



## A bibliometric analysis of health economics articles in the economics literature: 1991–2000

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### Summary

This paper describes and analyzes trends in health economics articles indexed in the economics literature from 1991 to 2000, demonstrating the robust state of publication in the field during the past decade. While articles, pages, and the number of journals increased, single authorship declined dramatically from almost half of articles published to only one-third, and papers with four or more authors increased three-fold. Over three-fourths of articles were analyses of healthcare markets or health production, while policy oriented articles constituted the third largest share. Author concentration ratios decreased almost by half and the Herfindhal–Hirschman index of author concentration declined from 14 in 1991 to only 4 in 1999. Copyright © 2003 John Wiley & Sons, Ltd.

**Keywords** health economics articles; bibliometric analysis; health economics literature

### Introduction

Publications in economics journals in the area of health economics increased almost 350% during the 1990s. Some 5545 articles categorized as health economics topics appeared in the journals indexed in EconLit by the Journal of Economic Literature (JEL) since 1990 [1]. The objective of this paper is to describe and analyze trends, co-authorship, topics, and concentration in the literature of health economics from 1991 to 2000, measured by articles published in journals indexed by EconLit.

Our research extends an extensive literature that explores the scholarly productivity of economists. Substantial research has been conducted on various aspects of publication in the literature of economics, with particular focuses on the broad journal literature of economics, on publications by

fields in economics, and on particular topic areas. Almost four decades ago, Bronfenbrenner [2] describes 'Trends, Cycles, and Fads in Economic Writing' in English language economic journals. He emphasized growth of the related trends of mathematical formalization of economics and specialization within the field, with successive cycles (waves of interest) in various areas. Over time, other researchers [3–5] also emphasize the increasing specialization of economics publications. Relatively more recently, Heck and Zaleski [6] analyze trends in economics literature for the period 1969–1989. They find that growth in the output of economics articles corresponded to the increase in the number of journals indexed by the JEL and that economists' research interests tended to shift direction as society's economic problems changed. Alexander and Mabry [7] evaluate finance journals (including some economics journals) to measure their relative

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effectiveness by analyzing frequency of citations. They develop rankings of the most cited journals and authors from 1986 to 1991. Laband and Wells [8] present an historical profile of publications in the three major general economics journals, the AER, JPE, and QJE. Their broad overview documents the long-term trend of increased relative importance of feature articles at the expense of book reviews and notes, etc. They found a significant decline in contributions by nonacademic authors, and that not until the 1990s did feature articles by women ever exceed 10%.

Cox and Chung [9] present a refreshing perspective on research output and author concentration in the economics literature, using statistical analysis to determine bibliometric regularity in publication patterns in 20 leading economics journals for the period 1963 through 1988. They find that the generalized pattern known as Lotka's Law provides a good description of patterns of research productivity in economics journals. Lotka's Law is:  $a_n = a_1/n^c$ , where  $a_n$  is the number of authors publishing  $n$  papers,  $a_1$  is the number of authors publishing one paper, and  $c$  is a constant. Further, they conclude that specialized journals, with a narrow field concentration, have a high author concentration. However, no journals specifically in health economics are included among those analyzed. Chung *et al.* [10] examine publication behavior of individuals, identifying the 100 most prolific authors in the 20 top EconLit economics journals for the period 1963–1988. They find that the majority of these authors published only once in these journals and among the articles of these authors almost 70% were single-authored.

Research on sub-field or subject publishing performance in economics has emphasized productivity and change over time, often in the context of evaluating academic departments by specified fields. Using the Index of Economic Journals, Bronfenbrenner [2] examines the subjects of economics articles from 1886 to 1963, based on 23 categories. He views 'health, education, and welfare' as a single category that declined from 2.6% of economics publications to only 1.1% over this extended period. Baumann *et al.* [11] evaluate seven economics fields but do not cover health economics as a separate area. Heck and Zaleski [6] research economic articles by subject area for 1969–1990, but do not include health economics as an area distinct from Welfare economics, except to note that health economics publications grew from 3% to 15% of this broad category.

Tremblay *et al.* [12] explore sub-field publishing performance for 19 selected fields by PhD granting US economics departments from 1980 to 1986. They do include health economics as a distinct field, finding that faculty at 47 universities published in the field during this period. However, among these departments, almost three-fifths (27) had only one faculty member publishing in health economics, one-fourth (12) had two, seven had three or four, and only one (Vanderbilt) had five faculty publishing in the field of health economics.

Numerous studies focus on specific fields in economics, including Kau and Johnson [13] on regional science and Niemi [14] on economic history. Other researchers examine geographic areas of economic analysis, including: Davis and Gonzales [15] on the Mexican economy; Colomatto *et al.* [16] on the Italian Economy; Davis *et al.* [17] on International Economics; and Davis and Patterson [18] on the impacts of economic transition on research.

Despite the proliferation of articles presenting analyses of various aspects of the economics literature, there has been no detailed research specifically focused on the rapidly growing field of health economics, a gap that our research seeks to fill. The objective of this paper is to present a descriptive analysis of healthcare economics publications during the 1990s, measured by publications in journals included in EconLit. We analyze the growth and topical trends in this literature, and we calculate concentration ratios to determine if limited numbers of authors and journals dominate and if this dominance has changed over time. The broad research question we consider is: What is the state of the field and what are recent trends in the journal literature in health economics? The specific research questions are:

- (1) What changes occurred in the number of health economics articles and journals publishing these articles over the 1990s?
- (2) Is there a trend toward greater co-authorship in the health economics literature?
- (3) What is the trend of publication by JEL health economics sub-category?
- (4) Who are the most prolific JEL health economics authors by number of articles published?
- (5) Is there a tendency toward greater concentration of authorship in health economics?

## Data

The data used in this paper are from the 'Health, Education, and Welfare' category (I000) of EconLit, the electronic bibliography of economic literature of the American Economic Association [1]. EconLit provides a widely accepted list of economics journals, with its corresponding internally generated classification system that permits identification of both articles and the authors who publish in the field.

EconLit includes journals indexed since 1969 in the Journal of Economic Literature. In March 1991, Econ Lit introduced a new classification system for articles and books in economics that substituted 19 new categories for the previous ten. By deliberately not dividing theoretical and empirical research into separate categories, the new system specifically accommodated articles combining original theoretical work with empirical research [19]. This approach is of particular relevance in the field of health economics, which relies upon both theoretical developments and applications of economic theory and methodology.

The health economics literature database for 1991 through part of 2000 includes the articles identified and coded, based on key terms by the JEL, in the broad category I – Health, Education, and Welfare, which includes I000 – Health, Education, and Welfare: General. The time period was selected both because it is sufficiently long to provide a reasonable time frame for assessing change and because a new classification system was introduced in EconLit in 1991. This presented a break-point in the comparability of categories over time.

A substantial database 'clean-up' was required to solve the problem that the JEL/EconLit is an author database, but names may vary according to publication guidelines for different journals. Using a pivot table analysis, we manually matched and merged data for different forms of authors' names for the entire database, e.g. John Doe or John E. Doe or J.E. Doe. In this process, we summed the number of articles and pages by each author to determine rankings by number of articles and pages indexed in EconLit. We also manually checked all very long articles in terms of page count to determine that no errors were included in the data. Because a few authors had a limited number of very lengthy articles, this process led us to conclude that we should analyze concentration ratios in terms of the number of articles, following

the approach of Cox and Chung [9], rather than in terms of the number of pages.

From 1991 to 2000, a total of 5545 articles were classified as health economics in the broad EconLit Classification category I000 – Health, Education, and Welfare: General. Within this category, there are five subject descriptors or sub-categories, including: General; I100 Health: General; I110 Analysis of Health Care Markets; I120 Health Production: Nutrition, Mortality, Morbidity, Disability, and Economic Behavior; I180 Health: Government Policy; Regulation: Public Health; and I190 Health: Other.

Each article is allocated to a specific category by an internal classification system. As noted by the JEL, the 'Subcategories for each subject classification were chosen by the editors and our Classification consultant with advice from economists who specialized in each subject area ... Classifications are assigned to articles by graduate students in economics... All classifications are checked by senior classifiers for consistency' [20]. Articles are listed under only one or two categories in the print reference, but on-line or on the CD-ROM versions articles may be listed under up to six classifications [21]. The list of 92 key words associated with the I000 category and used for topic classification can be found at [www.econlit.org](http://www.econlit.org) or is available from the JEL or from the authors upon request.

Analysis of health economics articles based only on EconLit journals mandates that several caveats be noted. First, while EconLit includes a wide range of economics and business journals, it does not include many social welfare journals or numerous health care journals (for example, *Social Science and Medicine*) that would be covered by an alternate index such as PubMed, a bibliographic database of the US National Library of Medicine. Second, EconLit may encompass a bias toward US journals. This bias may be perceived in the available categories for classifying the subject matter of articles, which would probably have a separate section for economic evaluation/applied welfare economics if a more internationally oriented categorization were used. This point is made by Chang and Rubin [22] who find that the most prolific authors in health economics during 1991–2000 published more articles on economic evaluation and quantitative methods in PubMed than in EconLit journals. Third, only some proportion of refereed health economics papers are published in economics journals, with the JEL journals likely to carry more clearly economics

papers, while general health and health services research journals are more likely to carry interdisciplinary papers. Chang and Rubin [22] find that prolific health economics authors published substantially more (2.5 times as many) articles in PubMed listed journals than in strictly EconLit journals.

## Findings

What changes occurred in the number of health economics articles and journals publishing these articles over the 1990s?

### State of the field – publications analysis

During the 1990s, there was more than a three-fold increase in both the annual number of articles published and the number of pages devoted to Health Economics in EconLit. Table 1 shows that the number of articles in Health Economics increased from 273 in 1991 to 890 by 1999, the last full year for which data is available, while total pages increased from 3748 to 12 801. Therefore, the average article length fluctuated very little from a minimum of 12.7 pages in 1992 to a maximum of 15.4 pages in 1998, with an overall average of 14.5 pages. The number of journals including health economics articles nearly doubled, increasing from 99 to 165 during the decade.

It is instructive to compare the growth in health economics articles with that for economics as a whole. While EconLit health economics articles increased 226% from 1991 through 1999, all EconLit articles increased only 40% (from 26 087 in 1991 to 36 478 in 1999). The growth in the number of total articles largely reflects expansion of the database or the addition of journals indexed in EconLit. This contrast in the growth of health articles and all economics articles reveals the increased interest in health economics as a field during the study period. Health economics articles were just 1% of all EconLit articles in 1991 and grew to about 2½% of all EconLit articles in 1999. Thus, while still quite small, the share of health articles considerably more than doubled.

Tables 2 and 3 present a detailed analysis and ranking of the 35 EconLit journals that published the most health economics articles during 1991–2000. Some of these journals have data for only a limited number of years, determined by the date at which their EconLit coverage began. In Table 2, the number of annual issues ranges from 18 for *PharmacoEconomics* to only 2 for the *Journal of Consumer Affairs*. This explains why, for example, *PharmacoEconomics* had 2½ times as many health economics articles as the next highest producing journal. The annual number of health economics articles varied widely among the general economics journals and from year to year within individual journals, as

Table 1. Major characteristics of the JEL health economics database: 1991–2000

| Year              | Articles | Total pages | Avg. length | Journal count    | Distribution of articles by no. of authors |               |               |               |
|-------------------|----------|-------------|-------------|------------------|--|---------------|---------------|---------------|
|                   |          |             |             |                  | 1 Author (%)                               | 2 Authors (%) | 3 Authors (%) | 4 or more (%) |
| 1991              | 273      | 3748        | 13.7        | 99               | 49.1                                       | 29.7          | 14.7          | 6.6           |
| 1992              | 400      | 5089        | 12.7        | 95               | 47.5                                       | 34.5          | 10.8          | 7.3           |
| 1993              | 350      | 4790        | 13.7        | 92               | 42.9                                       | 31.7          | 15.7          | 9.7           |
| 1994              | 524      | 7373        | 14.1        | 118              | 49.6                                       | 34.5          | 12.2          | 3.6           |
| 1995              | 531      | 7675        | 14.5        | 126              | 37.5                                       | 35.4          | 15.6          | 11.5          |
| 1996              | 676      | 9912        | 14.7        | 149              | 39.8                                       | 32.2          | 15.8          | 12.1          |
| 1997              | 718      | 10 886      | 15.2        | 153              | 38.9                                       | 30.2          | 16.2          | 14.8          |
| 1998              | 786      | 12 075      | 15.4        | 173              | 38.2                                       | 31.0          | 17.0          | 13.7          |
| 1999              | 890      | 12 801      | 14.4        | 165              | 39.8                                       | 28.7          | 15.7          | 15.8          |
| 2000 <sup>a</sup> | 397      | 5925        | 14.9        | 99               | 33.5                                       | 31.2          | 16.9          | 18.4          |
| 1991–2000         | 5545     | 80 274      |             | 423 <sup>b</sup> |  |               |               |               |
| Weighted avg.     |          |             | 14.5        |                  | 40.9                                       | 31.7          | 15.3          | 12.1          |

<sup>a</sup>Incomplete data.

<sup>b</sup>Count of unique journals for the 1991–2000 period and not the sum of counts of individual years.

Table 2. The 35 EconLit journals with the most health economics articles 1991–2000<sup>a</sup>

| No. | Journal title                                      | Annual issues | Annual number of health care economics articles |      |      |      |      |      |      |      |      |      | Total |
|-----|--|---------------|---|------|------|------|------|------|------|------|------|------|-------|
|     |  |               | 1991  | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |       |
| 1   | PharmacoEconomics                                  | 18            |   | 102  | 83   | 114  | 88   | 119  | 99   | 114  | 114  | 79   | 912   |
| 2   | Inquiry  | 4             | 44  | 46   | 39   | 48   | 42   | 36   | 29   | 34   | 38   | 7    | 363   |
| 3   | Health Services Research                           | 6             |   |      |      |      | 39   | 41   | 58   | 88   | 69   | 52   | 347   |
| 4   | Journal of Health Economics                        | 6             | 26  | 28   | 30   | 31   | 34   | 40   | 46   | 35   | 41   | 21   | 332   |
| 5   | Health Economics                                   | 6             |   |      |      |      |      | 46   | 54   | 66   | 65   | 48   | 279   |
| 6   | Health Marketing Quarterly                         | 4             |   |      |      | 30   | 30   | 27   | 24   | 17   | 28   | 14   | 170   |
| 7   | Journal of Research in<br>Pharmaceutical Economics | 4             |   | 17   | 10   | 22   | 15   | 29   | 22   | 15   | 3    |      | 133   |
| 8   | Journal of Health Politics,<br>Policy and Law      | 6             |   |      |      |      |      |      |      | 32   | 69   |      | 101   |
| 9   | Applied Economics                                  | 18            | 9   | 10   | 7    | 7    | 6    | 11   | 7    | 9    | 12   |      | 78    |
| 10  | American Economic Review                           | 4             | 7   | 2    | 2    | 7    | 20   | 6    | 7    | 14   | 8    | 2    | 75    |
| 11  | Demography   | 4             | 5   | 5    | 7    | 7    | 3    | 11   | 8    | 7    | 11   | 7    | 71    |
| 12  | Population Studies                                 | 3             | 11  | 5    | 7    | 7    | 10   | 5    | 5    | 5    | 5    | 6    | 66    |
| 13  | Journal of Human Resources                         | 4             | 8   | 1    | 8    | 3    | 11   | 11   | 6    | 1    | 4    | 5    | 58    |
| 14  | Development  | 4             |   |      |      |      |      |      | 2    |      | 46   | 3    | 51    |
| 15  | Family Economics and<br>Nutrition Review           | 4             |   |      |      |      | 6    | 8    | 15   | 12   | 10   |      | 51    |
| 16  | Health Care Management<br>Science                  | 4             |   |      |      |      |      |      |      | 18   | 25   | 6    | 49    |
| 17  | American Prospect                                  | 26            | 4   | 3    | 6    | 10   | 4    | 3    | 6    |      | 4    | 7    | 47    |
| 18  | Population Research and<br>Policy Review           | 6             | 1   | 2    | 3    | 5    | 1    | 5    | 8    | 4    | 16   |      | 45    |
| 19  | Population and<br>Development Review               | 4             | 6   | 1    | 7    | 3    | 6    | 8    | 2    | 4    | 3    | 1    | 41    |
| 20  | Environment and Planning A                         | 12            | 4   | 7    | 5    | 2    | 2    | 4    | 6    | 4    | 2    | 4    | 40    |
| 21  | Southern Economic Journal                          | 4             | 7   | 4    | 3    | 5    | 5    | 5    | 3    | 3    | 4    | 1    | 40    |
| 22  | Applied Economics Letters                          | 15            |   |      |      | 2    | 4    | 8    | 5    | 5    | 12   | 3    | 39    |
| 23  | Journal of the American<br>Statistical Association | 4             | 3   | 6    | 3    |      | 2    | 9    | 2    | 5    | 8    |      | 38    |
| 24  | World Development                                  | 12            | 1   | 4    | 1    | 1    | 1    | 2    | 2    | 11   | 11   | 2    | 36    |
| 25  | Food Policy  | 6             |   |      |      |      |      | 7    | 3    | 4    | 20   | 1    | 35    |
| 26  | Journal of Risk and<br>Uncertainty                 | 3             |   | 2    |      | 9    |      | 7    | 10   | 1    | 4    |      | 33    |
| 27  | Canadian Public Policy                             | 4             | 3   | 3    | 3    | 1    | 4    |      | 11   | 2    | 4    | 1    | 32    |
| 28  | American Journal of<br>Agricultural Economics      | 5             | 6   | 1    |      | 7    |      | 4    | 7    |      | 5    | 1    | 31    |
| 29  | Monthly Labor Review                               | 12            | 5   | 4    | 1    | 3    | 8    | 3    |      | 5    | 1    |      | 30    |
| 30  | Journal of Public Economics                        | 3             | 2   | 1    | 4    | 2    | 2    | 3    | 8    |      | 5    | 2    | 29    |
| 31  | Journal of Consumer Affairs                        | 2             | 1   | 7    | 3    | 1    | 2    | 2    | 5    | 2    | 5    |      | 28    |
| 32  | Pakistan Development Review                        | 4             | 3   | 7    | 4    | 2    | 6    | 2    | 2    | 1    | 1    |      | 28    |
| 33  | Journal of Economics and<br>Management Strategy    | 4             |   |      | 1    | 9    |      | 1    | 8    | 2    | 6    |      | 27    |
| 34  | Review of Economics<br>and Statistics              | 4             | 3   | 4    |      | 2    | 4    | 4    | 4    | 2    | 2    | 2    | 27    |
| 35  | Social Science Quarterly                           | 4             | 1   | 3    | 4    | 1    | 1    | 3    | 3    | 1    | 2    | 8    | 27    |

<sup>a</sup>Journals entered the database at year EconLit coverage was initiated.

contrasted with the more specific health economics journals that constitute the top eight journals listed.

Table 3 presents the publisher or sponsoring organization of each journal, as well as the editor's country and the publisher's country. Among the

Table 3. Publishers and/or sponsoring organizations of 35 EconLit journals with country and impact factor

| No. | Journal title                                   | Publisher or sponsoring organization                      | Editor's country | Publisher's country | 2001 impact factor | SSCI/SCI |
|-----|---|---|------------------|---------------------|--------------------|----------|
| 1   | Pharmacoeconomics                               | Adis International Limited A Wolters Kluwer Company       | NZ               | NZ                  | 1.725              | SCI      |
| 2   | Inquiry   | Excellus Health Plan, Inc.                                | US               | US                  | 0.879              | SSCI     |
| 3   | Health Services Research                        | Health Research and Educational Trust.                    | US               | US                  | 2.543              | SSCI     |
| 4   | Journal of Health Economics                     | Elsevier Science  | US               | Holland             | 1.806              | SSCI     |
| 5   | Health Economics                                | John Wiley & Sons, Ltd.                                   | UK               | UK                  | 1.746              | SSCI     |
| 6   | Health Marketing Quarterly                      | The Haworth Press, Inc.                                   | US               | US                  | NA                 |          |
| 7   | Journal of Research in Pharmaceutical Economics | The Haworth Press, Inc.                                   | US               | US                  | NA                 |          |
| 8   | Journal of Health Politics – Policy and Law     | The Duke University Press                                 | US               | US                  | 1.339              | SSCI     |
| 9   | Applied Economics                               | Taylor & Francis Group                                    | UK               | UK                  | 0.170              | SSCI     |
| 10  | American Economic Review                        | The American Economic Assn                                | US               | US                  | 2.087              | SSCI     |
| 11  | Demography                                      | Population Assn of America                                | US               | US                  | 1.549              | SSCI     |
| 12  | Population Studies                              | London School of Economics                                | UK               | UK                  | 1.043              | SSCI     |
| 13  | Journal of Human Resources                      | University of Wisconsin Press                             | US               | US                  | 1.047              | SSCI     |
| 14  | Development                                     | The Society for International Development (Italy)         | Australia        | UK                  | NA                 |          |
| 15  | Family Economics and Nutrition Review           | Center for Nutrition Policy and Promotion (USDS)          | US               | US                  | NA                 |          |
| 16  | Health Care Management Science                  | Kluwer Academic Publishers                                | US               | US                  | NA                 |          |
| 17  | American Prospect                               | American Prospect, Inc.                                   | US               | US                  | NA                 |          |
| 18  | Population Research and Policy Review           | Kluwer Academic Publishers for Southern Demographic Assn  | US               | US                  | 0.169              | SSCI     |
| 19  | Population and Development Review               | Population Council  | US               | US                  | 1.123              | SSCI     |
| 20  | Environment and Planning A                      | Pion Ltd  | UK               | UK                  | 1.070              | SSCI     |
| 21  | Southern Economic Journal                       | Sothern Economic Assn                                     | US               | US                  | 0.361              | SSCI     |
| 22  | Applied Economics Letters                       | Taylor & Francis Group                                    | UK               | UK                  | 0.101              | SSCI     |
| 23  | Journal of the American Statistical Association | American Statistical Assn                                 | US               | US                  | 1.571              | SCI      |
| 24  | World Development                               | Elsevier Science  | Canada           | Holland             | 1.134              | SSCI     |
| 25  | Food Policy                                     | Elsevier Science  | UK               | Holland             | 0.434              | SSCI     |
| 26  | Journal of Risk and Uncertainty                 | Kluwer Academic Publishers                                | US               | US                  | 1.400              | SSCI     |
| 27  | Canadian Public Policy                          | Social Sciences and Humanities Research Council of Canada | Canada           | Canada              | 0.193              | SSCI     |
| 28  | American Journal of Agricultural Economics      | American Agricultural Economics Assn                      | US               | US                  | 0.684              | SSCI     |
| 29  | Monthly Labor Review                            | US Dept. of Labor   | US               | US                  | 0.798              | SSCI     |
| 30  | Journal of Public Economics                     | Elsevier Science  | US               | Holland             | 0.981              | SSCI     |

Table 3 (continued)

| No. | Journal title                                | Publisher or sponsoring organization                      | Editor's country | Publisher's country | 2001 impact factor | SSCI/SCI |
|-----|--|---|------------------|---------------------|--------------------|----------|
| 31  | Journal of Consumer Affairs                  | The American Council on Consumer Interests                | US               | US                  | 0.455              | SSCI     |
| 32  | Pakistan Development Review                  | Pakistan Institute of Development Economics               | Pakistan         | Pakistan            | NA                 | SSCI     |
| 33  | Journal of Economics and Management Strategy | Kellogg School of Management, Northwestern University     | US               | US                  | 0.390              | SSCI     |
| 34  | Review of Economics and Statistics           | MIT Press   | US               | US                  | 1.315              | SSCI     |
| 35  | Social-Science-Quarterly                     | Blackwell Publishers for Southwestern Social Science Assn | US               | UK                  | 0.632              | SSCI     |

editors, 24 are in the US, 6 in the UK, 2 in Canada, with one each in New Zealand, Australia, and Pakistan. The countries of the publishers are slightly different, largely due to publication by Elsevier in Holland, with 21 in the US, 7 in the UK, 4 in Holland, and one each in New Zealand, Canada, and Pakistan. In addition, the 2001 impact factor for each of the journals is detailed in Table 3. Only two of the 35 journals are indexed in the Science Citation (SCI) [23], while the others are indexed in the Social Science Citation Index (SSCI) [24].

Is there a trend toward greater co-authorship in the health economics literature?

### Co-authorship analysis

Table 1 also presents the distribution of health economics articles by number of authors. In 1991, almost half (49.1%) of the Health Economics articles had single authorship, but this declined fairly steadily so that only one-third (33.5%) of articles were single authored by 2000, a decrease of almost a third. The number of articles with two or three authors fluctuated only slightly over this period with both categories increasing by a couple of percent. The largest change over the decade occurred in the case of papers with more than three authors. Only 18 articles (6.6%) had more than three authors in 1991, but by 1999, there were 140 articles (15.8%) in this category. Thus, the data suggest a trend toward increased co-authorship of articles in health economics, but this is seen mainly in the case of four or more authors. We speculate that this may derive, at least in part, from increased externally funded research in health economics that typically encompasses multiple researchers from a variety of fields.

It is instructive to place the trend of increased co-authorship in health economics in the context of co-authorship in the broader economics literature. Heck and Zaleski [6] report that, for the two decades prior to our study period, co-authorship of JEL articles increased steadily from 15.1% in 1969 to 35.7% in 1989.

What is the trend of publication topics by JEL health economics sub-category?

### Articles by JEL sub-category

The EconLit classification for Health Economics has five sub-categories into which articles are

classified by the JEL staff. They code each article by the application of subject descriptors, with articles potentially divided into multiple cate-

gories, as described above. Figure 1 (using data from Table 4) presents an overview of the decade 1991–2000, revealing that over three-fourths of all health economics articles were classified into one of two categories. The largest share (42.6%) were category I110 – Analysis of Health Care Markets and the second largest share (34.6%) were category I120 – Health Production: Nutrition, Mortality, Morbidity, Disability, and Economic Behavior. An additional 18.1% were category I180–Health: Government Policy; Regulation; Public Health, 4.6% were category I100 – Health: General, with the remaining 0.1% residual as I190 – Health: Other.

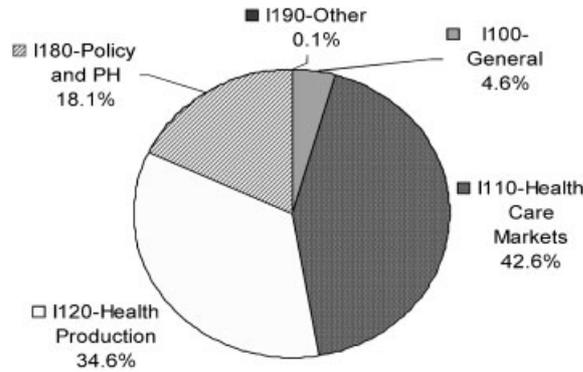


Figure 1. Distribution of 5545 articles by JEL sub-category in health economics, 1991–2000

Figure 2 (using data from Table 4) reveals the changing trends in Health Economics publication sub-categories over the course of the 1990s. Clearly, the overall shares were driven by the significant increases in publication of articles concerning Health Care Markets (from 95 articles

Table 4. Number of articles by JEL category in health, 1991–2000

| JEL sub-category in health <sup>a</sup> | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000 <sup>b</sup> | 1991–00 | %Change 91–99 |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|---------|---------------|
| I100-General                            | 7.3   | 7.0   | 12.5  | 24.0  | 37.0  | 40.0  | 30.0  | 34.5  | 44.0  | 17.5              | 253.8   | 500.0         |
| I110-Health Care Markets                | 95.3  | 124.5 | 150.5 | 286.0 | 277.8 | 254.0 | 298.8 | 335.3 | 353.5 | 188.5             | 2364.3  | 270.8         |
| I120-Health Production                  | 116.0 | 176.5 | 119.5 | 102.0 | 112.3 | 247.5 | 268.8 | 286.8 | 345.0 | 146.5             | 1921.0  | 197.4         |
| I180-Policy and PH                      | 53.0  | 92.0  | 66.0  | 111.0 | 102.8 | 134.5 | 120.3 | 129.3 | 147.5 | 44.5              | 1001.0  | 178.3         |
| I190-Other                              | 1.3   | —     | 1.5   | 1.0   | 1.0   | —     | —     | —     | —     | —                 | 4.8     | –100.0        |
| Total                                   | 273.0 | 400.0 | 350.0 | 524.0 | 531.0 | 676.0 | 718.0 | 786.0 | 890.0 | 397.0             | 5545.0  | 226.0         |

<sup>a</sup>Some articles are split between two or among three sub-categories.

<sup>b</sup>Incomplete data.

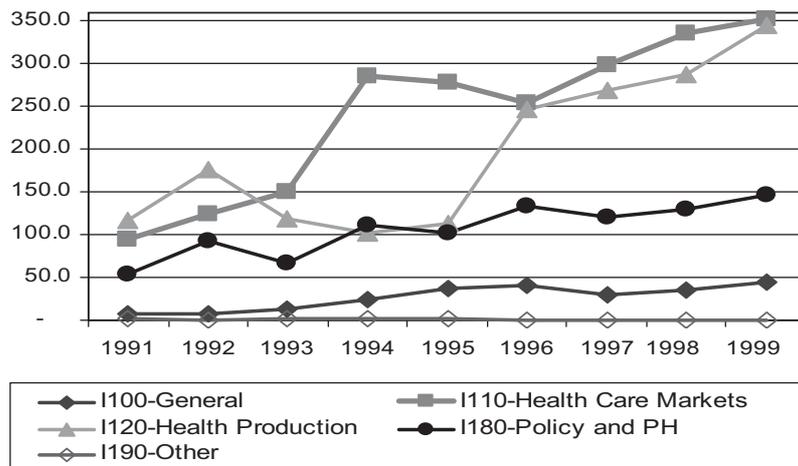


Figure 2. Article trends by JEL sub-category in health, 1991–99

in 1991 to 354 in 1999) and Health Production (from 116 articles in 1991 to 345 in 1999), while the General Health Economics articles increased from seven in 1991 to 44 in 1999. Concurrently, articles in Health Policy increased from 53 to 148 while the residual Other category declined from one to none.

Who are the most prolific JEL health economics authors by number of articles and number of pages published?

### Health economics authors

Table 5 lists the 50 authors with the largest number of attributed articles and the 50 authors with the largest number of attributed pages in the health economics literature during the 1990s. In the EconLit database, if an article has one, two, or three authors, all are listed; but if there are more than three authors, then only the first is listed. Therefore, for articles with one, two, or three authors, each author receives 1, or  $\frac{1}{2}$  or  $\frac{1}{3}$  article credit; and  $1/n$  pages credit in the two lists in Table 5. But, if there are four or more authors for an article, then only the first author is listed in the EconLit database; and therefore the first author gets full credit for both the article and pages, and co-authors do not get credit.

Almost three-fifths of the authors (30) appear on both lists of top article and page production. However, the order of the two lists is quite different even for those on both. And 40% of the top article producers are not top page producers, including the highest article producer.

Is there a tendency toward greater concentration of publications in health economics?

### Concentration ratios

We examine the data to determine whether there is a tendency for increased concentration or dominance of either authors or journals in health economics. Table 6 presents the concentration ratios of health economics articles for the top 10, 25, and 50 authors and journals, as well as the Herfindhal–Hirschman index [25] as a measure of concentration. The Herfindhal–Hirschman index gives a broader measure of dispersion indicating the shares of total health economics articles of the most productive authors or shares published by a limited number of journals.

With the increases in the total number of articles (from 259 to 784) and of authors (from 396 to 1254 authors named) in the health economics literature, the author concentration ratios decreased over time, declining almost by half from 1991 to 1999. We use the end point of 1999 rather than 2000 in this discussion, as the data for 2000 are incomplete. The 10-author concentration ratio declined from 7.0% to 3.7%, the 25-author ratio from 13.4% to 7.4%; and the 50-author ratio from 23% to 12%. Concomitantly, the Herfindhal–Hirschman index, as a measure of author concentration in the field of health economics, also decreased consistently from 14 in 1991 to only 4 in 1999.

In contrast, the journal concentration ratios for publication of health economics articles increased from 1991 to 1999. However, the rate of increase in the concentration ratio was much higher, the smaller the number of journals evaluated. The concentration ratio for the top 10 journals increased by one-third (32.4%); while the ratio for the top 25 journals increased by 15.1%; and for the top 50 journals it increased by only 6.8% between 1991 and 2000. Further, the annual increase was by no means consistent, revealing fluctuating ratios within the generally upward trend over the decade. The Herfindhal–Hirschman index of journal article concentration in health economics also fluctuated over the period, increasing significantly from 1991 to 1992 through 1994, and then declining again so that it ended the decade at almost the same level as in 1991. This might be expected, despite the fact that the number of journals publishing health economics articles increased consistently from 99 in 1991 to 165 in 1999, as a limited number of journals specialized in health economics.

### Conclusions

This research demonstrates the robust state of the field of health economics during the past decade. The literature in the field increased in terms of articles and pages published as well as the number of journals that included health economics articles. We find that single authorship in health economics declined dramatically over the 1990s from almost half of articles to only one-third. The largest change in co-authorship occurred among papers with four or more authors, which increased three-fold to over 18%. We find that almost three-fifths

Table 5. Authors<sup>a</sup> publishing most articles<sup>b</sup> and pages in health economics, 1991–2000

| Author                | Articles     | Author                | Total pages  |
|-----------------------|--------------|-----------------------|--------------|
| Swartz, K             | 19.17        | <b>Viscusi, WK</b>    | <b>221.0</b> |
| <b>Johannesson, M</b> | <b>17.58</b> | <b>Congdon, P</b>     | <b>176.0</b> |
| <b>Pauly, MV</b>      | <b>14.58</b> | <b>Newhouse, JP</b>   | <b>174.2</b> |
| Hadley, J             | 14.08        | <b>Gruber, J</b>      | <b>173.5</b> |
| <b>Newhouse, JP</b>   | <b>13.00</b> | <b>Danzon, PM</b>     | <b>161.0</b> |
| <b>Viscusi, WK</b>    | <b>12.83</b> | <b>Johannesson, M</b> | <b>154.2</b> |
| <b>Danzon, PM</b>     | <b>9.50</b>  | <b>Gal-Or, E</b>      | <b>154.0</b> |
| Nayga, RM Jr.         | 9.50         | <b>Philipson, TJ</b>  | <b>151.8</b> |
| <b>Cutler, DM</b>     | <b>9.42</b>  | <b>McClellan, MB</b>  | <b>148.0</b> |
| <b>Dranove, D</b>     | <b>9.33</b>  | <b>Kaestner, R</b>    | <b>146.5</b> |
| <b>Johansson, PO</b>  | <b>8.83</b>  | <b>Pauly, MV</b>      | <b>145.2</b> |
| Maynard, A            | 8.83         | <b>Ettner, SL</b>     | <b>144.0</b> |
| <b>Gruber, J</b>      | <b>8.50</b>  | <b>Dranove, D</b>     | <b>143.2</b> |
| <b>Feldman, RD</b>    | <b>8.08</b>  | <b>Propper, C</b>     | <b>143.2</b> |
| Luft, HS              | 7.83         | <b>Rizzo, JA</b>      | <b>129.1</b> |
| <b>Kaestner, R</b>    | <b>7.67</b>  | <b>Cutler, DM</b>     | 127.3        |
| <b>Philipson, TJ</b>  | <b>7.67</b>  | Gaynor, M             | 127.0        |
| <b>Mobley, LR</b>     | <b>7.50</b>  | Rockett, IRH          | 125.0        |
| <b>Pathak, DS</b>     | <b>7.50</b>  | <b>Cohen, SB</b>      | 120.8        |
| <b>Congdon, P</b>     | <b>7.33</b>  | <b>Mobley, LR</b>     | 119.5        |
| Drummond, MF          | 7.25         | Lynk, WJ              | 119.0        |
| <b>Ettner, SL</b>     | <b>7.17</b>  | Yelowitz, AS          | 116.0        |
| Jonsson, B            | 7.17         | <b>Wagstaff, A</b>    | <b>114.8</b> |
| <b>McClellan, MB</b>  | <b>7.17</b>  | Joyce, T              | 114.8        |
| Stone, DA             | 7.00         | Goa, KL               | 112.8        |
| Williams, A           | 7.00         | Madrian, BC           | 112.5        |
| Gerdtham, UG          | <b>6.92</b>  | <b>McGuire, TG</b>    | <b>111.7</b> |
| <b>Ryan, M</b>        | <b>6.92</b>  | <b>Chaloupka, FJ</b>  | <b>105.2</b> |
| Dolan, P              | 6.83         | <b>Bradford, WD</b>   | <b>105.0</b> |
| <b>Jones, AM</b>      | <b>6.83</b>  | <b>Feldman, RD</b>    | <b>104.5</b> |
| <b>Propper, C</b>     | <b>6.83</b>  | Mullahy, J            | 104.5        |
| <b>Chaloupka, FJ</b>  | <b>6.50</b>  | Burriss, S            | 104.0        |
| Olsen, JA             | 6.50         | Faulds, D             | 100.3        |
| <b>Rizzo, JA</b>      | <b>6.42</b>  | Frankford, DM         | 100.0        |
| Whynes, DK            | 6.42         | <b>Johansson, PO</b>  | <b>99.0</b>  |
| <b>Bradford, WD</b>   | <b>6.33</b>  | Ruhm, CJ              | 97.5         |
| <b>McGuire, TG</b>    | <b>6.33</b>  | Nathanson, CA         | 97.0         |
| Rice, TH              | 6.33         | Costa, DL             | 97.0         |
| <b>Wagstaff, A</b>    | <b>6.25</b>  | White, WD             | 96.8         |
| Gold, MR              | 6.17         | <b>Pathak, DS</b>     | <b>96.5</b>  |
| <b>Gaynor, M</b>      | <b>6.00</b>  | Meier, V              | 94.0         |
| <b>Kenkel, DS</b>     | <b>6.00</b>  | <b>Reschovsky, JD</b> | <b>93.7</b>  |
| <b>Reschovsky, JD</b> | <b>6.00</b>  | Burns, LR             | 92.7         |
| Tresnowski, BR        | <b>6.00</b>  | Jones, AM             | <b>92.2</b>  |
| Shortell, SM          | <b>5.83</b>  | Bleichrodt, H         | 91.7         |
| <b>Cohen, SB</b>      | <b>5.67</b>  | Thomas, D             | 91.3         |
| <b>Sloan, FA</b>      | <b>5.67</b>  | Little, JS            | 91.0         |
| Morrisey, MA          | <b>5.67</b>  | <b>Kenkel, DS</b>     | <b>90.5</b>  |
| Bhargava, A           | 5.50         | <b>Ryan, M</b>        | <b>89.9</b>  |
| Mason, JM             | <b>5.50</b>  | <b>Sloan, FA</b>      | <b>89.3</b>  |

<sup>a</sup>Authors who appear in both lists are in bold type.

<sup>b</sup>Each author gets 1/n article credit for articles with 3 or fewer authors. For articles with 4 or more authors, only the first author is named in the database and gets full credit. The number of pages of an article is evenly divided among the named authors.

Table 6. Concentration of authorship and journals, 1991–2000

|   | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  | 1997  | 1998  | 1999  | 2000a | Avg   |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 10 Author concentration ratio           | 7.0%  | 6.8%  | 5.7%  | 6.6%  | 4.7%  | 4.5%  | 4.7%  | 3.8%  | 3.7%  | 4.8%  | 5.2%  |
| 25 Author concentration ratio           | 13.4% | 13.7% | 11.2% | 11.9% | 9.6%  | 9.0%  | 9.0%  | 8.1%  | 7.4%  | 9.4%  | 10.3% |
| 50 Author concentration ratio           | 23.0% | 21.5% | 18.9% | 18.1% | 15.0% | 14.5% | 14.8% | 13.3% | 12.0% | 16.7% | 16.8% |
| Herfindhal–Hirschman Index <sup>b</sup> | 14    | 12    | 10    | 10    | 6     | 6     | 6     | 5     | 4     | 6     | 8     |
| No. of unique authors named             | 396   | 546   | 518   | 726   | 804   | 976   | 1009  | 1127  | 1254  | 622   | 817   |
| No. of articles published               | 259   | 378   | 324   | 510   | 485   | 614   | 638   | 705   | 784   | 342   | 522   |
| 10 journal concentration ratio          | 47.6% | 59.3% | 58.6% | 58.6% | 57.1% | 54.9% | 53.6% | 55.6% | 57.9% | 63.0% | 56.6% |
| 25 journal concentration ratio          | 67.0% | 74.8% | 76.3% | 76.3% | 72.3% | 70.6% | 70.6% | 70.9% | 72.9% | 77.1% | 72.9% |
| 50 journal concentration ratio          | 82.1% | 88.3% | 88.0% | 88.0% | 83.8% | 82.4% | 82.3% | 80.8% | 83.6% | 87.7% | 84.7% |
| Herfindhal–Hirschman Index              | 456   | 898   | 826   | 826   | 527   | 525   | 439   | 505   | 451   | 794   | 624   |
| No. of journals                         | 99    | 95    | 92    | 118   | 126   | 149   | 153   | 173   | 165   | 99    | 130   |

<sup>a</sup>Incomplete data.

<sup>b</sup>Calculated for named authors.

of the prolific authors presented are highly productive in both article and page production.

Viewing the five JEL sub-categories of health economics articles, we find that over three-fourths of articles published in the 1990s were analyses of healthcare markets or concerned with health production, while policy oriented articles constituted the third largest share. Each of these areas experienced more than a tripling in article production over the decade.

Author concentration ratios of publications in health economics decreased over time, declining almost by half from 1991 to 1999, and the Herfindhal–Hirschman index of author concentration declined from 14 in 1991 to only 4 in 1999. In contrast, the journal concentration ratios for health economics articles increased, but with fluctuations in the ratios within the generally upward trend over the decade, and the Herfindhal–Hirschman index of journal article concentration in health economics also varied, ending the decade at virtually the same level as in 1991.

Overall, we find that the literature of health economics is 'alive and well' as a thriving sub-category of economics publications. But our

exploratory analysis of JEL data suffers from the many limitations of a descriptive study. For example, it does not address the question of what are the underlying forces that propelled the expansion in health economics publications and the determinants of longitudinal changes in co-authorship, choice of topics, and author concentration ratios that are revealed by our analysis. Also, we have noted the limitations of using only the economics literature indexed in EconLit as our measure of the field. While we have indicated that there are probably even more articles on health economics topics in PubMed than in EconLit, this leaves a major question to be explored. These and other issues facing health economics as a field await further examination.

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