

Journal Impact Factors for the year-after the next can be objectively predicted

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OBJECTIVE: To determine whether trends of Journal Impact factor variation can be objectively predicted for the year after next.

METHOD: Curves for citations/document have been constructed for articles published in the two years previous to the current year (YEAR₋₁ and YEAR₋₂) and their citations in the current (unfinished year). Separate curves were constructed for YEAR₋₁ and YEAR₋₂. A parameter named INDEX R has been defined. INDEX R was calculated for a randomly selected sample of 100 journals with Impact Factors in the 1 - 3 range.

RESULTS: INDEX R was found to distribute in a quasi-normal manner, with a borderline adherence to the Gauss distribution ($0.10 > p > 0.05$). A mean value of 0.60 ± 0.19 was observed.

CONCLUSION: As a working hypothesis, it is suggested that INDEX R may indicate a trend for the Impact Factor to occur for the year-after (2017), to be published in the summer of 2018.

KEYWORDS: Impact Factor, bibliometrics, future trends.

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INTRODUCTION

In spite of objections frequently raised concerning Journal Impact Factor as a measure of quality, it is still true that, no matter how severely it is criticized, it has become, for many journal Editors, a “cannot-live-without” sort of talisman. Irrespective of whether it is a good or a bad thing, whether it is tampered with or not, it must be seen as a pandemic affliction, affecting the world of scientific editing. I do not intend to discuss Impact Factor merits or demerits. This communication is about a concept that may be helpful in predicting not merely next year’s Impact Factor, a procedure often described in the past. To the best of my knowledge it has never been previously described. The new idea is a device that may be potentially useful to detect Impact Factor trends in the year-after the next.

Generally speaking, journals have fairly steady Impact Factors over time, so that long term future trends are easy to envisage. On rare occasions, a journal may

present legitimately aberrant years, usually caused by an outlier article with an unusually large number of citations. The most famous recent example was Sheldrick, 2008,¹ which has been cited more than 50,000 times to date. Less than 100 articles in the entire range of published scientific articles (1900 – 2010, over 30 million articles) come even close to this.² In other occasions, an Editor may wish to detect whether his present policies of acceptance/rejection of papers may have positive or negative effects on the quality of the journal. Even though Impact Factor and equivalent citation-based metrics may have flaws, there is little question that citations per se are a definite measure of the interest generated by articles, and therefore must be seen as reflections of quality. Editors must keep in mind the fact that editorial actions performed in the current year will influence Impact Factors to be divulged 3 – 4 years later.

Other than looking at previously published Impact Factors, it appears that predicting two-year ahead trends for any particular journal is hazardous guesswork. But I believe I have come across a parameter capable of estimating the trend of Impact Factor at that point in time. But let us take this step by step.

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■ PREDICTING THE NEXT IMPACT FACTOR (2016)

Predicting the next Impact Factor is a well-established procedure: a number of studies have described how it is done.^{3,4} To put all of this into perspective, I will take one step at a time. I will only use one method, namely the gathering of information from Web of Science (WoS) releases.⁵

In the summer of 2017, Journal Citation Index (JCR) will publish Impact Factors for 2016. Let us begin by looking at the scenario as it will occur on March 31, 2017. By then, practically all the information required to calculate the IF will have been collected; Web of Science transparently provides it to all users:⁵ for any given journal “X” the Impact Factor can be estimated through the standard IF procedure:

$$\text{Estimated IF}_{2016} = \text{Cites}_{2016} / (N_{2014} + N_{2015})$$

where

N_{2014} and N_{2015} : number of citable documents (research articles and reviews) published by “X” in 2014 and 2015, respectively

Cites: number of citations granted in 2016 to all articles published by “X” in 2014 and 2015.

However, this is still not quite the Impact Factor that will be formally released by JCR. The release will be preceded by a search through the Web of Science database looking for mistakes and missed citations.⁶ Missed citations are usually more numerous than mistakes; consequently, the Impact Factor estimated in March will usually be slightly lower than the posted value.

Could this have been predicted earlier? Definitely yes and this has already been described.^{3,4} If we move backward in time, we will see that meaningful information was already being made available by WoS throughout 2016: at any date along this year, you could have gone to WoS and recorded a value for CITES_{2016} up to that date; N_{2014} and N_{2015} were already definitive values and CITES are systematically updated by WoS on a weekly basis. An interim cites/document “race” can be constructed by visiting WoS on a weekly basis, checking for citations and calculating an interim Cites/document for each week:

$$\text{Interim cites/document} = \text{CITES}_{\text{to-date}} / (N_{2014} + N_{2015})$$

If you happen to be a tennis fan, this would look very much like the ATP “Race to London”, London being the venue of the end-of-year tennis tournament, by invitation only.

Figure 1 shows this Impact Factor “race” for three journals (their recent Impact Factors were 2.5, 1.7, 1.1, respectively) as it developed from January to October. By mid-March, you could already tell the difference between them. As the year progresses, these differences become more evident. I have selected and marked two strategic moments along the “race”: end of June and end of August. Pilot tests for previous years strongly suggest that at these dates, journals average 30% and 50%, respectively, of what their posted Impact Factors will be. To the best of my knowledge, this specific indication has never been explicitly suggested. I offer it as a working hypothesis.

Cites per document

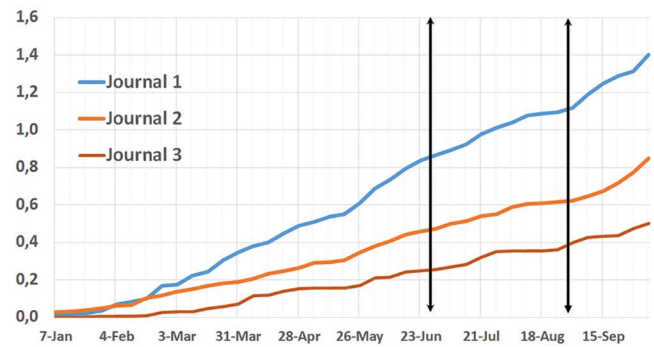


Figure 1 - The weekly progress of cites/document for three journals with recent impact factors of 2.5, 1.7 and 1.1. Two vertical lines mark the mid-year and the end of August. These provide indications for rapid estimation of the Impact Factor, as discussed in text.

As shown in Figure 1, by midyear cites/document reach only 30% of final value. Only well in to the 2nd semester, on August 31st do we see cites/document reaching 50% of their respective final values. There are two reasons for this lag:

(a) unlike the tennis “race for London”, the IF “race” only really gets going a few weeks after January 1st; before any citation can be displayed, journal issues for the new year must be published and picked up by Web of Science;

(b) when the “race” starts, papers from 2015 (YEAR_{-1}) are on average six months old, while those from 2014 (YEAR_{-2}) average 18 months. Six months is probably the minimum lag between an article being published and its first citations landing in Web of Science. Consequently, early in the new year papers published in 2015 (YEAR_{-1}) contribute very little to the race. Data for the distribution of CITES between YEAR_{-1} and YEAR_{-2} can be retrieved from the Journal Citations Report site; they show that, almost invariably, papers published in YEAR_{-2} are more cited than those from YEAR_{-1} . This is central to the argument that follows.

To conclude this item on predicting the “next” Impact Factor, the procedure is well established and extensively used by Editors. It is also useful for Editors hoping to insert journals into the Science Citation Index database. The new concept here is the marking of specific points in the race, from which easy calculations can predict the coming IF with some confidence.

■ PREDICTING FUTURE IMPACT: THE YEAR AFTER

At first site, predicting impact for the year-after (in the context of this discussion, predicting 2017, to be posted in the summer of 2018) sounds like mere guesswork: at the time of writing, October 13, the “race” has not even begun, meaning that, so far, articles have received a minimal number of “ahead-of-print” citations in very precocious 2017 issues. Approximately 10% of the articles to be included in the 2017 IF haven’t even been

published. Consequently, any exact numerical predictions is impossible. However, I will try to show that specific trends can be objectively estimated for any given journal.

To do this, I took advantage of the well-known fact, already mentioned, that citations to YEAR₋₁ papers are normally less numerous than those to YEAR₋₂ papers. Figure 2 has been constructed for three journals by splitting the citations “race” into YEAR₋₂ and YEAR₋₁. The journals have been deliberately selected to illustrate three distinct scenarios.

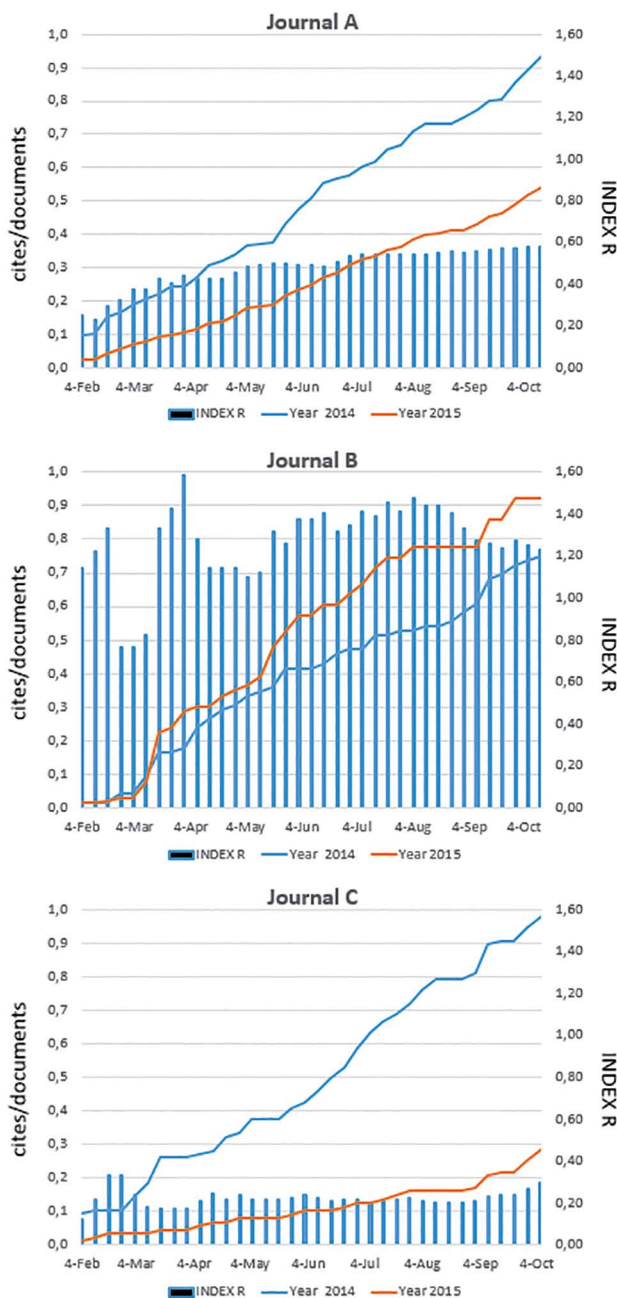


Figure 2 - Constructed curves of cites/document for three journals (previously published Impact Factors 2.5, 1.7, 1.1) for the period January 1st to October 4th. For each journal a separate curve was constructed for 2014 (YEAR₋₂) and 2015 (YEAR₋₁). Vertical bars indicate calculated INDEX R values from April to October.

For Journal A, citations to YEAR₋₂ papers are consistently higher than those to YEAR₋₁; the ratio YEAR₋₁/YEAR₋₂ is also displayed and tends to remain stable throughout the year, ending at 0.56; in contrast, for Journal B, YEAR₋₁ papers are consistently more frequently cited than YEAR₋₂ papers; the corresponding ratio averaged 1.30. Journal C shows a third possible pattern, with an extremely low YEAR₋₁/YEAR₋₂ ratio of 0.28. Supposing that Journal A represents the normal pattern, i.e., a pattern leading to a steady IF, it follows that Journal B is over performing in YEAR₋₁, and that this should lead to an increment of IF for 2017; the opposite is true for Journal C, which appears to be heading toward a decreased Impact Factor. For simplicity, I am defining a parameter:

$$\text{INDEX R} = \frac{\{\text{cites/doc to YEAR}_{-1} \text{ articles}\}}{\{\text{cites/doc to YEAR}_{-2} \text{ articles}\}}$$

But a question begs to be answered: is Journal A really representative of anything that can be described as the “usual” pattern? Figure 3 shows the distribution of INDEX R for 100 randomly selected journals: the overall mean \pm std. dev. was 0.60 ± 0.19 . The distribution was found to adhere to the Gaussian distribution ($\chi^2 = 10.1$; $10 > p > 0.05$). There is a small central tendency, with an equally slight skew toward higher values. However, it should be noted that this is a small sample coming from a restricted range of Impact Factors (1.00 to 3.00).

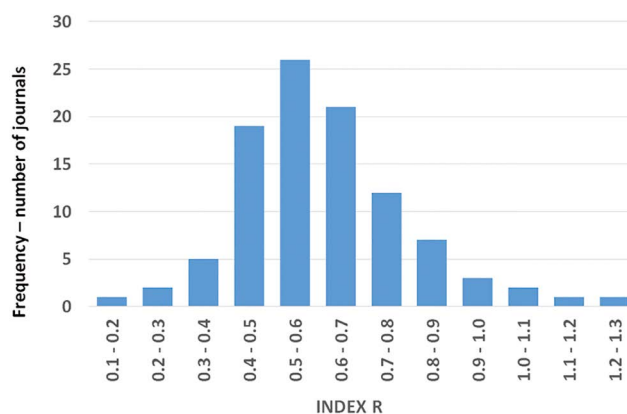


Figure 3 - Frequency distribution of INDEX R for 100 randomly selected journals within an Impact factor range of 1 - 3. The distribution adheres to the Gauss distribution with a borderline level of non-significance (Chi squared (5 df) = 10.06. $0.10 > p > 0.05$). The mean value for this population was 0.60 ± 0.19 , There is an above normal central tendency, with a slight skew toward higher values.

In conclusion, it appears possible to predict the trend for the Impact Factor for the year-after by looking at Index R, which is offered here as a working hypothesis: a ‘normal’ INDEX R (mean \pm 1 Std dev), i.e., within the 0.4 - 0.8 range indicates a neutral bias suggesting that over the next 2 years a steady IF should be expected; an INDEX R > 1.0 suggests that the Impact Factor should be rising, whereas R < 0.3 probably means that citations are on the decrease. Finding high or very high R values is probably indicative of one or a very few extremely well cited articles in YEAR₋₁.

The entire subject is highly debatable and open to further verification and alternative explanations; the theme will be the object of future notes.

■ CONFLICT OF INTEREST

None.

PREDIZENDO FATORES DE IMPACTO: O ANO SEGUINTE PODE SER OBJETIVAMENTE AVALIADO

OBJETIVO: Determinar se tendências de variação Fator Impacto podem ser objetivamente definidas para o ano seguinte ao ano corrente.

MÉTODO: Curvas para citações/documento foram construídas para artigos publicados nos dois anos anteriores ao ano em curso (ANO_{-1} e ANO_{-2}) e suas citações no ano corrente (Janeiro a Outubro). Curvas separadas foram construídas para cada ano. Um parâmetro designado ÍNDICE R foi definido e calculado para uma amostra aleatória de 100 revistas com Fatores de Impacto entre 1 e 3.

RESULTADOS: O ÍNDICE R distribuiu-se de forma normal, com aderência limítrofe à distribuição de Gauss. Observou-se um valor médio para ÍNDICE R = $0,60 \pm 0,19$.

CONCLUSÃO: Como hipótese de trabalho, sugere-se que o ÍNDICE R pode indicar uma tendência futura do Fator de Impacto.

PALAVRAS-CHAVE: fator de impacto, bibliometria, tendências futuras.

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