to train, recruit and retain those researchers that produce top quality or high impact research, as measured by the share of papers that receive the largest number of citations. This gap (also called “transatlantic gap”) is confirmed in recent authoritative policy documents (Campbell et al., 2013; National Science Board, 2014; OECD, 2015; European Commission, 2016), and in the academic literature of the last decade (Dosi, Llerena, & Sylos Labini, 2006; Aghion, Dewatripont, Hoxby, Mas-Colell, & Sapir, 2010; Bonaccorsi, 2007, 2011; Albarrán, Crespo, Ortuño, & Ruiz-Castillo, 2010, Albarrán, Ortuño, & Ruiz-Castillo, 2011a, Albarrán, Ortuño, & Ruiz-Castillo, 2011b, Albarrán, Crespo, Ortuño, & Ruiz-Castillo, 2011c, Albarrán, Ortuño, & Ruiz-Castillo, 2011d; Herranz & Ruiz-Castillo, 2011; Rodríguez-Navarro, 2016). Note that these policy documents and academic papers do *not* base their diagnosis on the well known university rankings, but on first hand, normalized, comprehensive bibliometric indicators.

[☆] This work was partially supported through a fellowship from the Hanse-Wissenschaftskolleg Institute for Advanced Study, Delmenhorst, Germany to Haddawy.

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This paper offers a new interpretation of the gap. It examines the publication performance of European universities vis-à-vis universities in North America (USA and Canada) and Asia Pacific with respect to the number and share of publications in, and citations from, top journals. The period covered is 2007–2010. The source of bibliometric data is Scopus. Data are disaggregated at the level of 251 Subject Categories and then aggregated in 14 broad areas (plus a miscellaneous one). We exploit a new data source (Global Research Benchmarking System) that offers unprecedented access to microdata on individual universities (Haddawy, Hassan, Abbey, & Lee, 2017).

We first introduce a novel definition of leadership in research excellence, which includes a subjective or strategic dimension, and an objective dimension (Section 2). We then introduce the dataset and examine the results (Sections 3 and 4). We suggest that very few institutions in Europe are able to sustain in the long run the leadership in research excellence in several areas in which they are active, and research excellence is, conversely, spread thinly across many universities. We call this model “distributed excellence” and discuss its advantages and disadvantages in the final part of the paper.

We believe the interest in this topic goes beyond a narrow focus on Europe but involves a deeper consideration of alternative institutional mechanisms in higher education and research. For historical reasons there has been a divergence between the Continental European distributed excellence model and the Anglosaxon model, also imitated by several Asian countries. The investigation of the causes and consequences of this divergence has therefore a more general interest.

2. Towards a definition of leadership in research excellence

2.1. The definition of research excellence at individual level and the problem of aggregation

The discussion on what constitutes excellence in bibliometrics and scientometrics is well developed (Tijssen, Visser, & Van Leeuwen, 2002; Waltman, 2016). Using the worldwide distribution of citations received by papers and/or authors, a commonly used strategy is to define a threshold for the upper quantile. Cutoff points of 10%, 5%, 1% or 0.1% are often proposed.

Bibliometric and scientometric studies are very careful in stressing the fact that these indicators are meaningful only with respect to specific scientific disciplines. The aggregation of these indicators at the level of universities is problematic, since it involves delicate issues of weighting of heterogeneous disciplines, which follow largely different distributions, and of the potential composition effect due to size, subject mix, and age of universities. For this reason the crude aggregation proposed by university rankings is not considered methodologically sound, although it is routinely used in the media and in policy making.

We are therefore left with a challenge: can we build a reasonable measure of excellence at university level, based on bibliometric indicators, *without* making unwarranted assumptions in the construction of aggregate indicators? It turns out that there are several definitions of excellence, which may be alternative to each other (a university may be excellent according to definition 1 but not according to definition 2), but also overlapping (it is not logically contradictory to be excellent according to both definitions 1 and 2).

Let us start from a conceptual discussion, trying to establish a foundation on the state of the art of empirical knowledge about the production of scientific research.

One of the most robust empirical regularities in the economics of science is that the individual research performance is subject to highly skewed distributions (Seglen, 1992; Egghe, 2005; Kaur, Radicchi, & Menczer, 2013; Ruiz-Castillo & Costas, 2014). For a variety of reasons we do not review here, most productive researchers are more than proportionally more productive than others. Now the question comes: how are researchers, of different individual productivity, assembled into departments and universities? And, more subtly, how does this process take place during researchers’ life cycle and during institutional life cycle? This question is rarely addressed in the literature.

Two fundamental processes are at place. First, universities and/or departments recruit academic staff in their early stage of career, then promote and retain them, and hire staff from the outside. Second, universities and/or departments create and sustain a research environment which has an influence on individual research productivity. Without knowing the details of these processes we can infer that excellent universities are those in which a larger *share* of the academic staff has an excellent performance, on average. We suggest that maintaining a large share of people with a high performance in the long term cannot be a random outcome, but requires strategic decision making, although emergent or implicit. If left to itself, the dynamics of recruiting and promotion will converge to an *average* outcome, not an excellent one.

There are two prominent processes by which the share of excellent researchers can be *persistent* over time, i.e. not subject to randomness but to autocorrelation in time series. One is path dependency in the history of recruitment decisions. If a department, for any historical reason, has a top level faculty, and if recruitment decisions are allocated to departments with significant autonomy, we would observe persistence in the level of excellence, simply because good researchers are also good to recognize potential talents, and because they prefer to work together with equally performing colleagues. This is the intuitive meaning of the great research schools so vividly illustrated in the history and sociology of science: to make an example, the Department of Physics in Roma La Sapienza is still a good one after more than sixty years from Enrico Fermi and the *Via Panisperna Group*.

In reality this path dependency may be interrupted for a number of historical circumstances: recruitment decisions may be taken not continuously in time but in discrete and distant-in-time waves, so that there is a deterioration of research quality due to the migration of the best researchers (Lissoni, Mairesse, Montobbio, & Pezzoni, 2010), or research staff may become

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