Demographers and Their Journals: Who Remains Uncited After Ten Years?

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CITATIONS OF AUTHORITATIVE SOURCES in scholarly publications have come to acquire a new function in recent decades. Their original purpose was to give credit to the originators of an idea or finding, but with increasing competition and specialization in academia, the function of citations as an intellectual credit system is increasingly giving way to their role as indicators of individual or departmental productivity. Citations are now widely used to assess the viability of research programs and journals. Students use citation rankings to assess which university or department is worth large tuition fees. Policymakers and science foundations use rankings to allocate funds in order to generate high returns on investment; universities directly or indirectly use citations in hiring and tenure decisions to assess individual scholars; and readers of journals who want to make the most of their reading time consult journals with high citation rankings.[1] Last but not least, scholars on the tenure track use citation rankings to decide to which journals they should submit their papers. The predominant use of citations in decisionmaking in academic life makes questions about the allocation of citations increasingly important (see Korobkin 1999; Frey 2003).

About five years ago, we (van Dalen and Henkens 1999) presented some figures on the number and frequency of citations that articles in demography journals received. The measurement unit we used was the journal or the group of articles published in the journal. The study revealed some surprising conclusions about the dissemination of demographic knowledge. It showed that 64 percent of the articles published in demography journals were cited at least once in the first five years following their publication. Contrary to studies by the Institute for Scientific Information (ISI),

which reported on so-called uncitedness in the social sciences (Hamilton 1990), the average level of uncitedness in demography proved to be relatively low. The variations between journals, however, were very large: whereas articles in top journals were almost all cited within a few years, a considerable proportion of articles in second-tier journals received few or no citations. Colleagues of ours who could not hide their disbelief about the large proportion of uncited articles in the second-tier journals questioned the time horizon we had used—five years.

In this research note, we elaborate on our 1999 study by following the same set of demography articles and tracking their influence in the social sciences over a ten-year period. We address two research questions. First, we establish the long-term impact of demography articles and the extent to which numbers of citations decrease or increase in the years following publication. Second, we determine whether articles that are not noticed by fellow researchers in the short term remain neglected in the long term. Conventional wisdom has it that the longer one remains uncited, the higher the probability that one has produced a so-called dry hole in science (Laband and Tollison 2003). But it is also possible that articles in less high-profile journals need time to become recognized and appreciated and that "dry holes" may not be so dry after all.

First, we present rankings of demography journals based on raw citation counts over a ten-year period. We then undertake a duration analysis of the timing of first citations. We close with an interpretation of the citation "facts" and the implications for science policy.

The set of demography journals

To study the impact of demography journals we used the *Web of Science*, published by the ISI (which covers the *Science Citation Index*, the *Social Science Citation Index,* and the *Arts and Humanities Citation Index*). This database tracks citations to and from articles in journals that represent the core of the literatures in the various sciences. Most of the citations to demography journals are given within the domain of the *Social Science Citation Index* (SSCI). To obtain insight into the long-term impact of journals and their articles, we gathered data on the citation frequency and other characteristics of individual publications in demography journals in three consecutive years (1990–92). The discipline of demography is covered worldwide by some 896 population serials, according to the reputable *Ulrich's Periodicals Directory* (as of fall 2003), although a large number of these serials are bulletins published by national statistical organizations and refereeing (certainly by outside readers) is weak. Only 17 of the 896 journals are selected by the SSCI as making an important contribution to the development of demography. The impact that we registered is therefore a partial one, because ar-

ticles may have been cited in non-refereed journals or in the gray literature (government documents, consultancy reports, or newspapers). But if science is viewed as the community of scholars working at the frontier of their field, then the impact as registered by the *Web of Science* may well be an accurate measure of influence: an article published in one of the 17 demography journals has a chance of being cited in approximately 8,700 journals (see www.isinet.com), representing an audience of scholars that has passed the screening of the gatekeepers of science: the editors and the referees. The benefit of using the ISI selection of demography journals is that it offers a wide variety of journals, not just the prestigious publications of large associations, but also the more specialized and less well-known journals. In their selection (and rejection) process of journals, the ISI editors take numerous factors into account, including the journal's basic publishing standards (timeliness of publication and the use of international editorial conventions that optimize the retrievability of source articles); its editorial policy with respect to topics covered; the use of English-language article titles, abstracts, and keywords; and the international diversity of authorship (of both source and cited articles).[2]

The 17 demography journals included in the study are, in alphabetical order: *Demography, European Journal of Population, Family Planning Perspectives, International Migration, International Migration Review, Journal of Biosocial Science, Journal of Family Welfare, Journal of Population Economics, Population, Population Bulletin, Population and Development Review, Population and Environment, Population Index, Population Research and Policy Review, Population Studies, Social Biology,* and *Studies in Family Planning*. Of course, demography is not a static science, as is evident from van de Kaa's overview (2003). The set of demography journals tracked by ISI is not fixed, because some journals lose their status as worthy contributors to the community of science and some journals change their editorial policy or expire. The market for demography journals, like every other market, has players that come and go. We briefly mention how we handle three changes that took place during the study period.

First, although the *Journal of Family Welfare* no longer forms part of the set of demography journals of the Social Science Citation Index, we have kept it in our sample for the purpose of comparison. The *Journal of Family Welfare* failed to maintain the standards that the ISI demands of the journals it registers. Its place has been filled by another demography journal. As of 2003 the *European Journal of Migration and Law* has been approved for inclusion in the ISI database.

The second change is the expiration of *Population Index*, published by Princeton University. We did not include *Population Index* in our 1999 study, because it published articles on an irregular basis and therefore did not seem comparable to the other journals. But to satisfy our curiosity, we included it

this time, because the focus of attention is on the total body of knowledge produced in demography and, with hindsight, our study may shed light on the function of a review journal such as *Population Index*.

The third change with implications for our study was a shift in the editorial policy of the French journal *Population.* Articles in *Population* were traditionally published in French, but in 2002 the editors decided to simultaneously publish English and French versions of the journal. Our data refer to the time when the journal was published only in French (with the exception of a special annual English-language edition of *Population*). The citation outcomes of this journal must be interpreted with caution. Previous research based on the same set of demography journals (van Dalen and Henkens 2001) suggests that the chance of an article in *Population* being cited could have doubled had the journal appeared in English.

Our total sample consists of 1,371 articles published between 1990 and 1992 in 17 demography journals. Our data refer solely to individual articles. Book reviews, editorials, and other so-called marginalia were excluded from our sample because they do not contain original research results.

Facts about citation ten years after publication

The chances of being cited

What can ten years of citation experience teach us that we cannot learn from, say, two or five years of citation experience? At first sight, things do not seem to have changed much if we look at Table 1. There is no radical change in the ranking of journals. Top journals and second-tier journals both retain their rankings. But things *have* changed if one looks at levels of uncitedness.

The average demography article published between 1990 and 1992 had roughly a 59 percent chance of remaining uncited two years later, a 36 percent chance five years later, and a 24 percent chance ten years later. If we exclude short commentaries from among the articles and if we exclude self-citations, the level of uncitedness drops to 21 percent. In other words, the gloom surrounding uncitedness is really quite unwarranted, because the level of uncitedness continues to drop over a ten-year period. This situation is in marked contrast to other sciences where a citation window of three to five years is sufficient to see whether or not an article makes a contribution. Compare, for instance, the insights generated by Glänzel et al. (2003), who showed that 60 percent of all articles listed in the *Science Citation Index* (1980 edition) were cited in the two subsequent years. After five years, this figure increased to 70 percent and after ten years to 75 percent.

Our database indicates that articles in the core demography journals and specialized family planning journals were already widely cited after five years, and 90–100 percent of all articles published were cited after ten years.

TABLE 1 Uncitedness after 2, 5, and 10 years of articles published in demography journals in 1990–92, ranked by the level of uncitedness after 10 years (column 3)

Journal	Percent of articles uncited after					Total number of articles (6)
	2 years (1)[a]	5 years (2)[a]	10 years (3)[a]	10 years including author self-citations (4)	10 years excluding short commentaries and self-citations (5)[a]	
1. Population and Development Review	22.7	4.0	0.0	0.0	0.0	75
2. Population Studies	31.6	5.1	2.5	1.3	2.6	79
3. Family Planning Perspectives[b]	15.6	5.6	4.4	2.3	1.4	90
4. Demography	25.8	11.7	5.0	3.3	4.4	120
5. Studies in Family Planning	40.4	15.2	5.1	4.0	5.4	99
6. Population Bulletin	25.0	8.3	8.3	8.3	8.3	12
7. Population Index	22.2	11.2	11.2	11.2	11.2	9
8. International Migration Review	64.7	36.1	18.5	16.8	13.1	119
9. Journal of Biosocial Science	73.6	45.0	19.3	15.0	18.2	140
10. Journal of Population Economics	50.0	28.8	21.2	21.2	21.2	52
11. Social Biology	78.7	42.7	22.7	18.7	17.2	75
12. Population Research and Policy Review	68.2	45.5	25.0	15.9	23.3	44
13. European Journal of Population	73.8	51.2	26.8	24.4	25.0	41
14. International Migration	79.3	51.7	36.8	33.4	32.9	87
15. Population and Environment	86.7	51.7	40.0	38.3	41.1	60
16. Population	80.2	62.2	48.8	42.4	34.8	172
17. Journal of Family Welfare	91.8	79.4	70.1	63.9	68.9	97
All demography journals	58.7	36.3	23.8	20.6	20.7	1,371

[a] The uncitedness rates in columns (1) to (3) and column (5) exclude self-citations by the author(s) of articles.
[b] This journal was retitled *Perspectives on Sexual and Reproductive Health* in 2002.

This observation is in line with similar research by Bott and Hargens (1991) into top sociology journals. They found that practically all of the sociology articles and books were cited within 11 years of their publication. However, their sample was limited to top journals, and they could not make statements about the state of uncitedness in the entire discipline of sociology. Our sample represents a far smaller discipline, but it has the advantage of covering both the giants and the dwarfs among the journals and the authors publishing in those journals. In that respect, our conclusions are more robust, although we acknowledge that the situation in other disciplines can be markedly different.

The highest-ranking journal in terms of the level of citations was *Population and Development Review*: ten years on, every article published had received at least one citation. For journals in the mid-category, such as the *Journal of Biosocial Science*, *International Migration Review*, *Social Biology*, *Population Research and Policy Review*, and *European Journal of Population*, the level of uncitedness after ten years dropped to around the half level found after five years. Only in the Indian *Journal of Family Welfare* did the large majority of articles published remained uncited after ten years.

To test the robustness of the ranking, we also present two alternative rankings in addition to column (3): namely, a ranking that includes author self-citations and a ranking that includes only full-sized articles (and excludes author self-citations). The two rankings are presented in columns (4) and (5) respectively. One reason for using these alternative rankings is that author self-citation could distort a ranking because authors of little note or authors publishing in low-profile journals may try to draw attention to their own work by "advertising," that is, citing their own work. Of the total sample of 1,371 articles, 37 percent of the authors of these articles had cited their own work in the subsequent ten years, and the average number of self-citations by those who had referred to their own work was 2.4 (these statistics not shown in table). The potential for self-citations to significantly influence rankings is therefore real, but, as Table 1 shows, the inclusion of self-citations does not greatly alter the rankings, the only exception being *Population Research and Policy Review*, whose level of uncitedness fell from 25 to 16 percent (compare columns 3 and 4).

The alternative journal ranking based on full-sized articles was constructed by excluding all research notes, comments, and replies from the total sample. The ranking and SSCI-impact factor of journals can be sensitive to these types of journal articles, and the editorial policies of demography journals differ markedly with respect to publishing these smaller pieces. Column (5) in Table 1 shows that a correction of this kind does not significantly affect the ranking of most journals. The correction was only found to benefit the uncitedness level of the French journal *Population*, which stands to reason because this journal publishes a considerable number of small contributions in each issue. The level of uncitedness of *Population* dropped as a consequence of this counting rule from 49 percent to 35 percent.

Impact

Of course, being cited is not the only means of gaining prestige or respect for one's work. It matters to most academics how many times an article is cited. In Table 2, we present similar citation figures as in Table 1, but this time the focus is on the frequency of citation.

The average number of citations a demography article received was 3.6 after five years and 7.1 after ten years. Although the number of cita-

TABLE 2 Average number of citations after 5 and 10 years of articles published in demography journals in 1990–92, ranked by total number of citations after 10 years (column 3)

Journal	Average number of citations per article in		Cumulative number of citations after 10 years		
	Years 1 to 5 (1)	Years 6 to 10 (2)	Total (1 + 2) (3)	Total including author self-citations (4)	Total excluding short commentaries and author self-citations (5)
1. Family Planning Perspectives	14.0	10.3	24.3	26.1	28.6
2. Demography	7.8	9.4	17.3	19.6	17.8
3. Population Index	8.0	8.1	16.1	19.1	16.1
4. Population and Development Review	7.2	7.2	14.4	16.0	17.7
5. Population Bulletin	8.5	5.6	14.1	14.8	14.1
6. Studies in Family Planning	5.6	6.4	12.0	13.2	12.2
7. Population Studies	4.8	3.9	8.7	9.6	8.7
8. International Migration Review	2.1	2.4	4.5	5.0	4.8
9. Journal of Population Economics	1.9	2.2	4.0	4.9	4.0
10. Population Research and Policy Review	1.3	1.9	3.3	4.3	4.0
11. Journal of Biosocial Science	1.4	1.7	3.2	3.9	3.2
12. Social Biology	1.3	1.9	3.2	3.9	3.5
13. European Journal of Population	1.2	1.8	3.0	3.6	3.1
14. International Migration	1.1	1.0	2.1	2.3	1.8
15. Population and Environment	1.2	0.8	2.0	2.3	2.1
16. Population	0.7	0.5	1.2	1.6	1.7
17. Journal of Family Welfare	0.3	0.2	0.5	0.6	0.5
All demography journals	3.6	3.6	7.1	8.0	7.8

NOTE: Columns (1) to (3) and (5) exclude self-citations by the author(s) of articles.

tions peaked in the fourth year after publication, Table 2 shows that the average number in the second five-year period was almost the same as the number of citations in the first five-year period. Interestingly, the average number of citations per article published in second-tier journals was higher in the second five-year period than in the first five.

The last two columns, (4) and (5), are included once again to test the ranking of journals for their robustness to alternative citation measures; as can be seen, there was no significant change to the rankings except some minor changes in the last column.

To get an impression of the share of citations that types of journals receive over time, one can make the following observations. The core research journals—*Population and Development Review*, *Population Studies*, and

Demography—captured 38 percent of all citations in the first five years and 41 percent of the citations in the second five-year period (data not shown in Table 2). The share of the two family planning journals (*Family Planning Perspectives* and *Studies in Family Planning*) dropped from 38 percent in the first five-year period to 33 percent in the second period. All other journals increased their share of total citations from 24 percent in the first period to 26 percent in the second five-year period.

Inequality of attention

Average citation frequencies mask the inequality of attention that is characteristic of every creative profession. Merton (1968), one of the first scholars to highlight the idiosyncrasies of science, described the apparently "unfair" distribution of attention as the "Matthew Effect": "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath." In short, Merton's claim is that in the race for priority in discovery, the attention goes to those who "have": the reputable authors and the authors publishing in reputable journals. Demography as a science is no exception to this rule, as we noted in our 2001 article and as can be seen in some rough measure from Table 3, which presents the cumulative number of articles by the number of cita-

TABLE 3 Distribution of articles by the number of citations received per article after ten years and their share of the total number of citations

Number of citations after 10 years	Number of articles	Percent	Cumulative percent	Share of total citations[a]	Cumulative percent
0	326	23.8	23.8	0.0	0.0
1	219	16.0	39.8	2.2	2.2
2	140	10.2	50.0	2.9	5.1
3	92	6.7	56.7	2.8	7.9
4	78	5.7	62.4	3.2	11.1
5	60	4.4	66.8	3.1	14.2
6	60	4.4	71.2	3.7	17.9
7	43	3.1	74.3	3.1	21.0
8	33	2.4	76.7	2.7	23.7
9	30	2.2	78.9	2.8	26.5
10	23	1.7	80.6	2.4	28.9
11–29	198	14.4	95.0	34.6	63.5
30+	69	5.0	100.0	36.5	100.0
Total	1,371	100.0		100.0	

[a]Out of the total number of citations (9,758) of articles in 17 demography journals after ten years.

tions received per article ten years after the publication date and the share of those articles in the total number of citations. The share of attention accorded to the articles is highly skewed: the top 5 percent of most-cited articles accounted for 37 percent of all citations, whereas the top 21 percent (those with ten or more citations) accounted for 74 percent of all citations. The most frequently cited article in demography received 158 citations in ten years.[3] The inequality is even more skewed if one takes the author or set of authors, rather than the article itself, as the unit of analysis. One of the reasons for doing this is that numerous authors publish not one article in three years (our observation period) but several. Teachman et al. (1993), for example, convincingly showed how a relatively small number of population centers contributed disproportionately to the journal *Demography*.

Does uncitedness accelerate over time?

The stable impact scores over time in Table 2 and the steadily falling levels of uncitedness in Table 1 suggest that one should not be too quick to draw conclusions. Just because an article is uncited two or even five years later does not imply that it will not be noticed and used subsequently. The figure confirms that this is the case. Figure 1 depicts the probability of being cited in a particular year for articles still uncited at the beginning of the year, and Table 4 illustrates how the pool of uncited articles decreases over time. The

FIGURE 1 Percent of articles cited for the first time among articles yet uncited in a particular year following publication

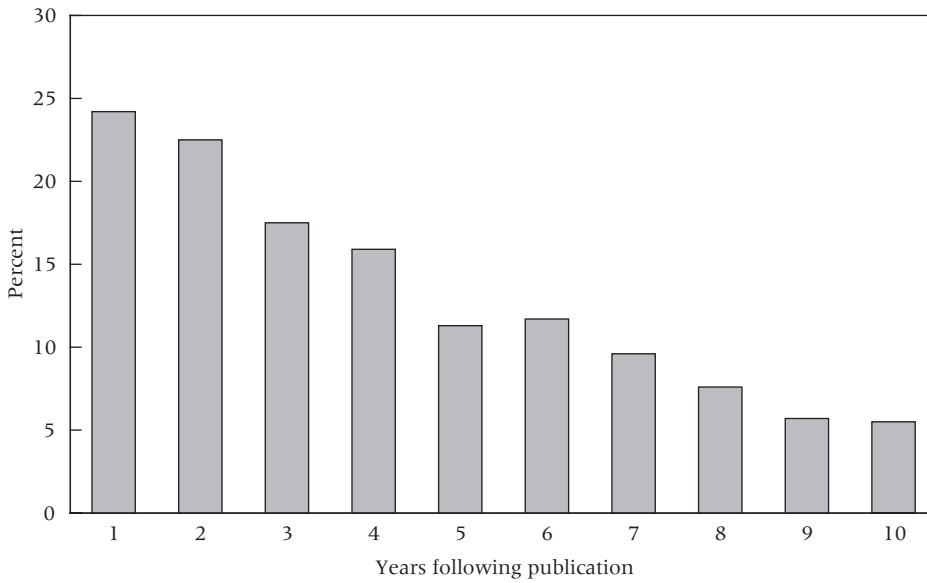


TABLE 4 The timing of first citation by years after publication

	1	2	3	4	5	6	7	8	9	10
Number of uncited articles at beginning of year	1,371	1,039	805	665	559	496	438	396	366	345
Number of articles cited for the first time	332	234	140	106	63	58	42	30	21	19
Chance of being cited in a particular year for articles uncited at beginning of year (percent)	24	23	17	16	11	12	10	8	6	6

percentages in the bottom row of the table correspond to those depicted in Figure 1.

Although an uncited article's chances of citation decrease over the years, the decline is relatively modest. In the first year, an uncited article had a 24 percent chance of being cited. An article that did not receive a single citation in its nine years of existence still had a 6 percent chance of being cited in the tenth year from among the articles yet uncited. The reason why the chances of a first citation decrease over time may be that observed uncitedness of articles signals to prospective users that the article is of low quality. In short, uncitedness may become a stigma and the longer an article is uncited, the lower the perceived quality and the less inclined researchers will be to cite it. The decline over time may, however, also reflect a selection process in which articles with certain characteristics are bound to get cited relatively early, whereas others need more time to be noticed and appreciated. In that case, the negative duration dependence may be at least partially attributed to a composition effect. One characteristic of articles that may be important in this regard is the sub-field in which demographers are active. Some demographers, such as family planning researchers, have different citation practices from demographers in other subfields (e.g., migration, social biology, economics, mathematical demography). Earlier (van Dalen and Henkens 1999), we showed how the exchange of ideas is structured within demography, but particularly with the outside disciplines such as sociology, medicine, and public health. In addition, a number of other characteristics are known to play a role in allocating citations in demography (see van Dalen and Henkens 2001). Authors with distinguished reputations have an advantage when competing with "rookie" authors for the attention of their colleagues. A delay in being noticed probably also arises for articles not written in the lingua franca of science, namely English. All of these effects might help explain the decline in the chances of being cited.

Testing for negative duration dependence

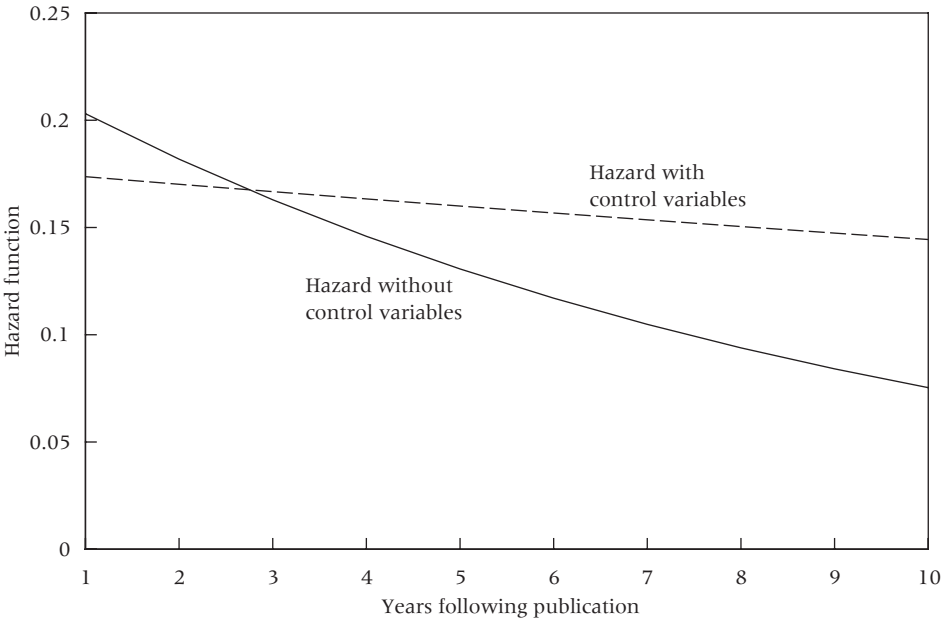
To test whether the negative duration dependence really holds up once one pays attention to article characteristics, we employed the method of duration analysis (see for an exposition, Wooldridge 2002). The idea behind duration analysis for examining the speed of citation is that all articles start their "life" uncited, and based on the characteristics of the articles at the start of their life (summarized by such variables as the type of author(s) and content and type of journal) the central question in survival analysis is: what determines the probability of leaving the initial state of uncitedness? The hazard function is of prime interest in duration analysis since it approximates the probability of exiting the initial state within a short interval, conditional on having survived (i.e., still not cited) up to the start of the interval. We are interested in whether or not the timing of first citations reveals some form of negative duration dependence: that is, whether the probability of leaving the state of uncitedness decreases the longer the article remains uncited even after confounding variables are taken into account.

In testing for duration dependence we have followed two steps. First, we estimated the hazard function without controlling for quality characteristics and by doing so we arrived at a baseline estimation of negative duration dependence that would fit Figure 1 best. Hazard models differ in the way the time dependence of the process under study is modeled. In parametric models, this time dependence is modeled by specifying a parametric form for the baseline rate. In our case, since the chance of being cited is assumed to decrease monotonically with age, the Gompertz function is an appropriate choice to model the time dependence of the process of receiving the first citation.

Next, we estimated a proportional hazard model controlling for article characteristics that were known at the time of publication, such as the reputation of the author(s),[4] the size of the research team, the length of the article (in number of pages), whether the article was a full-sized article or a short commentary, and the journal in which it appeared. Because the observation period per article is restricted to ten years, we have right-censored the data. After year ten we cannot determine whether or not an article is cited. The full results are shown in the Appendix, but at this point we are concerned with estimating the parameter that indicates the presence of duration dependence in first citations. Both of our constructed hazard functions are presented in Figure 2.[5]

The simple hazard model (solid line) is a reflection of duration dependence without controlling for article characteristics, whereas the dashed line reflects the corrected duration dependence, that is, by controlling for composition effects. As one can see, the slope of the dashed line is almost horizontal and is in marked contrast to the negative slope of the simple hazard

FIGURE 2 Duration dependence in first citations



model.[6] Figure 2 suggests that the observed negative duration dependence is largely attributable to article characteristics known at the time of publication. In other words, the reasons why an article is not cited or cited relatively late have to do with the journal in which the article appeared, certain visibility characteristics, and the reputation of the author(s) (see Appendix). But perhaps the most important thing to notice is that the absence of a duration effect—after controlling for the above-mentioned factors—indicates that a stigma of uncitedness plays only a modest role in the timing of the first citation. The conclusion that an article will never be cited because it remained uncited for a number of years therefore seems unwarranted.

Conclusions and discussion

Mapping the field of demography remains an arduous but insightful enterprise. Arduous because describing developments in science is a far more difficult task than simply summing up citation statistics. Insightful because it offers practitioners from all sub-fields within demography a mirror that might inspire some reflection. In this research note, we studied the long-term impact of articles published in 17 demography journals between 1990 and 1992. We also analyzed the timing of first citations. Ten years of the citation history of demography articles generated two novel insights. First,

the impact of demography journals does not slow down significantly over time. The average number of citations in the second five years hardly differs from the average in the first five years. Second, the chance of being cited for the first time does not depend on the length of time an article remains uncited. In other words, the stigma of uncitedness does not play a significant role in the allocation of citations.

The conclusion that older articles are still frequently cited may suggest that demography is not a strongly cumulative science. One of the most acclaimed scientometricians (Price 1970) argued that cumulative fields show a strong negative relation between an article's age and the likelihood that it will be cited. Less cumulative fields show a weak relationship between age and impact. However, Price's claim should be interpreted with care since this relationship and the judgment about the status of a scientific field are not without problems.[7] Hargens (2000) presented firm evidence on how citation practices differed across disciplines by examining the reference networks. Disciplines such as economics and sociology have a tendency to overcite classic articles and undercite recent work, whereas the situation is reversed in such sciences as astronomy, chemistry, and nuclear physics. Analyses by experienced insiders within the discipline seem more suitable for ascertaining whether or not demography is a cumulative science (cf. Caldwell 1996; Guest 1994; Morgan and Lynch 2001). Another and perhaps more appropriate interpretation of the weak relationship between age of an article and its impact is that the age of references in a journal literature may be an indicator of codification, that is, "the consolidation of empirical knowledge into succinct and interdependent theoretical formulations" (Zuckerman and Merton 1973: 507). In highly codified fields, such as particle physics or chemistry, knowledge is compacted and the research front is clearly delineated. In less codified fields, such as demography and sociology, knowledge is diffuse and, according to Zuckerman and Merton, "scientists must get command of a mass of descriptive facts and low-level theories." This may explain why articles written ten years ago are still important for addressing new questions today. In other words, the rate of obsolescence is slower than it is in highly codified fields, which may well be because in sciences such as demography and sociology there is room for greater pluralism.

The second finding is a more surprising and novel observation. The absence of a significant negative duration effect in the timing of first citations can be interpreted as a sign that demography functions as an open science. Openness refers in this context to the fact that researchers do not use an article's state of uncitedness as a signal that it does not contain valuable insights. The reasons why an article is not cited or is cited relatively late have to do with the journal in which the article appeared, certain visibility characteristics, and the reputation of the author(s), but not with its

state of uncitedness. It is likely, however, that this openness of demography may soon be jeopardized by the blessings of the information age. Scholars use all kinds of signals to judge the quality of an article. When browsing through journals, they focus on the type of journal in which an article appears, who wrote the article, whether it is a lead article or one that appears at the back of the volume, and so on. In using these signals, readers are unable to discern the importance of an article: the stigma of being uncited is not emblazoned across it. However, the emergence of electronic journals may alter this situation. The automatic registration of search behavior on the Internet and the use of rankings of journals[8] by "downloads" or "abstract viewing" make the stigma explicit to anyone who searches for articles on the Internet. In short, having no a priori information about "who has cited whom" is a state of blissful ignorance that may soon be a thing of the past.

Our findings suggest that it takes a considerable number of years before the bulk of demographic literature is acknowledged and cited. To form a balanced judgment of the impact of demography articles, one therefore needs a longer time span than five years. This conclusion may seem trivial to insiders, yet it is an important conclusion as sciences are increasingly evaluated by "outsiders." In the day-to-day practice of research evaluations, uniform time horizons (e.g., two-year or five-year impact factors) are used for all sciences, and our findings suggest that this is not a valid procedure in demography and probably in many other fields outside it. The flawed figures presented by the journal *Science* are a case in point. *Science* (Hamilton 1990, 1991) reported that the majority of articles in peer-reviewed science journals received no citation in the first five years after publication, inspiring *Newsweek* to make the bold deduction that "nearly half the scientific work in this country is basically worthless." Moreover, *Science* suggested that uncitedness is a far more serious and widespread phenomenon in the social sciences than in the natural sciences. The figures published in *Science* have taken on a mythical status and are hard to rebut. The analysis by Bott and Hargens (1991) for the discipline of sociology and the present article for demography show that things are not as bad as *Science* claimed.

With the increasing use of citation-based rankings, it is important that the users of citation statistics not become prey to the many pitfalls that accompany such statistics. Differences across disciplines are real, and one of the consequences of these differences may be the different perceptions of the time it takes for ideas to be appreciated. One scholar's long run may be another's short run.

Appendix

Here we describe the estimation procedure used to establish the presence or absence of duration dependence in first citations. The task was to discover whether the chance of being cited for the first time accelerated with time. To gauge the true speed of diffusion, we ran two separate hazard regressions: Model 1, which amounted to a pure bibliometric exercise in fitting a curve to a sample of citation statistics; and Model 2, in which, for each article, we controlled for the mechanisms that underlie the process of allocating (by editors) and attracting (by authors) attention (Klamer and van Dalen 2002): reputations, self-citation, making articles visible by allocating space and order in journal volumes, the size of audiences, and so on. The proportional hazard model is described specifically by the Gompertz hazard function $h(t_j) = e^{\gamma t_j} \cdot e^{x_j \beta}$, where the concomitant covariates (x_j) have a (constant) multiplicative effect on the hazard function and γ is the ancillary parameter of interest measuring the presence of a duration effect. A complete description of explanatory variables is given in van Dalen and Henkens (2001); a brief description follows:

—Reputation of the most reputable member of a team of authors, measured by the number of citations received by authors at the start of the observation period.

—US affiliation of author(s) = 1, otherwise 0.

—Number of coauthors.

—Presidential address = 1, otherwise 0.

—Full-sized article (= 0) versus a research note, comment, or reply (= 1).

—Number of pages in an article, with the average number of words that fit the pages of *Demography* as the standard.

—Order of an article within a journal volume (1 = lead article, etc.).

—Historical orientation (= 1) of an article (otherwise 0).

—Empirical focus of the article; dummy variables for Europe, Africa, Asia/Australia, Middle East, Latin America, Global and nonempirical content (theory, essay) with the US focus as the base category.

—Journal dummies with *Demography* as the base category.

Without going into the full details of the estimation results, Table A1 makes clear that the negative duration dependence effect (as measured by γ) disappears once one controls for the quality characteristics of an article. In general, it is the signals of quality that speed up or slow down the diffusion of knowledge: reputation, visibility of an article (length, full-sized article, order in volume), and the journal in which the article appears matter most in the timing of the first citation.

TABLE A1 Explaining the timing of first citations in demography journals by means of hazard analysis

	Model 1		Model 2	
Explanatory variable	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Author characteristics				
Max. reputation of author ($x10^{-2}$)	—		0.39*	2.38
Max. reputation of author squared ($x10^{-4}$)	—		–0.06	0.92
US affiliation of authors	—		0.03	0.38
Number of authors	—		0.02	0.85
Article characteristics				
Visibility				
Presidential address	—		0.85*	2.01
Comment/reply/note	—		–0.31*	2.51
Number of pages	—		0.05**	5.13
Order in a journal issue	—		–0.05*	2.55
Content				
Historical orientation	—		–0.27*	1.72
Focus of article: United States = base category				
Europe	—		–0.05	0.39
Asia/Australia	—		–0.18	1.61
Africa	—		–0.22	1.56
Latin America	—		–0.55**	3.31
Middle East	—		–0.38	1.43
Global	—		–0.05	0.36
Nonempirical focus	—		–0.17	1.43
Journal characteristics				
Demography = base category				
Population and Development Review	—		0.67**	4.01
Family Planning Perspectives	—		0.51**	3.10
Population Studies	—		0.39*	2.39
Studies in Family Planning	—		0.31	1.74
Journal of Biosocial Science	—		–0.24	1.36
International Migration Review	—		–0.25	1.64
Population Index	—		–0.29	0.76
Social Biology	—		–0.36	1.94
Journal of Population Economics	—		–0.47*	2.31
Population Bulletin	—		–0.65	1.90
Population Research and Policy Review	—		–0.68**	3.11
European Journal of Population	—		–0.86**	3.70
Population and Environment	—		–0.91**	4.18
International Migration	—		–0.92**	5.12
Population	—		–1.01**	5.81
Journal of Family Welfare	—		–1.64**	6.41
Constant	–1.48**	31.86	–1.55**	6.58
Duration parameter γ	–0.11**	9.75	–0.01	1.26
Log likelihood	–2048.4		–1765.5	

NOTE: The estimation method is parametric survival analysis with Gompertz distribution. The sample size is 1,371 articles.
* significant at $p < 0.05$; ** significant at $p < 0.01$.

Notes

We gratefully acknowledge discussions and comments by Dirk van de Kaa. On July 16, 2004 we unexpectedly lost our friend and colleague Evert van Imhoff (1959–2004). During the writing of this article we received numerous comments from him and we dedicate the article to him.

1 See, e.g, van Dalen (1998) and Drago and Kashian (2003).

2 For an exposition of the selection process see «www.isinet.com/essays».

3 The most widely cited article was Forrest and Singh (1990).

4 Reputation is measured by the total number of citations received by the author in 1990; in case of multiple authors the highest number of citations of one of the team members is used as an approximation of the reputation. The choice of the highest number instead of the average number of citations for a team of authors is that this approximates the signaling function of reputations and comes closer to the idea of the Matthew Effect (see Van Dalen and Henkens 2001: 467).

5 The dashed curve (the hazard function with control variables) is constructed by setting each covariate at its mean value.

6 One can also see this in the estimation results presented in the Appendix (Table A1), where the duration coefficient of the simple hazard model is clearly negative and that of the extended model does not differ significantly from zero.

7 An additional argument urging caution in interpreting the absence of an immediacy effect for demography is given by Cole (1983: 127), namely, that Price considered neither the growth rate of the relevant journal literature nor (especially important for the humanities) the difference between citations to data sources and "influence citations," i.e., citations to other current work in the area. The first point is especially pertinent, because to accurately determine the immediacy effect of publications one has to compare the distribution of references in the current literature with the age distribution of that literature.

8 See the journals registered by Elsevier Science at «www.sciencedirect.com» or the working paper series of the Social Science Research Network at «www.ssrn.com».

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