

How Influential Are Demography Journals?

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DEMOGRAPHY IS WHAT demographers do. Of course, witticisms of this sort circumvent many of the epistemological questions that the demographer with a philosophical streak would like to answer. Caldwell (1996) has recently shown the difficulties that demographers have had in pinpointing the boundaries of their discipline. In concluding his review of the past 50 years of the field, he stated that "it is easier to define a demographer, or even a demographic journal, than the field of demography, at least as it merges with the social sciences" (p. 328). The demographer according to Caldwell's definition is characterized by his or her approach: "a belief that the world can be largely defined in empirical terms, and that edifices of theory which are not quantitatively testable are likely to, or indeed often should, collapse" (p. 328).¹ Over the years demography has established itself as "a distinct and academically recognized independent discipline" (Demeny 1988: 477). The manner in which this development has taken place has raised some concerns. For instance, Demeny (p. 477) noted that the road to elevating demography to this status has also led to "a loosening of ties and diminishing interaction with neighboring social science fields." In his critical review of the agenda of population studies, McNicoll (1992) makes similar remarks with respect to scientific developments within demography when he notes that an "increasing fine-grainedness of research has been accompanied by a narrowing of scope. . . . Results are now reported on principally to other specialists rather than to a wider audience in the social sciences or public affairs" (pp. 400–401).

The question then becomes: How far does knowledge produced by demographers travel? Or to put it more formally: What does the pattern of knowledge dissemination look like? With the aid of a bibliometric approach we shed some light below on the question *whether* knowledge produced by

demographers is actually cited and, if so, *in which direction* the intellectual influence goes within a group of demography journals and, in a broader sense, within the social sciences.

A series of articles in *Science* (Hamilton 1990, 1991; Pendlebury 1991) reported on the basis of data assembled by the Institute for Scientific Information (ISI) that 22 percent of scientific articles do not receive a single citation within five years of publication.² For the social sciences and the arts and humanities this state of "uncitedness" was considerably worse: 48 percent and 93 percent respectively. The figures attracted a great deal of attention even in the American popular press. *Newsweek* (14 January 1991) asserted that "nearly half the scientific work in this country [the United States] is basically worthless." Although this conclusion seems farfetched, at the least the figures indicate that instances of intellectual exchange in these fields of science were fewer than one would have expected. As will become clear from our bibliometric exercise, McNicoll's complaints about the scientific exchange of ideas in the field of demography are not wide of the mark. The bleak state of social science as portrayed by *Science* is, however, by and large not supported, although the scale of uncitedness remains a vital issue.

This article examines in some depth the issue of knowledge dissemination for a set of demography journals for the years 1991–95. Previous analysts have examined the changes over time in the characteristics of articles appearing in such leading demography journals as *Demography* (Teachman, Paasch, and Carver 1993; Keyfitz 1993) and *Population Studies* (Caldwell 1996) and how the population debate is framed in popular magazines (Wilmoth and Ball 1992), but not whether and how demography journals perform as a group. The central question, of course, is whether demography is characterized by a lively intellectual exchange among demographers themselves as well as with scholars in neighboring social sciences.

Citations offer us a perspective on this exchange of knowledge. Citations are the signal posts left by scholars in their published research or intellectual debates. Or, to use another metaphor, each reference in an article is a building block in the construction of knowledge. This view of citations is consistent with the normative or universalist view of Merton (1957, 1973), who argued that the social system of science governing the behavior of scientists is characterized by objectivity and fairness. In this perspective citations not only reflect scientific communication in an attempt at cumulating knowledge; they also constitute the rewards to having made a contribution to science. Thorne (1977) and Rice et al. (1989) suggest, moreover, that there are many other purposes for citations, such as paying homage to pioneers, excessively referring to one's own work, identifying original publications, disclaiming and disputing work of others, and so on. Similarly, there are several reasons for *not* citing relevant work, for instance,

if the journal in which research is reported is not available or because of a phenomenon Merton (1968) identifies as "obliteration by incorporation"—that is, the tendency of influential publications to become so absorbed by the literature that they are rarely cited at all. Nonetheless, one can make the case that instances of citation represent some form of intellectual influence and that the scholars who are frequently cited are without exception influential members of the scientific community (see Zuckerman 1977; Garfield 1998). An extreme position in the debate about the scientific reward system is taken by social constructivists such as Gilbert (1977), Knorr-Cetina (1981), and Latour (1987), who argue that the allocation of citations has more to do with the location of the authors within the social stratification structure than with the intellectual content of a given publication. Research by sociologists of science (Cole and Cole 1973; Stewart 1983; Baldi 1998), however, suggests that the universalist norm is predominant in scientific communication.

Citations in journals are, as Keyfitz (1993: 535) puts it, "a sign of a readership that not only understands what it reads but uses it in its own subsequent work." Because we are interested not only in usage but also in exchange of knowledge, the issue of communication *between* journals is relevant. We focus on journals instead of books and other transmitters because we consider journals to be the chief means of communication among scientists. Compared with books, journals are more open to competition (as Clemens et al. 1995 show for sociology) and thus offer us the possibility of gaining insight into the demographic community that actively participates in an intellectual debate.³ Furthermore, the dual role of journals as the receiver of citations from other journal articles as well as sender of citations to other publications is well recorded, in contrast to the influence of alternative transmitters of knowledge such as books, reports, lectures, editorials, and newspaper columns. For journals the ISI records the citations sent as well the citations received, whereas for books and reports ISI records only the citations received. Assessments of the extent of intellectual exchange in journals of statistics and economics (Stigler 1994; Stigler, Stigler, and Friedland 1995) and psychology (Everett and Pecotich 1993) show that general journals influence application-oriented and specialized journals to a far greater extent than vice versa.

An additional reason for interest in the role of demography journals in the exchange of ideas is that the use of rankings and publishing records as a means of evaluating the "productivity" of researchers and evaluating research proposals is becoming standard practice among faculty deans and peers. A recent survey reported that some 60 percent of graduate departments at US universities use citation counts in making decisions about hiring, promotion, and tenure (see Hargens and Schuman 1990). And as some economic studies show, higher citation counts translate into higher sala-

ries (see, e.g., Diamond 1986; Sauer 1988; Moore, Newman, and Turnbull 1998; Oster and Hamermesh 1998).

Data and methods

The sample of demography journals analyzed in our study is limited to those covered by the *Social Science Citation Index* (SSCI), published by the Institute for Scientific Information. The SSCI contains information on the references made in scientific articles. It is a multidisciplinary database, covering about 1,400 journals in more than 25 major fields of the social and behavioral sciences, of which demography is one. According to the ISI, "the demography category covers the study of human population distribution, especially with regard to size and density, and vital statistics. Journals covered in this category are concerned with migration patterns, social biology, fertility and contraception, as well as demographic forecasting, environmental and economic factors, and life span studies."

The journals that ISI places in this category and that we have reviewed 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 Research and Policy Review*, *Population Studies*, *Social Biology* and *Studies in Family Planning*.⁴ A large number of demography journals are missing from this list. The *Review of Population Reviews* published by the Committee for International Cooperation in National Research in Demography (CICRED, France) lists the contents of 81 demography journals worldwide.⁵ However, bibliometricians point out that a small number of journals typically generate the majority of citations (Garfield 1996). Furthermore, ISI conducts extensive evaluations of journals to ensure coverage of the most important scientific literature. Journals are frequently added to and deleted from the database. The ISI editorial staff review nearly 2,000 new journal titles annually, but only 10–12 percent of the journals evaluated are selected (ISI 1998).⁶ For demography this set of journals has remained fairly constant over time. The Hungarian journal *Demográfia* was included in the SSCI database during 1966–89 and the Italian journal *Genus* was included during 1971–85, but both were discontinued because citations fell below the ISI threshold.⁷ The *Journal of Family Welfare*, which is included in our sample, was removed from the SSCI database in 1998. Although the number of journals in the field of population has increased in the last few decades, most of the new journals are still not evaluated by ISI as being crucial for the development of demography.

To analyze citation counts and citation frequency for 1991–95, we use the *Journal Citation Reports* (JCR) prepared annually by the ISI. To analyze uncitedness we use the *Social Science Citation Index*. In the JCR, journals

are the basic unit of analysis, whereas authors and their articles are the unit of analysis in the SSCI. We will elaborate on both sources below.

Journal Citation Reports

One tabulation recorded in the JCR is the "cited journal listing": which journals have cited a particular journal, with a distribution by year of publication of the cited material. Journals in this listing are social science journals and other publications relevant to the social sciences cited by the SSCI, the *Science Citation Index*, and the *Arts and Humanities Citation Index*. The ISI database covers approximately 8,000 international journals on an annual basis. A cited journal is not necessarily a source journal covered by the indexes above, as numerous serial publications are not recorded systematically by the ISI.

The other tabulation of the JCR, the "citing journal listing," presents the same information, but arranged by citing journal rather than cited journal. It includes entries for approximately 1,400 source journals covered by the SSCI. This listing shows which journals a particular journal has cited and, again, the distribution by year of publication of the cited material.

The listings in the JCR give the total number of citations journals received and sent. The lists of the separate citing and cited journals are, however, limited to a maximum of 100 items, or the number of items that account for 85 percent of the total citations. For each journal cited, the counts of citation are given for all citing journals that produce at least four citations during the year, with the additional proviso that at least 15 citing journals are included in all cases. The range of citation sources thus varies. Almost complete records are traced and given for infrequently cited journals, while only the major producers of citations are given for some large and frequently cited journals. We examined both the "citing" and "cited" listings in order to reconstruct the most accurate account of the citation flows between the relevant journals (as suggested by Rice et al. 1989).

To evaluate the influence of demography journals in the scientific community, we use measures based on the crude citation counts and also present the average impact factor for each journal in 1991–95 as published annually in the JCR. The impact factor is defined by the ISI as the total number of citations in year t to articles published in a given journal in years $t-1$ and $t-2$, divided by the total number of articles published in the journal in those two years.

Social Science Citation Index

Besides the *Journal Citation Reports* we have used the SSCI to gather data on the citation frequency of publications in the selected demography journals in three consecutive years (1990–92). For 1,362 articles published in

those years we established whether and how often they were cited in the five years following their publication in journals covered by the SSCI. To correct for the possibility of strategic citation practices, all author self-citations are excluded. Hence, not only the first-author self-citations are excluded but also those citations by all coauthors.⁸ We aggregated the citation figures on a journal level to obtain uncitedness rates for each demography journal.

Basic citation counts

Table 1 gives the aggregate counts of citations for the 16 demographic journals as recorded by the SSCI, together with the age of each journal and the country where the editorial office is based. The column on number of citations received ranks the journals by the total number of citations received on an annual basis in the period 1991–95. These numbers reflect a journal's average impact on the social science literature, based on the entire backlog of articles, no matter how long ago they were published.

The ranking of journals will hardly surprise most readers. *Demography* was the most frequently cited journal between 1991 and 1995: a yearly average of 1,049 citations in 220 different journals. At the other end of the scale are journals that are cited fewer than 50 times a year in 25 journals or less. Of course, recently established journals such as the *European Journal of Population* have a much smaller stock of articles that can potentially be cited and are at a disadvantage relative to older journals. What strikes us as noteworthy is the distribution of citations, which is extremely skewed toward the top journals. The three most frequently cited journals (*Demography*, *Family Planning Perspectives*, and *Population and Development Review*) account for half of all the citations in the observed period. As can be deduced from the number of journals citing these journals, the top demography journals find large audiences beyond the narrowly defined demographic community.⁹

Most journals cite a substantial number of different sources (last column of Table 1). These numbers are generally higher than the number of citing journals; this stands to reason as the number of sources covers not only journals but also reports and books. The number of journals that cite listed demography journals is the most interesting statistic in this table. *Demography* is clearly not only the largest exporter of demographic knowledge, it also has the most diversified group of users of demographic knowledge as it is cited in 220 journals. *Demography* is closely followed by the next five journals with well above 100 citing journals.

Aggregate citation counts give only a crude indication of the importance of a journal in the scientific literature. High citation counts may indicate that a journal is a major innovator in its discipline. On the other hand,

TABLE 1 Aggregate citation data for demography journals 1991–95 (yearly averages)

Journal	Editorial office	Age of journal in 1995	Number of citations received	Number of journals citing	Number of citations sent	Number of sources cited
1. Demography	United States	32	1,049.0	220	1,178.4	548
2. Family Planning Perspectives	United States	21	975.2	167	704.4	261
3. Population and Development Review	United States	21	698.8	172	1,036.0	651
4. Population Studies	Great Britain	49	592.2	141	858.0	514
5. Studies in Family Planning	United States	26	549.0	106	744.2	397
6. Journal of Biosocial Science	Great Britain	27	336.2	140	919.6	460
7. International Migration Review	United States	28	314.6	94	984.8	696
8. Social Biology	United States	42	233.4	119	344.5	207
9. Population	France	50	204.8	64	698.6	477
10. Population Bulletin ^a	United States	50	115.0	95	142.3	70
11. Population and Environment	United States	16	75.0	42	582.8	401
12. Population Research and Policy Review	United States	14	60.0	38	394.8	246
13. European Journal of Population	France	10	48.6	24	359.6	241
14. International Migration	Australia	22	45.4	25	306.6	228
15. Journal of Family Welfare	India	41	24.4	10	204.4	135
16. Journal of Population Economics ^b	Germany	8	20.0	15	597.5	322

^aPublished by the Population Reference Bureau; not to be confused with the *Population Bulletin* published by the United Nations.

^bCovered in *Journal Citation Reports* for the years 1994–95 only.

two problems arise when comparing these aggregate figures. First, it is unclear how many separate articles are involved in these citations; one article might be cited several dozen times whereas a large proportion of articles in the same journal may never be cited. Second, aggregate citation figures are not adjusted for factors such as journal size. Journals that appear infrequently with only a small number of articles are less likely to be cited. In the next section we examine to what extent skewness in the distribution of articles cited and journal size affect the recorded influence of a journal.

TABLE 2 Impact of articles in demography journals published in 1990–92

Journal	Percent of articles uncited after ^a		Average citations per article after 5 years ^b	Total number of articles
	2 years	5 years		
1. Population and Development Review	22.7	4.0	7.21 (0.76)	75
2. Population Studies	31.6	5.1	4.81 (0.46)	79
3. Family Planning Perspectives	15.6	5.6	13.98 (1.67)	90
4. Population Bulletin	25.0	8.3	8.50 (2.06)	12
5. Demography	25.8	11.7	7.84 (0.77)	120
6. Studies in Family Planning	40.4	15.2	5.55 (0.69)	99
7. Journal of Population Economics ^c	50.0	28.8	1.85 (0.26)	52
8. International Migration Review	64.7	36.1	2.06 (0.21)	119
9. Social Biology	78.7	42.7	1.29 (0.20)	75
10. Journal of Biosocial Science	73.6	45.0	1.41 (0.18)	140
11. Population Research and Policy Review	68.2	45.5	1.32 (0.29)	44
12. European Journal of Population	73.8	51.2	1.22 (0.28)	41
13. Population and Environment	86.7	51.7	1.20 (0.31)	60
14. International Migration	79.3	51.7	1.06 (0.19)	87
15. Population	80.2	62.2	0.68 (0.10)	172
16. Journal of Family Welfare	91.8	79.4	0.30 (0.07)	97
All demography journals	59.0	36.4	3.54 (0.18)	1,362

^aExcluding self-citations of all authors involved in the writing of an article.

^bStandard errors of mean in parentheses.

^cFirst indexed by SSCI in 1992. To fill in the missing year 1991, we counted the citations in the 1991 issue of the *Journal of Population Economics* to the relevant demography journals.

The cited and uncited

Table 2 measures citedness and uncitedness of articles published in demography journals. The average demography article published in 1990–92 has roughly a 60 percent chance of remaining uncited two years later, and a 36 percent chance five years later. The average number of citations an article receives is 1.2 after two years and 3.5 after five years. For the set of demography articles, the peak impact is reached in the fourth year after publication.

Behind these averages lies a large variation in citation practices. General demography journals and specialized family planning journals are frequently cited after five years, ranging from 96 percent for the articles pub-

TABLE 3 Probability that an article not yet cited is cited in a given year, by number of years following publication

Years following publication	Probability (in percent) of citation in		Total
	Major journals ^a	Other journals ^b	
1	49 (N=475)	11 (N=887)	24 (N=1,362)
2	47 (N=244)	15 (N=789)	22 (N=1,033)
3	36 (N=130)	14 (N=673)	17 (N=803)
4	34 (N=83)	13 (N=580)	16 (N=663)
5	24 (N=55)	10 (N=502)	11 (N=557)

^aThe top six journals in Table 2: *Population and Development Review*, *Population Studies*, *Family Planning Perspectives*, *Population Bulletin*, *Demography*, *Studies in Family Planning*.

^bAll other journals in Table 2. Total pool of uncited articles at beginning of year in parentheses.

lished in *Population and Development Review* to 85 percent for *Studies in Family Planning*. The only general journals that are not frequently cited are *Population*, undoubtedly less frequently cited because it is in French,¹⁰ and the relatively new *European Journal of Population*, which publishes articles in English and French. For the latter journal, 51 percent of articles remain uncited after five years, and the average article in this journal generally receives only one citation in the five years following publication. Inexperience or a small distribution may explain this weak performance, but even the newer *Journal of Population Economics* ranks far higher on this measure.

Keyfitz (1993: 537–538) suggests that *Population* is a high-quality journal only hampered in its development by the language barrier. The French network of demographers may be a separate, self-sufficient world that is not covered adequately by the selection of journals in the SSCI. For instance, such journals as *Annales de Démographie Historique* and *Economie et Statistique* are missing from the records of the SSCI, omissions that lead to an underestimate of the influence of *Population*.

Table 2 may give the impression that articles that are not cited shortly after publication remain uncited in the long run. Table 3 shows that the 557 articles not cited after four years have an 11 percent probability of being cited in the fifth year following publication. The most striking element of Table 3 is the large difference in knowledge dissemination between major and minor journals in demography. The probability of articles in major journals being cited is high, whereas the probability of articles in minor journals being cited is low.

The balance of intellectual exchange

Another way of assessing the influence of a journal in professional literature is to regard citations as import–export statistics and to measure the

"balance of trade" of individual journals, an approach developed by Stigler (1994).¹¹ The counts of citations made by authors who write in a journal may be seen as their import of intellectual knowledge from earlier publications. At the same time, the imports of one journal are another journal's exports, although by definition it takes time to export knowledge. On that count, young journals are clearly at a disadvantage compared with mature journals, and their balance of trade yields a less well-rounded picture of the import and export of knowledge. The ratio of counts of citations received (exported knowledge to other publications) in a given period to counts of citations sent (imported knowledge from other publications) is a simple measure of the balance of trade (BOT). A high BOT score indicates that a journal is a major exporter of knowledge, that is, the articles published by the journal are relatively often used by scholars publishing in other journals. A low BOT score indicates that a journal primarily imports knowledge: it uses many sources but it is infrequently used by others. Table 4 presents the BOT ratio for our 16 demography journals. This ratio indirectly adjusts the aggregate citation counts for journal size: journals that

TABLE 4 The balance of intellectual trade for 16 demography journals 1991-95

Journal	BOT ^a	BOTDEM	BOTDEM excluding journal self-citations	Average impact factor, 1991-95 ^b
1. Family Planning Perspectives	1.38	1.00	1.02	1.32
2. Demography	0.89	1.29	1.60	1.63
3. Population Bulletin	0.81	1.46	1.59	1.37
4. Studies in Family Planning	0.74	1.06	1.15	1.12
5. Population Studies	0.69	1.25	1.40	1.12
6. Social Biology	0.68	0.85	0.51	0.28
7. Population and Development Review	0.67	1.71	2.31	1.29
8. Journal of Biosocial Science	0.37	0.42	0.22	0.39
9. International Migration Review	0.32	1.17	1.46	0.39
10. Population	0.29	1.03	1.11	0.31
11. Population Research and Policy Review	0.15	0.21	0.16	0.38
12. International Migration	0.15	0.66	0.42	0.12
13. European Journal of Population	0.14	0.38	0.28	0.27
14. Population and Environment	0.13	0.57	0.29	0.32
15. Journal of Family Welfare	0.12	0.40	0.22	0.07
16. Journal of Population Economics ^c	0.03	0.12	0.04	0.40

^aBOT is the balance of trade (Citations received 1991-95)/(Citations sent 1991-95) = (Exports 1991-95)/(Imports 1991-95).

BOTDEM is the balance of trade within the 16 demography journals.

^bThe impact factor in year t = number of citations received in year t to articles published in the years $t-1$ and $t-2$, divided by the number of articles published in the years $t-1$ and $t-2$ in the journal in question.

^cCovered in *Journal Citation Reports* for the years 1994-95 only.

appear infrequently or that have a small number of articles not only cite articles on a smaller scale than journals that appear regularly or carry large numbers of articles, but are also less likely to be cited in the literature. Of course, journals that send and receive a high number of citations could in principle have the same BOT ratio as journals that send and receive a low number of citations.

An alternative indicator that corrects for the size of a journal (i.e., the number of articles appearing in an issue) and the frequency with which it appears is the impact factor as calculated annually by the ISI. The impact factor is the average number of times recent articles are cited in the year of coverage of the JCR. In addition to correcting for size and frequency, it also tends to discount the advantages of older journals over younger ones (an element that the BOT ratio misses). In so doing, the impact factor eliminates the bias that so-called classic articles¹² may introduce since these articles have a long citation life. The last column of Table 4 presents the average impact factors for 1991–95. The journal of the Population Association of America (PAA), *Demography*, has the highest impact score, namely 1.63, whereas the journal of the European counterpart of the PAA—the *European Journal of Population*—performs rather badly, with an average impact score of 0.27. An advantage of looking at the impact factor is that it gives an impression of recent export of knowledge. The impact factor in a particular year enumerates citations from the previous two years of publication. As an indicator of journal quality, this assumes that newly acquired knowledge finds its way through the scientific community rather quickly. ISI (1996) reports that the highest number of citations for a social science article was achieved on average in the second year following publication. There has, however, been a steady shift in the transmission of intellectual knowledge: nowadays, the peak citation impact is achieved three years following publication (ISI 1996). According to Glänzel and Schoepflin (1995) the timing of peak impact varies by field. For the natural and life sciences the standard ISI impact factor seems well suited, but for the social sciences and mathematics an observation period of four years may generate a more reliable picture of knowledge dissemination.

If a journal's impact factor is relatively large and the balance of trade is relatively small, this may suggest that the journal's influence is relatively strong in current population debates. Table 4 shows a generally strong relationship between the BOT and impact factors. Among the exceptions, the BOT score of the *Journal of Population Economics* is low in comparison with the impact factor, suggesting that this journal is relatively important in ongoing debates but still does not figure significantly as an exporter of demographic knowledge. In this respect it is interesting to note that the low impact factor of *Social Biology* and its high BOT score suggest that scholars cite this journal primarily for its "old" contributions.

In addition to the BOT score, which reflects the balance of intellectual exchange within the social sciences in general, the BOTDEM score reflects the balance of intellectual exchange within demographic literature. The latter statistic in conjunction with the BOT score gives an indication of the relationship of demography to the other social sciences. A journal may, for instance, have a well-balanced intellectual exchange in social scientific literature, but a fairly unbalanced readership in demographic literature. In other words, a journal may receive a large number of citations within the group of demography journals, but may primarily cite journals outside demography, a fact that cannot be detected by using only the BOT score. The second column of Table 4 presents this balance of trade within demography, the BOTDEM score. To obtain a more accurate picture of intellectual exchange outside the journal of observation, we also present the BOTDEM statistic in which we exclude the number of journal self-citations (i.e., citations linking articles in the same journal) from the citation counts. For all but three journals, BOTDEM is larger than BOT, indicating that the primary influence of these journals lies within the demographic discipline. The biggest exporter of knowledge to other demography journals within the set of demography journals is *Population and Development Review*, closely followed by *Demography* and *Population Bulletin*. Only *Family Planning Perspectives*, the *Journal of Biosocial Science*, and *Social Biology* seem to be more influential outside the field of demography than inside. Another interesting conclusion drawn from Table 4 is that most of the journals whose influence in the social science community is small also have limited influence within demographic literature.

Compared with statistics journals, the impact factors of major demography journals are more or less the same, indicating comparable levels of recent intellectual export. For instance, the top statistics and econometrics journals have impact factors for the years 1987–89 that vary from 0.62 (*Journal of the Royal Statistical Society, Series C*) to 1.49 (*Journal of the Royal Statistical Society, Series A*), with one exceptionally influential journal, *Econometrica*, having an impact score of 2.64 (Stigler 1994: 98). The balance of intellectual trade is, however, much higher in these journals: all BOT scores are well above 1.0, ranging from 1.11 for the *Journal of the Royal Statistical Society, Series C* to 3.53 for *Econometrica*. This suggests that statistics and econometrics journals have a much higher archival impact than demography journals.

Links between demography journals

The figures representing the balance of intellectual exchange in the previous section give an impression of demography journals as importers and exporters of knowledge. They do not, however, provide a complete picture of intellec-

tual trade between these journals. To gain insight into details of the demography network, Table 5 presents an overview of the interrelationship between journals. The rows correspond to the cited journals, while the columns correspond to the citing journal. For example, *Population and Development Review* (row 3) is cited 158 times by *Demography* (column 1) during 1991–95, whereas *Population and Development Review* cites *Demography* 101 times.

The numbers in the table represent the flows of intellectual influence between demography journals only. If we combine information from Tables 1 (yearly citation averages) and 5 we see that *Demography* was cited 5,245 times ($= 5 \text{ years} \times 1,049.0$) between 1991 and 1995, and that 1,589 (30 percent) of these citations (self-citations included) were in the 16 demography journals included in the SSCI. *Demography* is the only journal that was cited by all other demography journals between 1991 and 1995. There thus seems to be some truth in the remark by Keyfitz (1993: 539): "When someone asks the question 'What is demography today?' the simplest and clearest answer is 'The research published in *Demography*.'" *Population and Development Review* also is cited in most other demography journals. This observation underlines the central role that these general journals play in the demographic community.

As we mentioned when referring to low BOTDEM scores, the influence of journals is often asymmetric. A number of specialized and/or low-impact journals are cited only incidentally in major journals. Low-impact journals are often cited only within their own subdiscipline. For instance, *International Migration* and the *Journal of Population Economics* are cited in only three and four other demography journals, respectively. Since *International Migration* is cited almost exclusively in *International Migration Review*, we conclude that this prestigious journal in migration circles has a very small base within the wider demographic community. This observation underscores the opinion by Caldwell (1996: 308) that the relationship between demography and migration studies "remains ambiguous."

The regional dimension of intellectual trade between journals reveals a considerable connection between European-based journals, such as the French journal *Population*, the *European Journal of Population*, and the English journal *Population Studies*. *Population* was cited primarily in the *European Journal of Population* and *Population Studies*; indeed, 16 percent of the articles published in the *European Journal of Population* between 1991 and 1995 were in French. The influence of European journals on American journals appears to be weak. The only exception is *Population Studies*, which is frequently cited in American journals and as such serves as a gateway between two bases of demographic inquiry.

To summarize the variety of markets in which demography journals participate, we have calculated a concentration index, measuring the diversity of export markets of a particular journal, that is, the audiences which

TABLE 5 Cross-citations involving only demography journals, with total cumulated citations for the years 1991–95 (rows correspond to the cited journal, columns to citing journals; bold numbers indicate journal self-citations)

Journals cited	Citing journals																Percent of journal self-citations	Gini concentration index ^a
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1 Demography	639	25	101	34	170	69	52	103	130	48	67	26	27	71	4	23	1,589	40.2
2 Population Bulletin	30	14	18	4	16	14	16	0	9	0	8	4	8	0	0	0	141	9.9
3 Population and Development Review	158	22	351	0	225	156	20	87	99	34	33	24	39	20	0	31	1,299	27.0
4 Family Planning Perspectives	36	0	9	544	7	54	0	4	6	0	0	0	10	0	0	0	670	81.2
5 Population Studies	170	0	105	7	362	64	0	41	231	15	65	60	0	48	4	19	1,191	30.4
6 Studies in Family Planning	61	0	83	70	56	573	0	36	112	0	0	4	0	26	0	43	1,064	53.9
7 International Migration Review	31	0	33	0	7	0	221	24	0	0	0	0	6	4	85	0	411	53.8
8 Population Research and Policy Review	21	0	12	0	2	0	7	21	0	7	0	0	0	0	0	0	70	30.0
9 Journal of Biosocial Science	16	0	15	4	16	52	0	9	230	0	4	8	0	20	0	10	384	59.9
10 Journal of Population Economics ^b	1	0	1	0	1	0	0	1	0	10	0	0	0	0	0	0	14	71.4
11 European Journal of Population	5	0	8	0	33	0	2	3	9	0	35	4	0	0	0	0	99	35.4
12 Population	12	0	13	4	47	3	0	0	10	0	52	356	0	3	0	0	500	71.2
13 Population and Environment	12	0	0	0	2	2	0	2	4	0	0	0	58	4	0	0	84	69.0
14 Social Biology	36	0	5	0	11	6	0	3	61	0	0	0	0	26	0	4	152	17.1
15 International Migration	1	0	5	0	0	0	33	0	0	0	0	0	0	0	64	0	103	62.1
16 Journal of Family Welfare	2	2	2	0	0	7	0	1	14	0	0	0	0	1	0	38	67	56.7
Total	1,231	63	761	667	955	1,000	351	335	915	114	264	486	148	223	157	168	7,838	

^aThe Gini concentration index is defined in text as the sum of the squared share (s_j) of citations that a journal received from a particular journal i , with summation over all demography journals.
^bIncludes only the years 1994–95.

use the knowledge generated in the journal in question. The Gini concentration index (last column of Table 5), also known as the Herfindahl index in economics or as Simpson's measure of diversity in population biology, is given by the following formula:

$$\text{Gini concentration index} = 100 \times \sum_{i=1}^{16} s_i^2$$

where s_i is the fraction of total citations that a journal received from source i , summed over all demography journals. The index can be thought of as the chance that if two citations are selected at random with replacement from those received during the sample period, they will come from the same journal (Stigler 1994: 99). According to this index, the journal with the most highly diversified export market is *Population Bulletin*, closely followed by *Population and Development Review*. However, most journals are not as highly diversified as these top journals since most of them receive citations from their own pool of contributors.

Another indicator of a small knowledge base within the demographic community is the high rate of journal self-references—citations linking articles to other articles in the same journal. Within the set of demography journals, most have a high self-citation rate, with *Family Planning Perspectives* heading the list (81 percent) followed by the *Journal of Population Economics* and *Population* (both 71 percent) and the Indian-based *Journal of Family Welfare* (67 percent). The self-citation practices of these journals are largely explained by the audiences they serve. Family planning and population economics are two distinct specializations within demography that rarely make references to other demography journals. *Population* serves a mainly French audience, thereby narrowing considerably the potential audience.

On the other hand, some journals have an editorial policy that allows for a broad spectrum of topics, and, as one may expect, their self-citation rates are well below those of specialized journals. The journal with the lowest self-citation rate is *Population Bulletin*, which appears quarterly, with a single lengthy article per issue. Because article topics differ substantially, the chance of citing work from a previous issue is smaller than in the case of journals that appear on a more regular basis and publish articles covering the entire range of demography.

Links outside demography

The current links with neighboring social sciences reflect the historical connection between demography and a number of other disciplines. Indeed, until the post-World War II era, demography was often not considered an autonomous discipline but merely a subdiscipline of sociology (Caldwell 1996). As demography developed into a separate discipline, a division of

labor evolved. The split between formal and social demography is often seen as such a division between demographers. Within these subdisciplines one can, of course, distinguish a further refinement of research topics. Richards (1984) split the preferences of members of the Population Association of America into four categories: formal, social, geographical, and epidemiological demography. Much of this division has to do with events that command demographers' attention. Mortality, fertility, and household formation currently rank high on demographers' list of priority research topics (see, e.g., Teachman, Paasch, and Carver 1993). One would thus expect the focused research of these specialists to hold value for social scientists in related disciplines. To show which linkages exist within and outside the demographic community, Table 6 tabulates the leading social science journals outside demography that make use of the knowledge contained in major demography journals.

Table 6 points up the relevance of leading journals in demography to the medical and sociological sciences. The strong association between demography and sociology is reflected in the citations received by, for example, *Demography*: a large proportion of citations received come from sociological journals, of which the most visible are *Journal of Marriage and the Family* (citing *Demography* 311 times), *Social Forces* (139 times), and *American Sociological Review* (119 times). Apart from the interest shown by sociology journals, medical and public health journals also frequently cite demography journals. *Social Science and Medicine*, for example, is a major importer of demographic knowledge.

The connection between psychology journals and demography journals is weak. *Family Planning Perspectives* is the only journal frequently cited in psychology journals, with the developmental psychology journal *Adolescence* being a major importer. The emphasis on historical developments in the European demographic community is reflected in the large number of

TABLE 6 "Outside" journals most frequently citing five major demography journals, 1991-95

	Population and Development Review	Demography	Population Studies	Family Planning Perspectives	Studies in Family Planning
1	Social Science and Medicine (187)	Journal of Marriage and the Family (311)	Social Science and Medicine (137)	Journal of Adolescent Health (227)	Contraception (174)
2	Annual Review of Sociology (100)	Social Forces (139)	Journal of Family History (62)	American Journal of Public Health (209)	Social Science and Medicine (171)
3	Economic and Political Weekly (51)	American Sociological Review (119)	Social History of Medicine (62)	Adolescence (167)	International Journal of Gynecology and Obstetrics (89)

NOTE: Number of citations received in parentheses.

citations of *Population Studies* in both the *Journal of Family History* and *Social History of Medicine*. This finding is in line with Caldwell's (1996) contrast between the major demography journals (and perhaps more substantively between the European and American ones). *Population Studies*, he notes, "is seen as a journal interested in quantified theories and social history but less in social theory and anthropological findings" (p. 333), in contrast to *Demography*, which in his view has a "minimal interest in historical change" (p. 329).

Studies in Family Planning, lastly, has strong links outside the social sciences, two of its main importers being medical journals. This is an obvious connection given that family planning relies heavily on developments in medicine.

Besides the intellectual exchange of ideas engaged in by top demography journals, it is of interest to know how well the specialized and smaller journals fare in trading demographic knowledge. In delineating the export markets for demography journals, we have counted the number of citations received from distinct research fields outside demography. We have refrained from tabulating these exchanges since the citations journals receive from outside demography are, first, difficult to put into general categories that apply to all demography journals, and, second, in most cases come from one or two distinct disciplines. For instance, regionally oriented journals such as *International Migration Review* and *International Migration* export a considerable amount of knowledge to geography journals. Other journals worth mentioning are *Population Research and Policy Review* and the *European Journal of Population* with their strong connections to sociology, and the *Journal of Biosocial Science* with a connection to biology and medicine. Although the influence of the aforementioned journals is modest, they seem to act as gateways to these neighboring sciences.

Exemplifying a strong connection between a specialized journal and a specific discipline is the link between economics and the *Journal of Population Economics*: approximately 50 percent of its citations are in economics journals, which is far more than its influence on demography journals. Although this finding in this case is based on only two years it remains noteworthy. Demography journals have long played an insignificant role in economics. For instance, Liebowitz and Palmer (1984) and Laband and Piette (1994) show by means of a citation analysis how top demography journals can easily compete in terms of impact on the social science literature with top journals in economics. On the other hand, when they pay attention to the intensity of the citation flows between the group of journals in the database of the *Journal of Economic Literature* (this includes *Demography*, *Population Studies*, and *Population and Development Review*), demography journals play a minor role in influencing economics journals. In that respect the *Journal of Population Economics* may provide a link between the

worlds of demography and economics, at least if it becomes deeply rooted in the world of demographers. However, a lot still needs to be done for the latter objective to be attained, as the *Journal of Population Economics* is cited only four times in other demography journals in the years 1994–95 (see line 10 in Table 5). Evidently, the population economics produced by economists is hardly noticed by demographers.

Conclusions

Intellectual exchange of ideas is difficult to analyze and characterize since the exchange itself is in large part intangible. Citation analysis goes some way toward making the intangible tangible. In this article we have tried to show how far the knowledge produced in demography journals travels. Here we summarize the bibliometric results and put them in perspective.

Our study shows that 64 percent of the articles published in demography journals are cited at least once in the first five years following their publication. For an optimist this may sound like good news, as it suggests that the majority of articles in demography journals provide knowledge that is used elsewhere as an input for further knowledge creation. However, a pessimist could make a different evaluation since the variations between journals are great: whereas articles in top-tier journals are almost all cited within a few years, a considerable proportion of articles in second-tier journals receive few or no citations. This finding is in line with the results presented by Hargens (1991) for a selection of sociology journals and by Schwartz (1997) for journals on library and information sciences. The journal with the largest number of cited articles is *Population and Development Review*, with only 4 percent left uncited; the *Journal of Family Welfare*, with roughly 80 percent of articles uncited, is at the low end of the scale. Unlike the Institute for Scientific Information studies that reported on uncitedness in the social sciences, the average uncitedness rate in demography is relatively low, especially if one takes into account that we have excluded self-citations from our records. The *distribution* of attention given to articles is highly skewed: articles that receive more than one citation per year belong to the top 15 percent of all articles published in our journal sample (see van Dalen and Henkens 1999). The finding that approximately one-third of all articles in demography are not cited within five years following publication suggests that a large number of articles are not very important for the development of science. This harsh conclusion provides fodder for the argument that academic incentives are not geared primarily toward knowledge accumulation but rather to signaling ability through publication. This “publish or perish” culture may be one of the reasons why many papers are left uncited. As an editor of the *Journal of the American Chemical Society*, Allen Bard, stated: “In many ways, publication no longer represents a way of communication with your scientific peers,

but a way to enhance your status and accumulate points for promotion and grants" (cited in Hamilton 1990: 1332).

Another point that needs to be stressed in putting the citation figures in perspective is the specific nature of the audience of the demography journals reviewed in this article. Those who cite published work are generally active researchers in the social science community. As the selection of journals recorded by the SSCI is biased toward the most prestigious journals that publish research at the frontier of science, their audience can be seen as the users of basic demographic research. As noted earlier, there are far more demographically oriented journals than covered by the SSCI, journals that also import knowledge. Their citation practices are not visible in our counts. But perhaps a more important point is that science serves distinctly different audiences. In this article we have focused on the audience for basic demographic research. Beyond the audience of researchers who work at the forefront of their discipline, there are, of course, scientists with different objectives and interests that are not included in the journals selected for the SSCI. Van Dalen (1998) shows that the majority of economists fail to read the prestigious academic journals, preferring the journals with articles of an applied nature. It stands to reason that family planning administrators, bureaucrats, educators, and researchers within the community of demographers each have their specific interests and therefore also their specialized journals.

This article has yielded some relevant findings with respect to the concern over whether specialization within demography has gone too far. Within the set of demography journals chosen, most stay within their narrowly defined research field, giving the impression that demographic subdisciplines are islands in the sea of ideas. Specialized journals within the group of demography journals scarcely communicate with one another, and the bulk of knowledge tends to be created in general, US-based demography journals.¹³ This knowledge trickles down to more specialized journals and to general European journals rather than the other way round.¹⁴ Moreover, language barriers in the demographic community are strong. The picture that emerges from our analysis is of three major journals defining the field of population research: *Demography*, *Population and Development Review*, and *Population Studies* cite and are cited in nearly all other journals. In general, specialized journals play a modest role in the construction of fundamental demographic knowledge. The new and specialized research journals are major importers of knowledge with very little export to other journals, which stands to reason as their export market has yet to be developed or is relatively small. The only exceptions to this rule are the two journals that form the core of the subdiscipline of family planning.

Communication among demographers is similar to the communication processes among sociologists, psychologists, and economists (cf. Bott and Hargens 1991; Everett and Pecotich 1993; Stigler, Stigler, and Friedland

1995): a small core of journals produces the most significant or outstanding research, and the flow of intellectual influence goes from general to applied or specialized research journals. In the field of economics Laband and Piette (1994) provide some evidence of increasing specialization over the last two decades: while retaining their ranking, the top-tier general journals have lost their share of citations relative to top-ranked specialized journals over this period; second-tier general journals have lost citation share and have fallen in rank relative to top field journals.

In order to know in which direction demography is heading, we need to replicate this study a decade hence, after the relatively new journals of today have proven their worth. The present study merely presents a snapshot of the state of and interaction among demography journals in the first half of the 1990s. However, if the critical appraisals of the status of demography by insiders like McNicoll (1992) and Greenhalgh (1996) are a guide to predicting the future of demography journals, then such journals will remain the islands in the sea of ideas that they appear to be right now. On the other hand, if demographers become more attentive to such critical and self-reflexive reviews, demography may well experience a renaissance and become the interdisciplinary social science it deserves to be.

Notes

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1 Likewise, Preston (1993: 594) states that "demographers are the most inductive of social scientists, focused to a greater extent than other social scientists on careful measurement and cautious interpretation."

2 Initially, Hamilton (1990) reported the figure of 55 percent of uncited publications in science. Subsequently, Pendlebury (1991) corrected this figure of uncitedness by leaving out the journal "marginalia" in the citation count, such as meeting abstracts, editorials, letters to the editor, and obituaries.

3 An additional reason for using demography journals and not demographers as the unit of analysis is that, despite Caldwell's optimism about defining a demographer, many academics who are engaged in demography are not demographers by training but

come from sociology, applied mathematics, geography, economics, biology, epidemiology, history, or other sciences that share an interest in demography. In that respect demography journals are better suited to establishing a common ground for analysis.

4 The SSCI list of demography journals includes *Population Index*, published by Princeton University. We have, however, omitted *Population Index* because it mainly carries summaries and lists of reports, books, and articles published in other journals and, on an irregular basis, publishes review articles.

5 Of the 81 population journals registered by CICRED, 15 journals are based in the United States; US-based journals dominate the SSCI, however, by taking up nine of the 16 recorded demography journals. Compare this number, for example, to the number of European journals (35) recorded by CICRED and to the fact that only six European journals are recorded by the SSCI.

6 A bias in recording English and American journals is not surprising since the criteria that ISI uses for selecting journals in-

clude (besides timeliness of publication and geographical representation of authors) the requirement that authors provide English-language article titles, abstracts, and keywords.

7 In 1966 when the SSCI started its enterprise some periodicals included in the demography category were soon excluded (e.g., the *Monographs of the Carolina Population Center*) or were placed in a different category of the ISI (e.g., the *American Journal of Epidemiology* and the *International Journal of Epidemiology*).

8 Most earlier studies used the printed version of the SSCI and could not correct for self-citations of coauthors. In those studies self-citation is generally not considered a major problem. For instance, Bott and Hargens (1991) mention that only 1 percent of their sample of 396 papers received first-author citations. But bearing in mind the difficulties in registering self-citations, this figure is probably a considerable underestimate.

9 A factor not reviewed but nevertheless relevant is the distribution of authors by affiliation. Teachman, Paasch, and Carver (1993: 527) show that authors affiliated with the top ten universities or research organizations in the United States produced approximately one-third of all articles in *Demography*.

10 The collection of translated French articles on demography (most of which come

from the French edition of *Population*) published by *Population: An English Selection* once a year receives even less attention: 69 percent of the articles remain uncited after five years and the average number of citations per article is 0.5. Of course, portions of the English-speaking world may not yet have discovered the English edition of *Population*.

11 A precursor to this type of study can be found in Eagly (1975).

12 The ISI keeps track of citation classics in its journal *Current Contents*. A citation classic is an article or a book that stands out because of the large number of citations it has received after publication. The selection criteria for nominating an article or book as a citation classic are diverse, as citation practices across disciplines are equally diverse (Garfield 1984).

13 The importance of geographically related networks should not be underestimated. As Guest (1994) characterizes the Annual Meeting of the Population Association of America: "... there is an easy camaraderie. It is like a big family reunion, with the different major demographic centers being various wings of the family" (p. 88).

14 On the basis of our analysis we cannot examine the thesis that European demographers have a minor influence in demography, as we have explicitly taken journals as the unit of analysis rather than individuals.

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