



The h-bubble

Ronald Rousseau^{a,b,c}, Carlos García-Zorita^d, Elias Sanz-Casado^{d,*}

^a KHBO (Association KU Leuven), Faculty of Engineering Technology, Zeedijk 101, B-8400 Oostende, Belgium

^b KU Leuven, Department of Mathematics, Celestijnenlaan 200B, B-3000 Leuven (Heverlee), Belgium

^c Universiteit Antwerpen, IBW, Venusstraat 35, B-2000 Antwerpen, Belgium

^d Universidad Carlos III de Madrid, LEMI, Associated Unit IEDCYT-LEMI, C/Madrid 126, Getafe, 28903 Madrid, Spain

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ABSTRACT

Hypes occur in every domain of human behavior, including scientific research. We show in this contribution that journals and authors who studied the h-index benefited in terms of short-term citations. As, moreover, the introduction of the h-index is more a 'clever find' than a first rate intellectual achievement, its rise can be compared to a stock market bubble.

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1. Introduction

Hypes or fads are objects or (social) ways of behaving receiving much more attention than they objectively deserve. This leads to inflated expectations for those who possess the object in question or exhibit that particular behavior. Hypes occur in every domain of human behavior. Nowadays the use of Facebook to keep contact with so-called friends is a prime example. It is well-known that investment is an area which is very vulnerable to hypes, possibly leading to stock market bubbles. A classical definition of the stock market bubble was made by [Kindleberger \(1978\)](#) "A bubble may be defined loosely as a sharp rise in the price of an asset or a range of assets in a continuous process, with the initial rise generating expectations of further rises and attracting new buyers – generally speculators interested in profits from trading in the asset rather than its use or earnings capacity". [Siegel \(2003\)](#) thought that this definition "implies that a high and growing price is unjustified (not related to 'earnings capacity') and is fed by 'momentum' investors who buy with the sole purpose of selling quickly to other investors at a higher price". We think that also scientific research is not free of hypes and see some analogies with stock market bubbles as defined above. For instance, if authors (or journals) receive more citations than expected just because they publish about a fashionable topic (a hype), this may lead them and others to feed – speculatively – the production of works on this topic, in order to obtain unreasonable recognition. Assuming a pattern similar to what is observed in the stock market, this effect may last until the hyped topic becomes saturated and the speculative advantage disappears. In particular we intend to show in this article that the h-index or [Hirsch \(2005\)](#) index can be considered a hype in our field. In 2005, Hirsch became a well-known name in science, and especially in the field of *scientometrics*, thanks to his article published in the *Proceedings of the National Academy of Sciences of the United States of America* (in short: PNAS). Concretely, we will show

* Corresponding author.

E-mail addresses: ronald.rousseau@khbo.be (R. Rousseau), elias@bib.uc3m.es (E. Sanz-Casado).

Table 1
Sources citing (Hirsch, 2005).

| Source | Number of items |
|--|-----------------|
| Scientometrics | 176 |
| Journal of Informetrics | 99 |
| Journal of the American Society for Information Science and Technology | 76 |
| ISSI Conferences | 49 |
| PLoS One | 24 |
| Current Science | 14 |
| Research Evaluation | 13 |
| Online Information Review | 12 |
| Information Processing & Management | 9 |
| Journal of Information Science | 9 |

Table 2
Citing journals' WoS categories.

| WoS category | Number of citing items |
|---|------------------------|
| Information science library science | 452 |
| Computer science interdisciplinary applications | 187 |
| Computer science information systems | 157 |
| Multidisciplinary sciences | 39 |
| Biology | 36 |
| Economics | 23 |
| Management | 20 |
| Computer science artificial intelligence | 19 |
| Ecology | 19 |
| Physics multidisciplinary | 19 |
| Medicine general internal | 18 |

that, in terms of received citations, articles on the h-index form a different population than articles that do not deal with the h-index or its variants. This will be shown for articles published in the journals *Journal of Informetrics*, *Journal of the American Society for Information Science & Technology* and for *Scientometrics*. Before coming to the essence of this contribution we recall the definition of the h-index:

Consider a scientist's list of publications, ranked according to the number of citations received, then this scientist's h-index is defined as the highest rank such that the first h publications received each at least h citations.

An h-index can not only be calculated for scientists, publications and citations, but for many other source-item systems, such as, for instance, libraries, books and the number of loans (Liu & Rousseau, 2009), leading to a statement such as: library L has this year h books that have been lent out each at least h times (where h is the largest natural number for which this expression is true). Hirsch's original definition referred to lifetime achievements but publications as well as citations can be restricted to any well-defined period. Finally, we like to point out that citations are always collected from some database (e.g. Web of Science, Scopus) or part thereof (e.g. only the Social Science Citation Index, or counting only citations in the journals *Nature* and *Science*), leading to many variations on the same theme. Of course, the notion of an h-index has been generalized to other h-type indices such as the g-index (Egghe, 2006a,b), the R-index (Jin, Liang, Rousseau, & Egghe, 2007) and many other ones.

2. Basic statistics

Data for our investigation were collected in July 2012 from Thomson Reuters' Web of Science (WoS). Hirsch' article received "officially" 924 citations during the period 2005–2011. Actually, we found many more citations, using a "Cited Reference Search", including several variants for the cited article. Even before its official publication the article's arXiv version had already attracted a lot of attention (and received citations). Nowadays (August 2012) Hirsch's total number of received citations for all variants (including printing errors and citations to the arXiv version) exceeds the number of 1100 citations. However, using the normal search function for the original article in WoS, the "number of citations received" leads to 924 citations during the period (2005–2011). The advantage of using this method is that we can use the "Citation Report" and see how many citations are received each year. Indeed, Tables 1–4 were obtained from such a search, using the "Analyze Results" function. Fig. 1 illustrates the yearly increase in numbers of received citations.

All articles citing (Hirsch, 2005) form a set referred to as the set of H-articles. In Fig. 2, we show the growth in citations received by Hirsch (2005) PNAS article and on a different scale the citations received by H-articles.

Not surprisingly journals especially devoted to "indicators" such as *Scientometrics* and the *Journal of Informetrics*, published the most H-articles (see Table 1), as was also found by Zhang, Thijs, and Glänzel (2011). Although published in PNAS, a multidisciplinary journal, and immediately commented upon in *Nature* (Ball, 2005), mainly LIS journals (and the ISSI conferences) published H-articles. This is shown in Table 2. Most-citing authors are shown in Table 3. Table 4 shows the

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