STI Conference 2016 · València Peripheries, frontiers and beyond
València, 14 · 16 September 2016

Proceedings of the 21st International Conference on Science and Technology Indicators | València (Spain) | September 14-16, 2016
DOI: http://dx.doi.org/10.4995/STI2016.2016.xxxx

Effects of performance-based research funding on publication patterns in the social sciences and humanities[1]

Raf Guns* and Tim C.E. Engels*

* raf.guns@uantwerpen.be, tim.engels@uantwerpen.be
University of Antwerp, Faculty of Social Sciences, Centre for R&D Monitoring (ECOOM), Middelheimlaan 1, 2020 Antwerp, Belgium

Introduction

In more and more countries and regions, government funding of universities and research institutions is linked to their research output (Hicks, 2012a). The effects of such performance-based research funding systems (PRFSs) have been studied in a number of papers.

Butler (2002, 2004) was among the first to show how researchers adapt their publication behaviour to changes in the system. Specifically, she studied the effects of changes in the Australian national funding model in 1993, which included productivity indicators that did not account for the quality of the publication or publication outlet. The main results showed that, while publication productivity increased, the overall citation impact of Australian publications decreased. Moreover, the relative increase was highest in lower-impact journals. Butler (2002) concluded that "the present system rewards quantity, not quality."

The studies of Butler showed that, at least in some cases, researchers adapt their publication behavior to the parameters of the local funding model. Rousseau and Rousseau (2015) refer to this as metric-wiseness, the phenomenon that researchers are aware of and can adapt to the indicators by which they are evaluated and/or funded.

Hicks (2012b) focusses on the position of the social sciences and humanities (SSH) in the context of performance-based research funding. In OECD countries, STEM fields account for 70–80% of government research spending. As a consequence, traditional publishing patterns in the SSH are under pressure, in order to better fit research evaluation protocols that are anchored mainly on the sciences. At the same time, in several cases it can be observed that there is a backlash against evaluation protocols that are too narrowly aimed at the sciences and the evaluation protocols are revised to better suit the characteristics of the SSH. In other words, research evaluation and SSH publishing are *co-evolving*.

A good example of the co-evolving dynamic described by Hicks (2012b) is the case of Flanders, the northern region of Belgium. In Flanders, the BOF-key is the distribution key used to determine how much funding each of the five Flemish universities receive out of the government University Research Fund (BOF), currently accounting for roughly 150 million euro. The BOF-key has included research output data from 2003 onwards (Debackere &

[1] This investigation has been made possible by financial support of the Flemish government to ECOOM. We thank Jesper W. Schneider for sharing some of the data underlying Figure 1 and Linda Sīle for useful comments on a previous version.

Glänzel, 2004), based on publication and citation data from the Science Citation Index Expanded (SCIE), part of Web of Science (WoS). Because of the nature of the SCIE, research output of the SSH was almost invisible in the BOF-key. This spurred on two further reforms in 2008 (Spruyt & Engels, 2013; Verleysen et al., 2014):

- Four other WoS databases – the Social Sciences Citation Index (SSCI), the Arts and Humanities Citation Index (AHCI), as well as the conference proceedings databases – were included.
- The framework was laid out for constructing a comprehensive local database of research output in the SSH, the Flemish Academic Bibliographic Database for the Social Sciences and Humanities (VABB-SHW), which was first used in the BOF-key of 2011 (Engels, Ossenblok & Spruyt, 2012). Originally accounting for 2.6% of the BOF-key, the VABB-SHW currently represents 6.8% of the BOF-key.

These evolutions illustrate how SSH publishing has affected the PRFS. In this paper we will consider the reverse direction: effects of the PRFS on publishing patterns in SSH.

According to the BOF legislation, publications in the VABB-SHW should (1) be publicly accessible, (2) have an ISSN or ISBN, (3) contribute to the development of new insights or applications thereof, and (4) have been subjected to a demonstrable peer-review process by experts in the field. These criteria are upheld by the Authoritative Panel (Gezaghebbende Panel or GP), a panel of 18 professors affiliated to the five Flemish universities and coming from the different SSH disciplines (Verleysen, Ghesquière, & Engels, 2014). In addition to these four criteria, the GP has decided to exclude publications that count less than four pages.

Five publication types are included in the VABB-SHW. These types are weighted differently:

- journal articles: 1 point,
- books as author: 4 points,
- edited books: 1 point,
- book chapters: 1 point,
- proceedings papers: 0.5 points.

We can distinguish between two subsets of the VABB-SHW: *VABB-WoS* publications are those journal articles and proceedings papers that are also indexed in Web of Science (SCIE, SSCI, AHCI, CPCI-S, or CPCI-SSH), whereas *VABB-GP* publications are those publications that are not indexed in WoS but instead selected by the GP. Furthermore, we will also consider those publications that do not meet all the abovementioned criteria and are hence not approved for inclusion in the VABB-SHW. We will refer to this group as *Non-approved*.

In this paper we tentatively address the following questions:

1. How did changes in the PRFS in Flanders affect publication growth in WoS over all disciplines?
2. How did changes in the PRFS in Flanders affect publication growth in the SSH, both in WoS and in the VABB-SHW?
3. How did changes in the PRFS in Flanders affect evolutions in the relative share of different publication types?

Since it is very hard to establish causal links between changes in the PRFS and publication patterns, we consider the present analysis a first step to answering questions like the ones above.

Data and Methods

Our main data source is the VABB-SHW, a comprehensive database of peer-reviewed publications from the SSH. We consider publications from the period 2000–2013 (inclusive). In Table 1 some basic descriptive statistics are provided about the data set used. The number of VABB-GP and VABB-WoS publications is similar for journal articles and proceedings papers, the two publication types where both groups occur. However, VABB-GP also includes book publications, which are not indexed in any of the WoS databases that are used for the BOF-key.

Table 1. Numbers of VABB-GP and VABB-WoS publications in period 2000–2013

	VABB-GP	**VABB-WoS**
Journal articles	23148	24681
Books as author	909	-
Edited books	1618	-
Book chapters	8953	-
Proceedings papers	1017	1158

To answer the first question, we also consulted data on total WoS publication output (including non-SSH publications) by Flemish universities, as used for the BOF-key.

Since we are interested in change and evolution over time, we will mostly work with relative rather than absolute numbers. More specifically, we take the first year of a time period as a point of comparison and then observe how different sets evolve relative to their value in the first year.

Results

The BOF-key has included publications (and citations) in WoS as a parameter since 2003. Figure 1 compares the evolution of the number of WoS publications in Flanders with that in four other countries over the course of a 23-year period. We observe that in all countries the increase in publications is greater than the growth of WoS itself (the lowest line). The growth in Flanders is considerably stronger than in the other countries. From 2003 onwards, the increase becomes even steeper. This suggests that the introduction of a parameter of research output that is entirely based on the WoS, has driven researchers to publish more in WoS-indexed publication outlets. At different points in time similar trend changes can be observed for Norway, Australia, and Denmark.

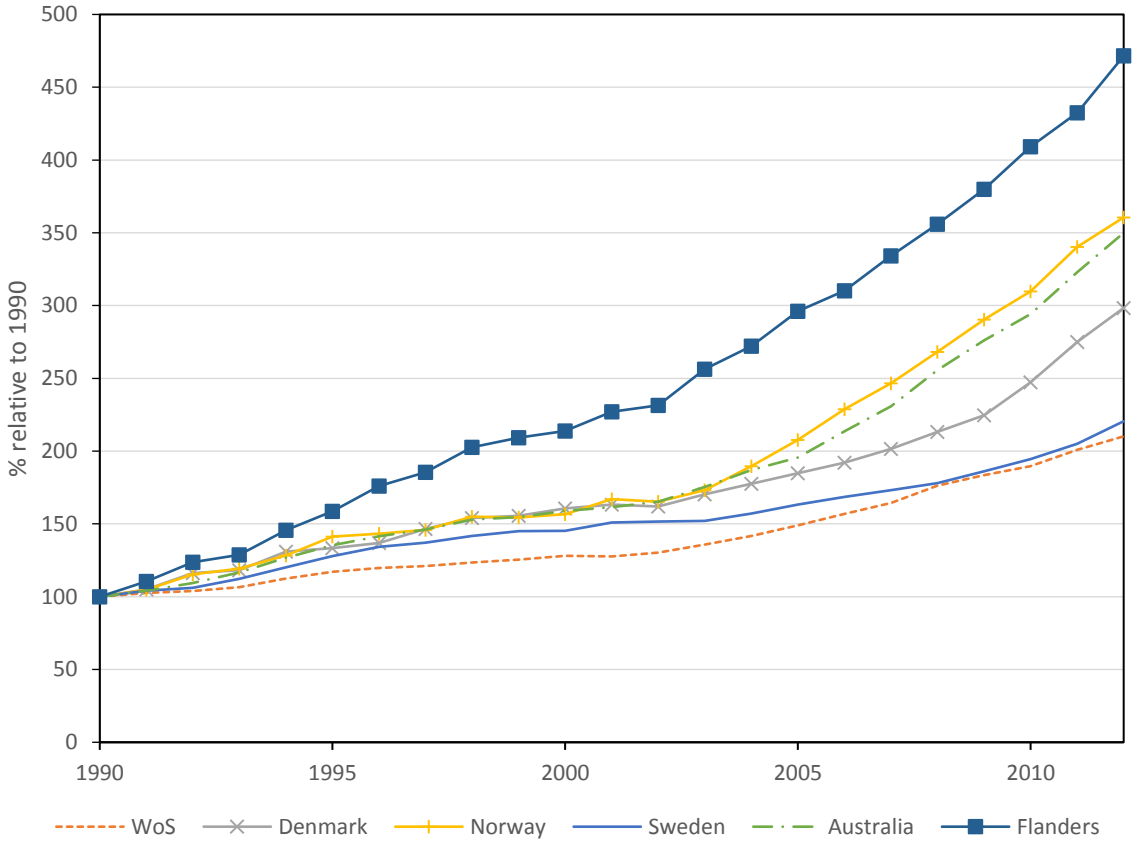
Between 2000 and 2012, the amount of WoS publications by researchers affiliated to Flemish universities has grown by 230%. This increase cannot be ascribed solely to the PRFS. Other factors are at play, including the following:

- The WoS itself has increased its coverage of journals and proceedings.
- The number of Flemish researchers has increased by 175% over this same period. Especially the group of pre- and postdoctoral researchers has grown, while the number of professors has expanded only slightly.

- Flanders is no exception to the global trend toward more collaboration (Ossenblok, Verleysen & Engels, 2014). This is an important factor that helps to explain increased publication volume (Fanelli & Larivière, 2016).
- Better monitoring of publication output by individuals, research groups, institutions and the government alike

Of course, these factors also occur to some extent in other regions and countries.

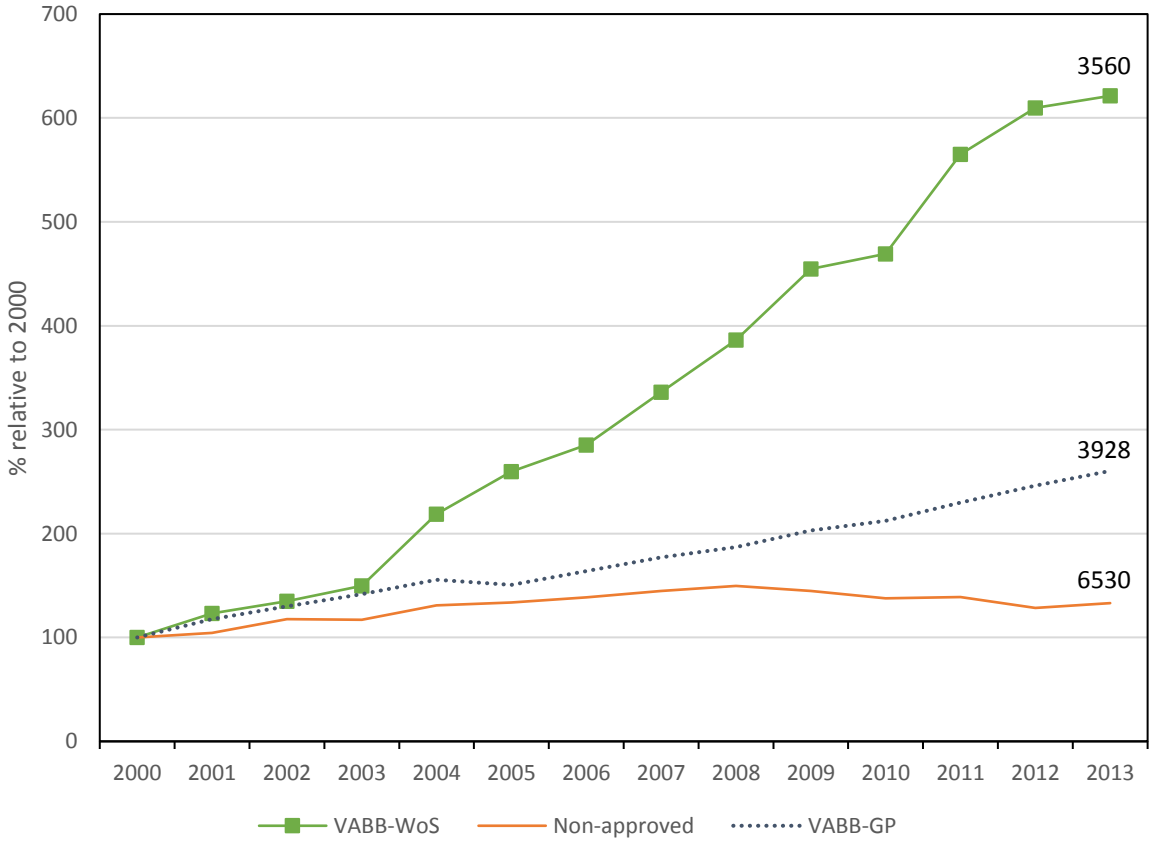
Figure 1. Evolution of WoS publications relative to 1990 in different countries (partially based on Schneider, Aagaard & Bloch, 2016)



We now focus on evolutions that can be observed within the SSH, using data from the VABB-SHW. As one might expect, we witness an increase (Figure 2) between 2000 and 2003 for all three sets of publications – VABB-WoS, VABB-GP, and Non-approved. Between 2000 and 2003, the evolution of peer-reviewed literature within (VABB-WoS) and outside of WoS (VABB-GP) appears to run in parallel, but the number of WoS publications grows faster than that of GP publications afterwards. The strong rise of WoS publications observed for Flanders across all disciplines can also be seen within the SSH, with a 'jump' starting in 2003. In fact, the growth of WoS publications is even stronger within the SSH. Factors that may help to explain this finding include: the introduction of the PRFS in 2003; the expansion of the PRFS with the AHCI and the SSCI in 2008; the fact that several Flemish and Dutch journals were added to the WoS in the period 2005–2009 (Ossenblok, Engels, & Sivertsen, 2012) as part of Thomson Reuters' coverage expansion to regional literature (Testa, 2011); and, more generally, the low volume of WoS publications in 2000 (*n*=573 or 33% of all journal articles and proceedings).

We further observe that the growth of VABB-GP publications is faster than that of Non-approved publications, both before and after the introduction of the VABB-SHW. Around 2008 the curve of Non-approved publications reaches a maximum and slightly decreases in the years thereafter. In 2008 work also began on the construction of the VABB-SHW, although it seems unlikely that this could have immediately brought about this change. In spite of the different evolution of peer-reviewed and non-peer-reviewed literature, we note that in absolute terms the number of Non-approved publications in 2013 is still slightly higher than the number of VABB-WoS and VABB-GP combined.

Figure 2. Evolution of VABB-WoS, VABB-GP and non-approved publications relative to 2000. For each type, the absolute number in 2013 is reported.



The increasing trend for VABB-GP publications one can observe in Figure 2 is not the same across the five different publication types. Figure 3 shows the evolution for the five publication types (restricted to VABB-GP) and adds the curve for WoS articles for comparison purposes. Because the volume of proceedings is very low, GP and WoS proceedings are taken together.

Let us first look at journal articles. The difference between journal publications that are and are not indexed in WoS is striking. Researchers are increasingly opting for journal publications in WoS, whereas the growth for other peer-reviewed journals is much slower. This is not entirely unexpected, given the fact that until 2011 only WoS-indexed articles were taken into account for the BOF-key. However, the introduction of the VABB-SHW and of GP-indexed journal articles as (part of) a parameter in the BOF-key does not appear to have caused a divergence of the existing trend.

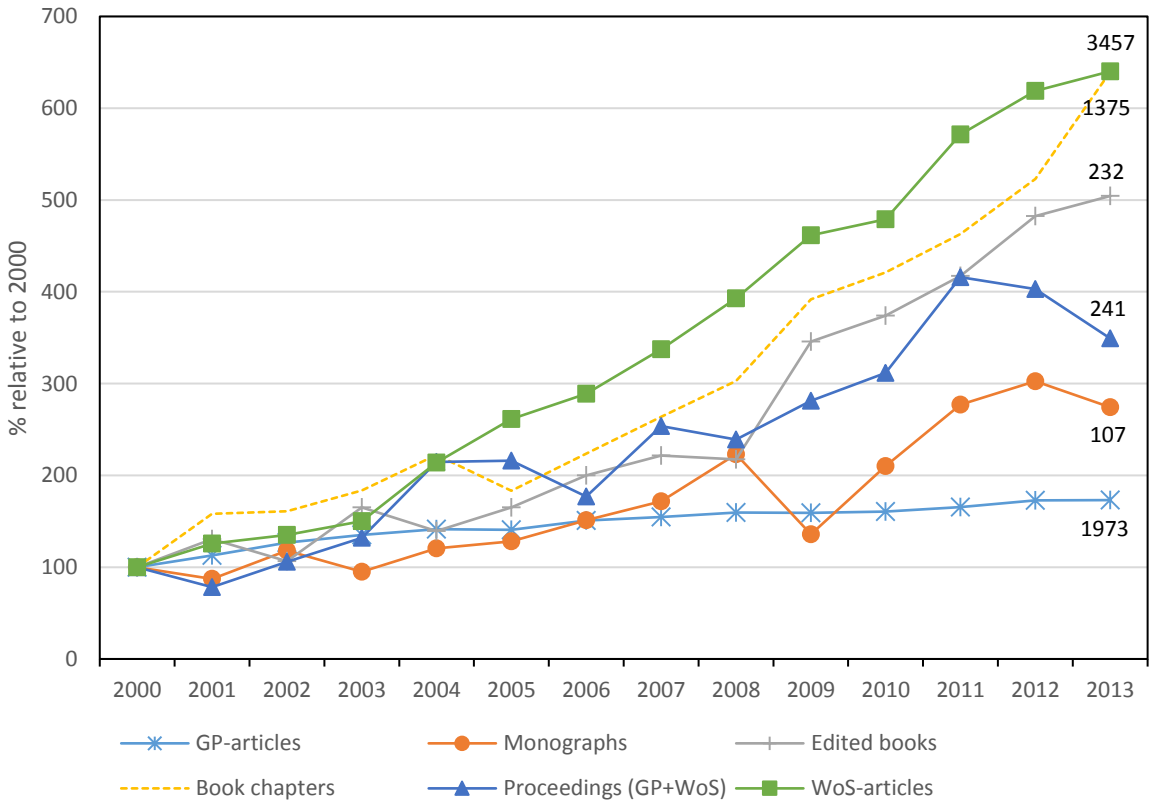
Table 2. Number of WoS and GP journals in which SSH scholars working in Flanders have published

	WoS journals	GP journals
2000–2002	1077	1127
2006–2008	2165	1715
2011–2013	3125	1944

A similar picture emerges if we consider journals rather than journal articles. Table 2 shows the evolution of number of WoS and GP journals in three three-year time periods. The (non-cumulative) number of WoS journals in which SSH scholars working in Flanders have published has almost tripled between the first and the last time period, whereas the number of GP journals has grown by a factor of 1.7.

It is quite striking that edited books and especially book chapters in Figure 3 follow almost the same trend as VABB-WoS articles. This could be interpreted as the PRFS having little to no influence on publication type. On the other hand, we could also see it as a result of the fact that some publication types are partially indexed in WoS, whereas others are not at all. Indeed, for journal articles the difference between VABB-GP and VABB-WoS is very clear. For those publication types to which the criterion 'indexation in WoS' does not apply, the criteria used by the GP are of greater relevance. The increase in book publications is likely also related to the introduction of the GPRC label for peer-reviewed books in 2010 (Verleysen & Engels, 2013).

Figure 3. Evolution of publication types in VABB-SHW relative to 2000. For each type, the absolute number in 2013 is reported.



Conclusions

In this paper we present an analysis on how in Flanders the PRFS has shaped and influenced publication practices in the SSH. We find that a strong emphasis on WoS publications since 2003 has caused a growth in WoS publications that is greater than what can be observed in other countries and other fields of science in Flanders. The introduction of the VABB-SHW has not led to a marked decrease of WoS publications in the SSH. Instead, WoS articles have grown 3.5 times faster than GP-selected articles over the course of the 14-year time period considered in this paper.

Other mechanisms appear to exist for publication types that are not indexed in the WoS databases used for the PRFS. This is the case for edited books and especially book chapters, which witness a growth comparable to that of WoS articles.

References

Butler, L. (2002). A list of published papers is no measure of value. *Nature*, 419(6910), 877.

Butler, L. (2004). What happens when funding is linked to publication counts? In: Moed, H. et al. (eds.), *Handbook of Quantitative Science and Technology Research*, pp. 389–405. Netherlands: Kluwer.

Debackere, K. & Glänzel, W. (2004). Using a bibliometric approach to support research policy making: The case of the Flemish BOF-key. *Scientometrics*, 59(2), 253–276.

Fanelli, D., & Larivière, V. (2016). Researchers' individual publication rate has not increased in a century. *PloS One*, 11(3), e0149504. http://doi.org/10.1371/journal.pone.0149504

Hicks, D. (2012a). Performance-based university research funding systems. *Research Policy*, 41(2), 251–261.

Hicks, D. (2012b). One size doesn't fit all: On the co-evolution of national evaluation systems and social science publishing. *Confero: Essays on Education, Philosophy and Politics*, 1, 67–90.

Ossenblok, T. L. B., Engels, T. C. E., & Sivertsen, G. (2012). The representation of the social sciences and humanities in the Web of Science - A comparison of publication patterns and incentive structures in Flanders and Norway (2005-9). *Research Evaluation*, 21(4), 280–290.

Ossenblok, T. L. B., Verleysen, F. T., & Engels, T. C. E. (2014). Coauthorship of journal articles and book chapters in the social sciences and humanities (2000-2010). *Journal of the Association for Information Science and Technology*, 65(5), 882–897.

Rousseau, S., & Rousseau, R. (2015). Metric-wiseness. *Journal of the Association for Information Science and Technology*, 66(11), 2389.

Schneider, J.W., Aagaard, K., & Bloch, C.W. (2016). What happens when national research funding is linked to differentiated publication counts? A comparison of the Australian and

Norwegian publication-based funding models. *Research Evaluation*, in print. doi:10.1093/reseval/rvv035.

Spruyt, E.H.J., & Engels, T.C.E. (2013). Nieuwe sleutel verdeling van middelen Bijzonder Onderzoeksfonds. *Thema: Tijdschrift voor hoger onderwijs en management*, 13(3), 56–61.

Testa, J. (2011). The globalization of Web of Science: 2005-2010. Philadelphia: Thomson Reuters. http://wokinfo.com/products_tools/multidisciplinary/webofscience/contentexp/expansionessay/

Verleysen, F. T., & Engels, T. C. (2013). A label for peer-reviewed books. *Journal of the American Society for Information Science and Technology*, *64*(2), 428-430.

Verleysen, F. T., Ghesquière, P., & Engels, T. C. E. (2014). The objectives, design and selection process of the Flemish Academic Bibliographic Database for the Social Sciences and Humanities (VABB-SHW). In W. Blockmans, L. Engwall, & D. Weaire (Eds.), *Bibliometrics. Use and Abuse in the Review of Research Performance* (pp. 117–127). Portland Press. http://www.portlandpress.com/pp/books/online/wg87/087/0117/0870117.pdf