

From first submission to citation: An empirical analysis*

Philip Hans Franses[†]

Econometric Institute, Erasmus University Rotterdam

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Abstract

The academic publication process consists of at least two stages. The first stage covers the conception of a paper, its submission to a journal, possible revisions due to comments made by (anonymous) reviewers, and acceptance of the manuscript, among other aspects. The second stage concerns the eventual publication of the paper and its academic life-cycle, which is usually measured by a citation score. Next to describing this process in some detail, this paper describes the results of an empirical analysis of a database which includes data on a range of aspects of the publication process. Descriptive statistics give insights as to how long it takes (on average) before the editor returns to the author with the reviews, and also how long it takes for the editor to make a final decision on acceptance, based on a revised manuscript. Econometric models are used to see if, for example, the number of pages, the number of authors, and the number of previous rejections have an impact on these times. Also, it is examined if a special issue makes a difference. Finally, it is studied if the editorial process and observable properties of the paper have any effect on the number of citations, which can be seen as a measure of quality.

*I thank Jesse de Klerk for his assistance with constructing the database, and I thank Peter Boswijk, Harry van Dalen, Richard Paap and Dick van Dijk and seminar participants at the Econometric Institute Rotterdam and the Tinbergen Institute Rotterdam for helpful discussions. The main motivation for writing this paper originates from a recurring series of lectures on "Publishing strategy" for graduate students of the Tinbergen Institute Rotterdam and the Erasmus Research Institute of Management. A second motivation is that I moved to a bigger office, and wanted to get rid of some old files.

[†]Econometric Institute, Erasmus University Rotterdam, P.O. Box 1738, NL-3000 DR, Rotterdam, The Netherlands, email: franses@few.eur.nl

1 Introduction

A key activity of academic researchers concerns the publication of their research findings in scientific journals. There are many researchers affiliated with universities and research institutes, and their scattered research interests are reflected by a sheer infinite number of scientific journals. Through various modes of communication, each scientific discipline seems to have established a set of journals that are considered the best, and a larger set of journals that are second best or otherwise. It is also widely accepted that academic researchers should once in a while publish their findings in these high quality journals. This is seen as a measure of scientific achievement and it is usually met with respect. This holds in particular for young academics, like graduate students, postdoctoral researchers and assistant professors, whose subsequent academic career often depends on their publications in high quality journals. Whether this is good or bad is beyond the scope of this paper, although some of the descriptive statistics below may shed some light on the time frame within which one could judge junior faculty. For example, the period between first submission and eventual publication (at least for the case study at hand) covers 2 years on average, see also Ellison (2002) for similar findings.

As the publication process is key to the careers of academic researchers, it is no wonder that there are many theoretical and empirical studies and that there are even topical journals. A quick scan of the relevant literature shows that there are mainly two types of studies. Those of the first type consider the process starting with the conception of the paper until final acceptance. For example, it might be interesting to see how classic papers (as these turn out to be so after many years or even decades) proceeded through the editorial process. The study of Gans and Shepherd (1994) is a nice and fascinating example of this. Another frequently encountered research issue concerns the editorial process and the decisions involved, see Trivedi (1993), Hamermesh (1994), Street, et al. (1998), and Ellison (2002). Many journals publish editorial statements and some journals also evaluate their editorial behavior, often to see if there has been some bias or some form of particularism, see for example Beyer, Chanove and Fox (1995). Finally, there are also papers which explicitly address the

issue of how one can better write a paper, see for example Thomson (1999).

The second type of studies is concerned with what happens with the academic results once they have been published. One way to measure the quality of scientific output amounts to measuring the number of times other academics cite a paper and perhaps build their research activity on its content, see for example van Dalen and Henkens (2001). Very successful papers in economics and econometrics can get something like 150 citations per year for a period of a decade, see Franses (2002). However, as Klammer and van Dalen (2002) report, for non-exceptional papers an average of 5 citations per author per year is a more natural figure. These citations are not only of importance for authors, but also for the journals. Indeed, when a journal publishes papers which get cited more often, the journal gets a higher rating, and in turn may attract better submissions in the future. There are now various rankings of journals, and in several countries there are lists which rate (economic) departments and researchers on their scientific output, based on these rankings.

It is the aim of this, predominantly empirical, paper to bridge the two research areas by examining the full publication process, ranging from first submission to citations. The analysis will be based on a rather unique database, which contains information on various relevant variables, like dates of submission, revision and acceptance (or previous rejection) and annual citations, for 66(of my own) published papers for the period of 1990-1999. This database, by the way, concerns publications which (on average) get cited close to the average, found by Klammer and van Dalen (2002). These papers were published in a wide range of journals, although these all related to economics, statistics and econometrics. There are a couple of insights to be gained from the empirical analysis. For example, does a better review process, measured amongst other things by the number and size of referee reports, lead to more citations? How long do editorial processes take, on average? Do specific features of the paper make a difference for the editorial process? And, do special issues make a difference? This last topic has not been studied before.

The outline of this paper is as follows. In Section 2, I briefly discuss various stages in the publication process. In Section 3, I first discuss various features of the database, and next provide various descriptive and model-based results. Finally, in

Section 4, I conclude with some remarks.

2 The publication process

In this section the focus is on a few features of the publication process. The discussion is narrowed down such that it matches with the empirical discussion in the next section. For example, there is no discussion on how new ideas get shaped and how they arise, even though such a discussion could be illuminating, simply as these features are difficult to measure quantitatively. Also, as the database concerns an academic researcher in economics/econometrics, the discussion is based on personal experiences concerning journals in these areas. In other disciplines, matters may run much differently, but I am simply not aware of that.

2.1 From first submission to acceptance

The first stage concerns the submission of a manuscript to a journal, the receipt of a letter from the editor with attached referee reports and an associated decision to reject or to allow to revise, and final acceptance.

Conception of a paper

Naturally, before one can submit a paper for possible publication, there first should be a paper. In some areas one can shape the paper beforehand towards the guidelines of the target journal. This means that one follows the style files, but it can also mean that one explicitly aims to contribute to a range of papers that have already appeared in the same journal on the very same topic. This strategy implies that the author is up-to-date with the published literature, and also with the unpublished working papers from other academics who happen to have the same strategy. This strategy can be noticed in disciplines as marketing and finance, where the number of top quality journals is limited.

In other scientific disciplines, one first thinks about an issue or a problem, collects data, designs a new theory, evaluates related theories, or perhaps derives a new methodological tool, and after that one considers which journal could perhaps be most interested. This strategy is more often followed in econometrics and statistics,

where there are plenty good quality journals. Indeed, if a manuscript gets rejected by one journal, one can always send it to another journal.

Before a manuscript is sent out to a journal, the author usually presents his or her work at departmental seminars or international conferences. In most disciplines there are many of these conferences, and there is a tendency to present at at least one or two of these each year. The smaller scale seminars can be more fruitful in terms of feedback, as there is an opportunity to have a closer contact with the audience and hence there is perhaps more room for discussion. During the lectures, the authors themselves also get to know their own work better, and this can be fruitful in the process of writing the final draft of the paper. First rough drafts usually appear in working paper series, and these can be markedly different from the final version. Hence, one may want to be a bit cautious with the working paper versions. Usually, these working papers serve as a kind of patent, implying that the author's rights are claimed.

Key features of a manuscript that can be measured are its length (in number of pages), the number of references and the number of co-authors. The quality is difficult to measure, and an indicator of a topic is too. It can happen that a manuscript is submitted to a special issue of a journal, and hence this usually implies that the topic of the paper matches with the interest of the (special issue) editors.

First submission and response

By the time the author is confident enough to submit the manuscript and to undergo the scrutiny of senior researchers in the area, it can be sent off to the editorial address. If things run by regular mail, it is my personal experience that it may take a month on average before the editor has sent it to the relevant associate editor. Usually, the first response of the editor is that he or she has done so.

Once the manuscript has been sent off, the most uncertain period commences, that is, the author has to await the response from the editor and the associate editor, where their judgement is usually based on what the referees have to say. In the meantime one is better off working on one or a few new papers, as simply waiting for the postman would lead to a very low average productivity. Indeed, this

uncertain period may take a long time, as we will see below.

The key variables here are the number of referees and the average size of their reports. One may believe that more comments, at least if these are constructive and helpful, can make a paper better. So, if there would be a measure of eventual quality of a paper, these two variables might have a positive impact. Additionally, the time between submission and first response can be of interest. More time may suggest that the manuscript is perhaps difficult to understand or that referees do not like it at all and postpone their refereeing duty. Ellison (2002) investigates various possible reasons for differing delays.

Revision and acceptance

The response of the editor can involve a few decisions. The first is the recommendation that the manuscript should be sent to another journal, that is, a rejection. The second is that the editor invites the submission of a revised manuscript, where this revision should be based on what the referees have to say. This can involve much additional work, and sometimes one may feel that the referees ask for this work just to slow you down. In case one feels able to respond adequately, the revision gets sent back to the editor, with a set of accompanying letters to the referees, which outline how their comments were handled.

Then, a second uncertain period commences. Below we will see that this period can be about equally long as the first period. The second letter of the editor can involve a decision of acceptance, of rejection (meaning one has to start all over again by sending it to another journal) and of a request for a further round of revision. There are journals that have a policy that one round of revision should do it, while there are also journals that ask you to revise perhaps 4(!) times. On the other hand, it rarely happens that a paper gets accepted outright.

The key variables here are the number of prior rejections by other journals, before acceptance at the current journal, and the number of revisions. One could think that more revisions would make a paper better. But, if the paper got rejected frequently, it is perhaps not a very good one, and might not turn out to be effective in the end. Obviously, the discussion in Gans and Shepherd (1994) indicates differently, but it

should be borne in mind that there only classic studies were considered. One might argue that papers became classics because of their innovation content, and this may scare off referees. The database to be considered below does not contain such classic papers (I am quite confident to state this!), so perhaps the results are a little more representative. Finally, one may be interested in the time between revision and decision. The shorter this period, the more likely did the revised manuscript meet the referees' suggestions.

Before I proceed to the second stage of the publication process, there are a few remarks to be made about special issues. Such a journal issue usually concerns a specific theme, and the special issue editors invite certain specific people to submit, while also allowing interested individuals to submit. Hence, some form of reputation effects is at stake here. It may be that only those researchers get invitations to submit, from whom one might expect that their paper gets cited well. Also, it may be that the editorial process is different, in the sense that there are smaller sized referee reports, there is a faster response, a smaller amount of referees and so on. In Section 3, I will examine whether this is the case for the database at hand.

2.2 From publication to citation

Once a paper has been accepted, it will be put in the queue for eventual publishing. And, once it got published, everybody can access it, read it, use it, cite it, apply it, and so on.

Eventual publication

As rankings of academic researchers are based on their published papers, the timing of the actual publication is not unimportant. The queue for publication can be rather long. This may be due to an a priori allocated special issue or simply to a large amount of papers in the pipeline. The latter may be due to a high acceptance rate of the editorial board, and to a large number of submitted manuscripts. Hence, the time between the decision of acceptance and the final publication is not very informative for the scientific quality of the editor or the journal. On the other hand, one should of course take this time into account when evaluating resumes of young

faculty.

A word of caution is needed here for those authors who were familiar with the working paper version of the eventually published paper. In many cases, these two versions differ substantially, which is simply due to the fact that the author has tried to meet the comments from the referees. Hence, once a paper is published, one better discards the working paper version, although there are always some exceptions. Indeed, for historical and more qualitative analysis, it would be interesting to see to what extent the working paper and the final version differ.

Diffusion of publication

Once a paper has been published, it is uncommon to present it again at seminars and conferences, and hence, the paper has to do the attraction itself, see Klammer and van Dalen (2002). A key measure of attraction is the number of citations. When a paper gets cited often, it may be considered as more relevant. Of course, there are various reasons why in exceptional situations this suggested relevance may not hold (the author's students may only cite his or her own work, or, the paper is so wrong that everybody wants to stress that), but in general the citation score is a rather reliable measure of quality.

An interesting aspect is the time it takes before papers get cited and before papers do not get cited anymore. Hence, it is of interest to see how the diffusion of publications look like. In Franses (2002) I illustrate that this process can be highly nonlinear. Without going into details here, it seems relevant to measure citations over time (not in just a single year), and that some average measure might be used. In this paper, I will use the number of citations (including self-citations) and an annual average. The latter variable may be improved, as it assumes linearity, but as of yet it is uncertain how.

3 An empirical analysis

This section contains two parts. In the first, I give an outline of the contents of the database. In the second part, I provide various descriptive statistics and two

Table 1: The journals in which the papers have been published

Journal	Rating	Amount
Applied Economics Letters	D	1
Applied Statistic Models and Data Analysis	D	2
Communications in Statistics - Theory and Methods	B	1
Computational Statistics and Data Analysis	C	1
Econometric Theory	B	1
Economics Letters	B	8
Empirical Economics	B	2
International Journal of Forecasting	C	7
International Journal of Research in Marketing	A	1
Journal of Applied Statistics	D	2
Journal of Business and Economic Statistics	A	4
Journal of Applied Econometrics	B	1
Journal of Econometrics	B	5
Journal of Economic Surveys	D	1
Journal of Forecasting	C	5
Journal of Futures Markets	D	1
Journal of Macroeconomics	B	1
Journal of Marketing Research	A	1
Journal of the Operational Research Society	C	1
Journal of Time Series Analysis	C	2
Macroeconomic Dynamics	D	1
Oxford Bulletin of Economics and Statistics	C	4
Quality and Quantity	C	2
Review of Economics and Statistics	A	2
Statistical Papers	C	1
Statistics and Probability Letters	D	5
Studies in Nonlinear Dynamics and Econometrics	D	1
Technological Forecasting and Social Change	C	2

econometric modeling results.

3.1 Data collection

The data concern 66 published papers in 28 different journals, for the period 1991-1999. This period effectively starts in the year of my graduation. In the Netherlands, these journals get rated as A (top), B, C and D. There are 8 publications in A journals, 19 in B journals, 25 in C journals and 14 in D journals, and this suggests a reasonably balanced spread over the journal qualities. The journals, their rating and the amount of published papers in these journals appear in Table 1

Table 2: The years in which the publications appeared

Year	Number
1991	5
1992	6
1993	4
1994	7
1995	8
1996	9
1997	10
1998	8
1999	9

Table 2 gives the empirical distribution of the amount of publications per year. Again, this distribution does not show obvious peaks or asymmetries, although there is a moderate trend upwards.

For the empirical analysis, the following variables were constructed. First, there are the number of citations and the number of citations, standardized. This standardization entails that the data are averaged over the years, since the actual publication. Upon doing this, care has been taken of the timing within a year that the journal issue with the paper appeared. Hence, the data are scaled back from months to years.

Next, for all 66 papers, there is information on the number of co-authors, the number of published pages, the number of cited references and whether the paper appeared in a special issue or not. The number of published pages is of course not necessarily equal to the number of initial manuscript pages, but these were difficult to collect and standardize.

As measures for the editorial process, there are observations on the amount of prior rejections by other journals (before final acceptance by the last one), the number of referees, the average size of the referee reports and the number of revisions.

Finally, there is information on the number of months between first submission and first response, between submission of the revision and the decision of acceptance (hence the total time that the manuscript has been with the journal), and the time

Table 3: Descriptive statistics concerning the published papers

Variable	Mean	Median	Maximum	Minimum	Standard deviation
Citations	3.955	2	27	0	6.072
Citations, standardized	0.630	0.405	3.290	0	1.904
Co-authors	0.818	1	2	0	0.654
Pages	13.045	10	47	2	8.204
References	18.492	15	97	3	14.743
Special issue	0.121	0	1	0	0.329
Prior rejections	0.500	0	3	0	0.965
Referees	1.379	1	4	0	0.973
Average report size	1.284	1	3.5	0	0.933
Revisions	1.061	1	4	0	0.802

between the decision of acceptance and final publication.

In the next subsections, I will first provide some descriptive statistics and then discuss some modeling outcomes.

3.2 Descriptive statistics

Table 3 provides key statistics, like mean, median, maximum, minimum, and standard deviation of the papers themselves.

It can be seen that each paper has about 4 citations. Several paper never got cited (18 of the 66 here) and at least one paper has 27 citations. The empirical distributions of these variables appear in Figure 1 and Figure 2. Note that the citations also include self-citations.

The maximum number of co-authors is 2, and there are 21 single-authored papers, see Figure 3. This means that there is substantial variation in this variable.

The largest paper contains 47 pages (and also happens to have 97 references as it is a survey paper). Deleting this observation in the modeling below does not lead to very different results. The empirical distributions of the variables concerning the number of pages and the number of reference appear in Figure 4 and Figure 5. The average number of references is about 18.5, and this is close to the average of all

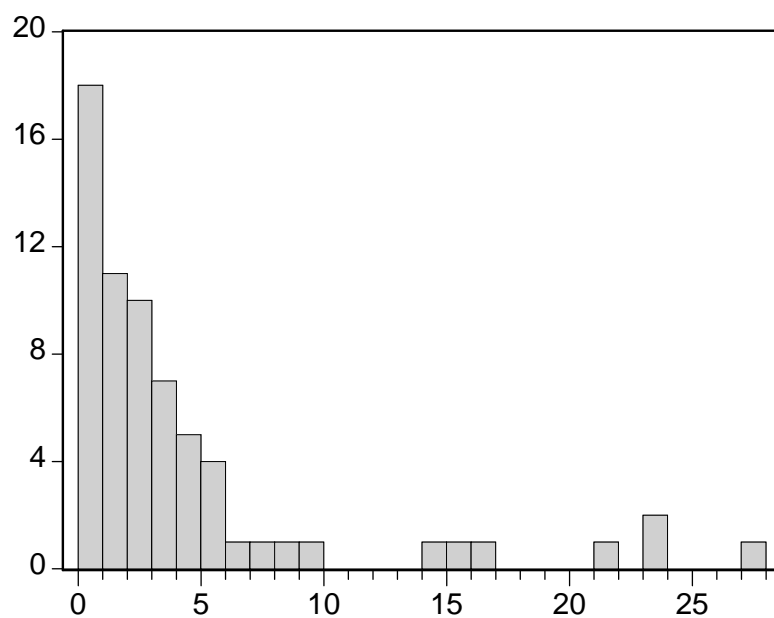


Figure 1: Number of citations, cumulative up to October 2001

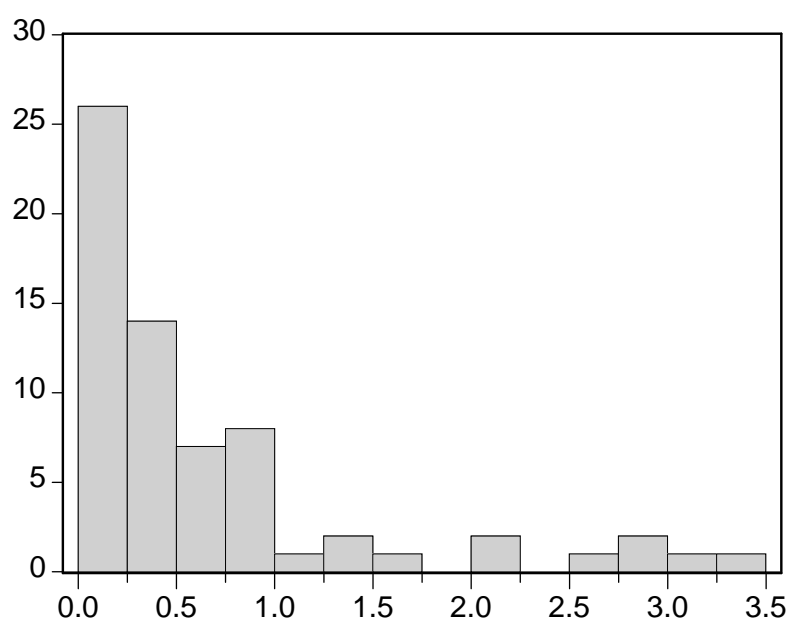


Figure 2: Number of citations, cumulative up to October 2001, standardized

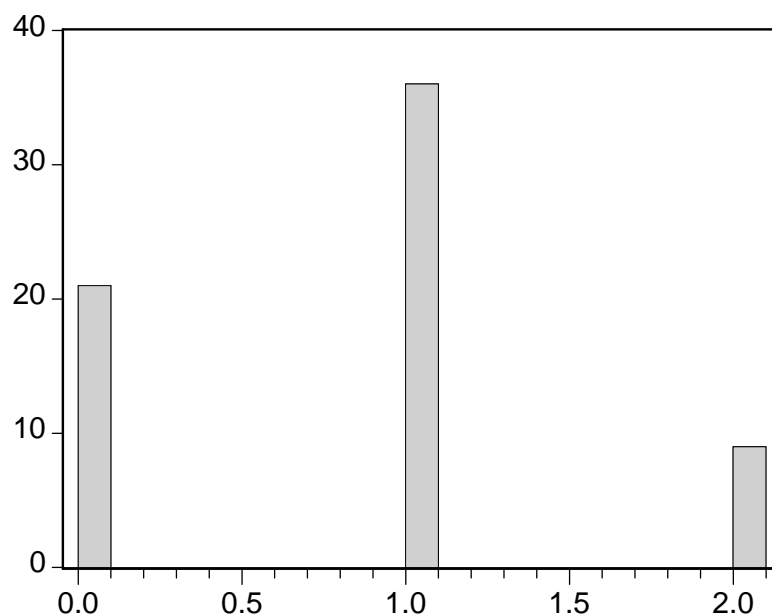


Figure 3: Number of co-authors

articles in the Social Science Citation Index, see Klammer and van Dalen (2002).

Next, I turn to features of the editorial process. Some papers got rejected three times before they eventually got published, see Figure 6

The following three graphs deal with the referees and the revisions. In Figure 7 I present the number of referees. When the number of referees is zero, this can mean that the paper got accepted outright or that the editor him- or herself wrote the reports. This was apparently the case for 14 of the 66 papers.

The average report size is one page, with exceptions of size 3.5 pages, see Figure 8. These extensive reports, by the way, also correspond with the journal which endorsed 4 revisions before final acceptance. Clearly, the number of revisions is on average equal to 1. Figure 9 gives the empirical distribution of the number of revisions.

Now I turn to the statistics on the time between various important events. Table 4 provides key statistics, like mean, median, maximum, minimum, and standard deviation of the periods. Empirical distributions of these four variables appear in Figure 10, Figure 11, Figure 12 and Figure 13. The time the paper has been with

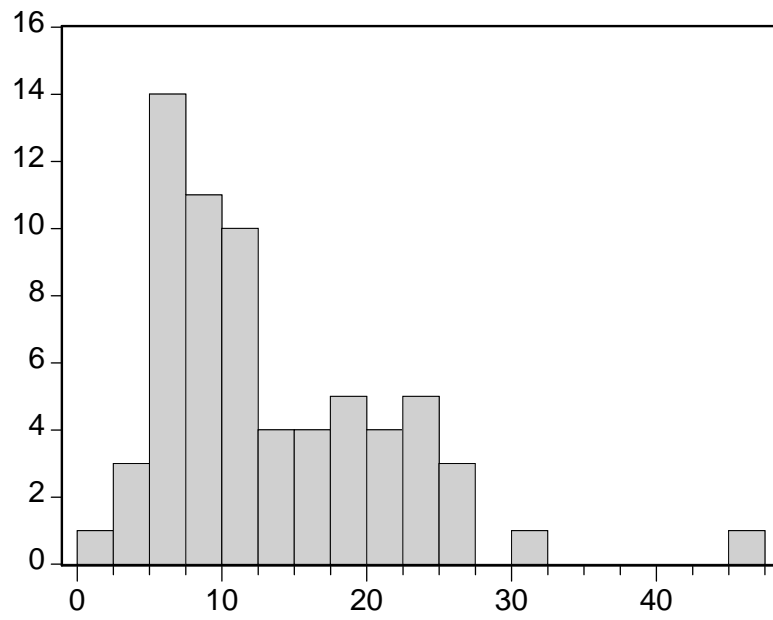


Figure 4: Number of pages of paper (in published form)

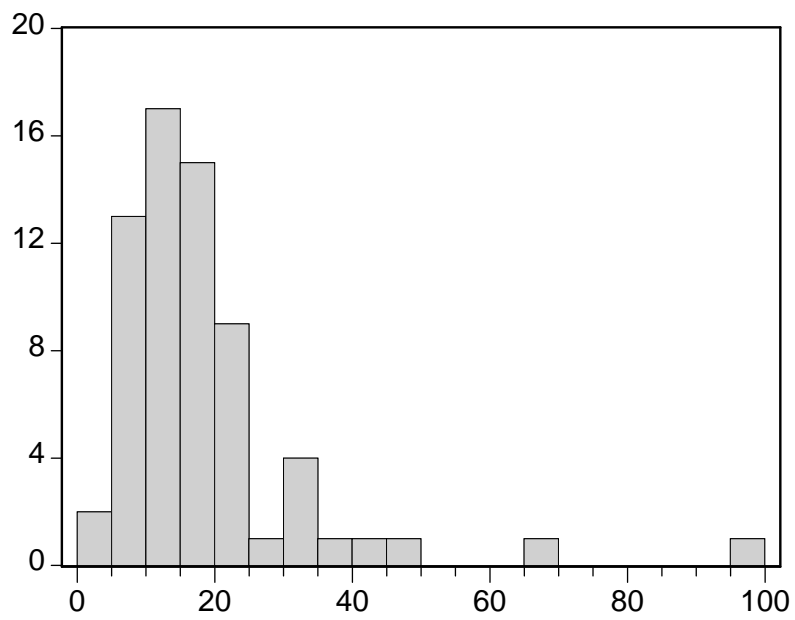


Figure 5: Number of cited references

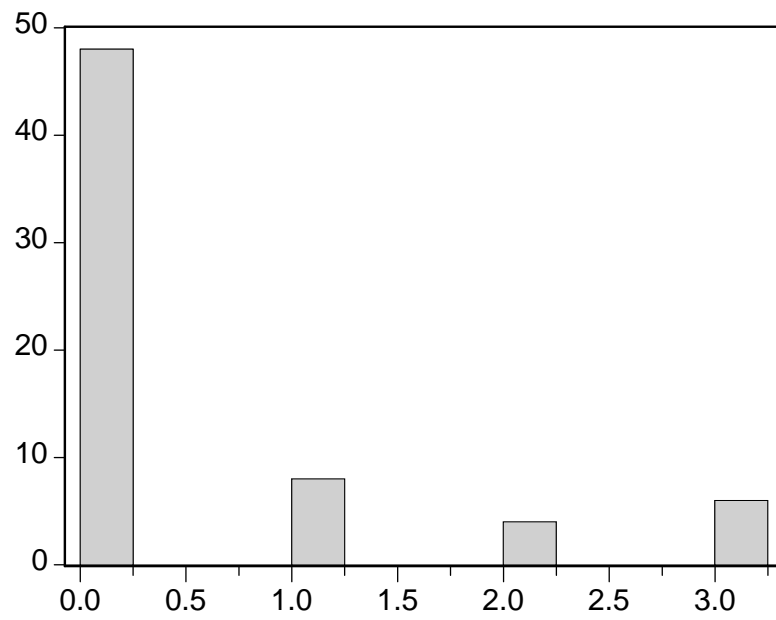


Figure 6: Number of times the paper was rejected prior to current publication

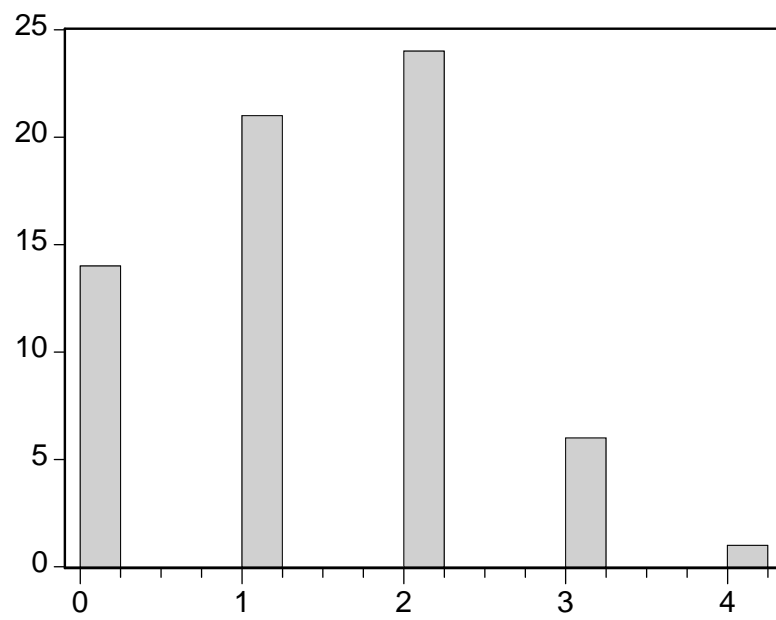


Figure 7: Number of referees

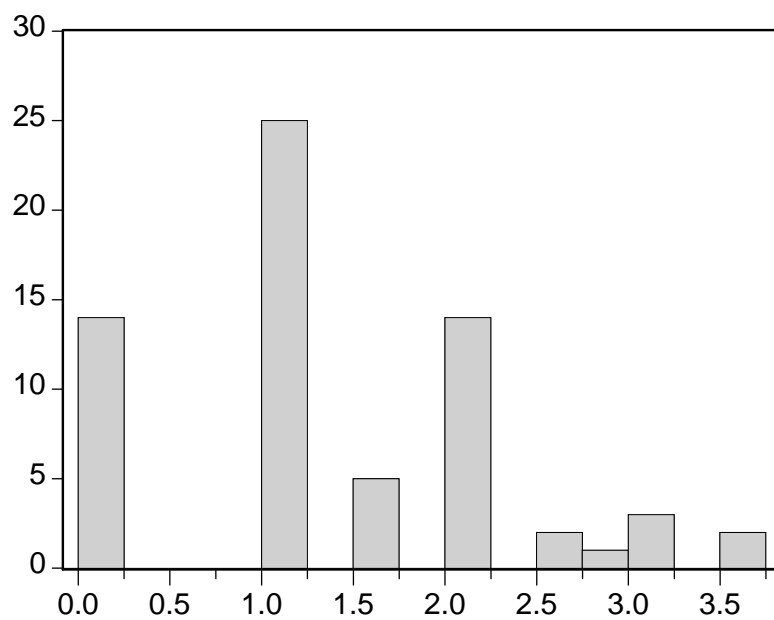


Figure 8: Average size of reviewers' reports (in A-4 format)

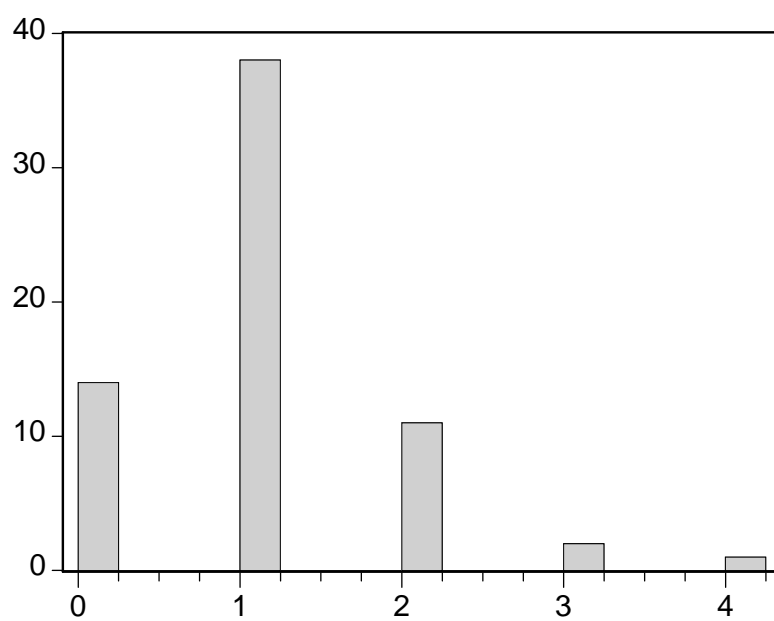


Figure 9: Number of revisions that were required for current publication

Table 4: Descriptive statistics concerning the editorial process: The time in months between decision moments

Variable	Mean	Median	Maximum	Minimum	Standard deviation
Submission-first response	5.545	5	15	1	3.168
Revision-decision	5.182	4	21	0	5.132
With journal	10.727	10	27	1	6.646
Decision-publication	8.606	9	24	0	4.516

the author for revisions is of course very case-specific, although for this database I found it to be equal to 6 months.

In various respects, the numbers and graphs above give interesting insights. Note that many journals publish these time frames too, like for example the time the paper has been with the editor, but that the numbers here concern averages over journals. In some cases, the editorial process can be shorter than a month, but it may also happen that a paper is with the journal for 27 months. On average, this number is 11 months, with a median of 10 months. Additionally, it can happen that a paper is in the publication queue for 2(!) years.

In sum, taking an average time that the paper is with a journal, that is, 11 months, take another 6 months for the author to do the revisions, and then take another 9 months for eventual publication, it can happen that there is an average time difference of more than 2 years between first submission and final publication. Note that this holds true for the successful papers, as these outcomes were not discounted for the time it took to handle earlier rejections.

3.3 Econometric models

The next question of course concerns the impact of aspects of the paper and of features of the editorial process have an impact on the quality of the paper, as measured by citations.

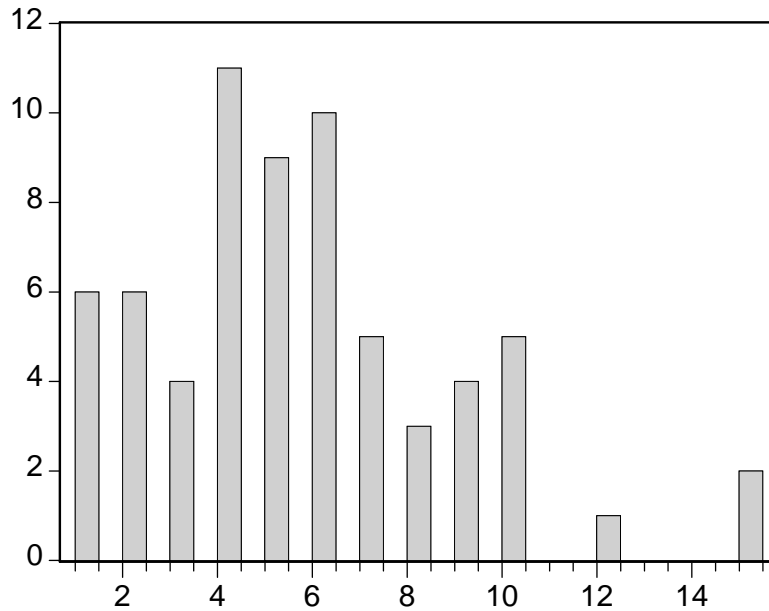


Figure 10: Time in months between first submission and the response from the editor with the review reports

Does a special issue make a difference?

It is commonly believed that special issues of journals are different, not only in topical interest, but particularly in terms of treating certain researchers otherwise and perhaps have differing refereeing procedures. Also, it is said that special issues have more impact in terms of citations, than regular issues have.

In Table 5 I report on a regression of a variable of interest on an intercept and a 1/0 dummy in case the paper appeared in a special issue of a journal. This dummy variable takes a value of 1 in 9 of the 66 cases. The results in this table clearly suggest that all aspects of the paper and all features of the editorial process are not significantly different for special issue papers. The only variables for which the special issue makes a significant contribution concern the citations and standardized citations. Hence, indeed, special issue papers get cited more often.

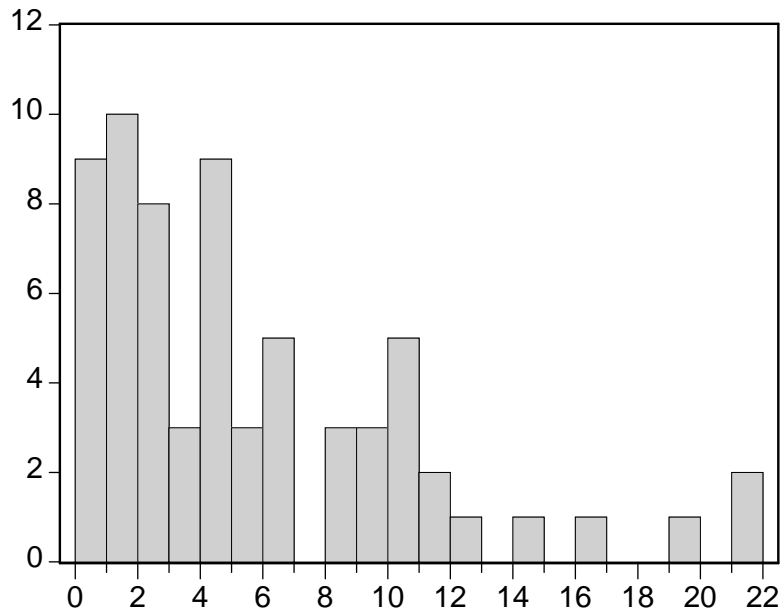


Figure 11: Time in months between submission of revised manuscript and the response from the editor with the decision of acceptance

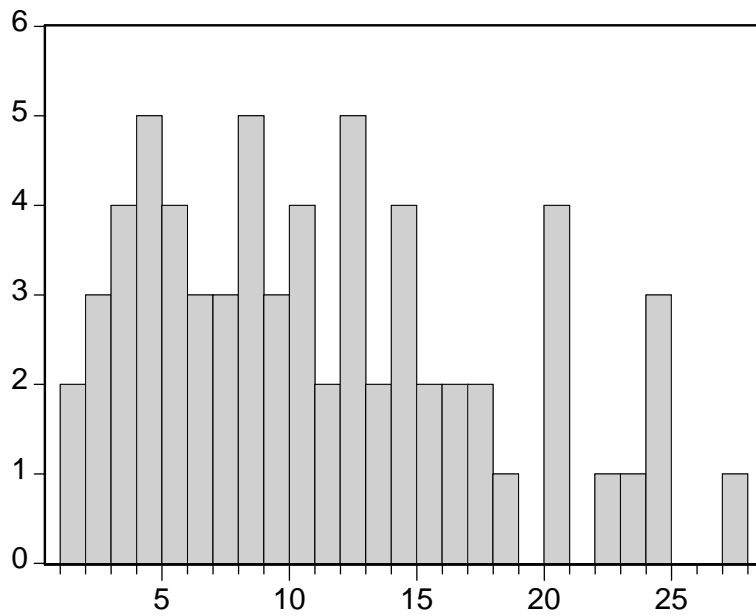


Figure 12: Time in months between first submission and the date of acceptance

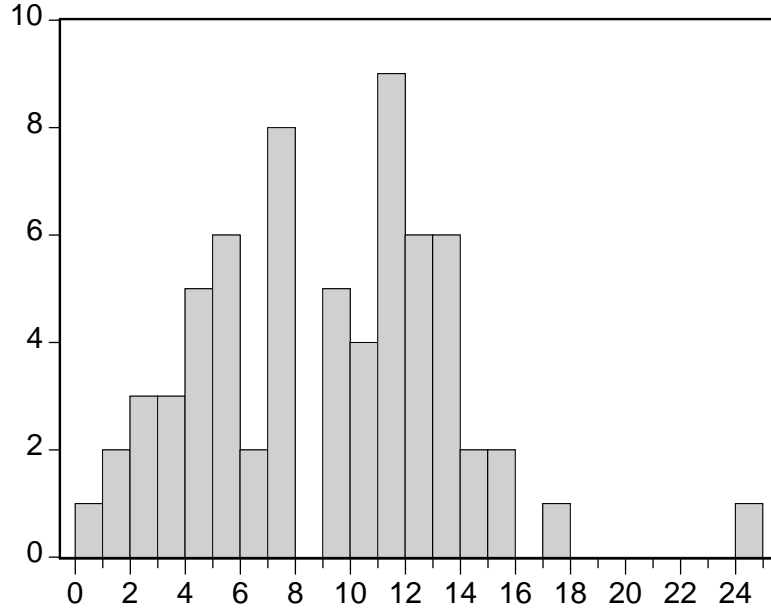


Figure 13: Time in months between decision of acceptance and eventual publication

Table 5: Does a paper in a special issue make things different?

Variable	Intercept	Dummy for special issue	P-value
Citations	3.379	4.746	0.037
Citations, standardized	0.544	0.709	0.022
Co-authors	0.776	0.349	0.143
Pages	13.086	-0.336	0.915
References	18.741	-2.491	0.655
Prior rejections	0.569	-0.444	0.225
Referees	1.362	0.138	0.710
Average report size	1.220	0.530	0.133
Revisions	1.052	0.073	0.811
Submission-first response	5.379	1.371	0.254
Revision-decision	5.483	-2.483	0.202
With journal	10.862	-1.112	0.661
Decision-publication	8.328	2.297	0.179

Models for time

The second type of model analysis concerns the possible explanatory value of the average reports size, the number of co-authors, the number of pages, the number of referees, the number of references, the number of previous rejections, whether it is a special issue or not on the various time variables. Each of these models also includes a variable which measures the year, that is, 1 for 1991, 2 for 1992 and so on. This is done to see if things might have changed over the years, which is convincingly suggested by Ellison (2002) and others.

The models for this analysis are various proportional hazard model and the accelerated lifetime models, where the Eviews code as given in Chapter 8 of Franses and Paap (2001) is used, and models for the natural logarithmic transformed time variables. For all models it turned out that none of the above variables is significant, except for the year, which obtains a positive sign in all models. Hence, over time, the editorial process is taking longer and longer, and this is in agreement with the findings in Ellison (2002).

Model for standardized citations

As there are 18 papers that never got cited, the analysis of citations should involve a tobit-type regression model. With the number of standardized citations as the explanatory variable, and all other variables as potential explanatory variables, the final tobit-1 model (where insignificant variables at the 10% have been deleted) implies the following effects. A significant and positive effect (t-statistic values in parentheses) is found for the number of pages (4.447), the number of referees (1.864), and the 1/0 dummy variable for a special issue (2.723). A significant and negative effect gets the year (-4.409). This last finding suggests that this author gets less and less cited over the years. One reason may be the quality of the manuscripts, another reason may be the increasing abundance of authors and journals.

4 Concluding remarks

This paper has provided a coherent empirical analysis of various features of the publication process. Additional to various interesting descriptive statistics, it was found that special issues are not treated differently by authors and editors, but that papers in these issue get cited more often. Also, it was found that the editorial process takes longer and longer, and that longer papers which had more referees to evaluate it get more citations.

This study has of course various limitations. First of all, it concerns the publications of a single individual. It would be of interest to combine various databases, although the reluctance of academics to cooperate as noted in Trivedi (1993) may make this a non-trivial exercise. Additionally, if one includes data for different individuals, one has to take account of observed and unobserved heterogeneity. A second limitation is that papers that never got published were not included, simply as these files have been thrown away. Hence, databases which also include detailed records of rejected papers would be informative.

An important conclusion to be drawn from this empirical analysis, which in fact enhances the findings in Ellison (2002) and others, is that the editorial process takes long and that only a few papers get frequently cited. This makes the evaluation of junior faculty cumbersome.

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