Features and Information

In this section, the *Journal of Economic Education* publishes survey articles, international and institutional comparisons, and analytical studies on the economics curriculum, instructional materials, practices in teaching, and academic economics.

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Comparative Research Productivity Measures for Economics Departments

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Resource reallocations among academic departments become increasingly necessary as total university budgets grow more slowly. Economics and other departments frequently find themselves in competition for slices of a resource pie of given (or shrinking) size. For economics departments administratively located in colleges of business administration, the competition typically comes from accounting, finance, management, and marketing departments. For arts and sciences economics departments, the competition comes from disciplines ranging from chemistry, microbiology, and physics to history, sociology, and English. Although clearly needed, reliable indicators of differences in interdisciplinary productivity are hard to find.

National rankings of departments within the same discipline are currently based on surveys of department chairs, graduate program directors, deans, and other administrators (Webster and Massey 1992). Such surveys may be biased by the personal experiences and predilections of the respondents. Establishing such bias is difficult because the evaluation criteria are seldom expressed as quantitative performance standards.

In an effort to avoid inappropriate interdepartmental comparisons, we tried to develop a simple theoretical model to evaluate interdisciplinary differences in research productivity. We then used this model to analyze some information currently available on research productivity.

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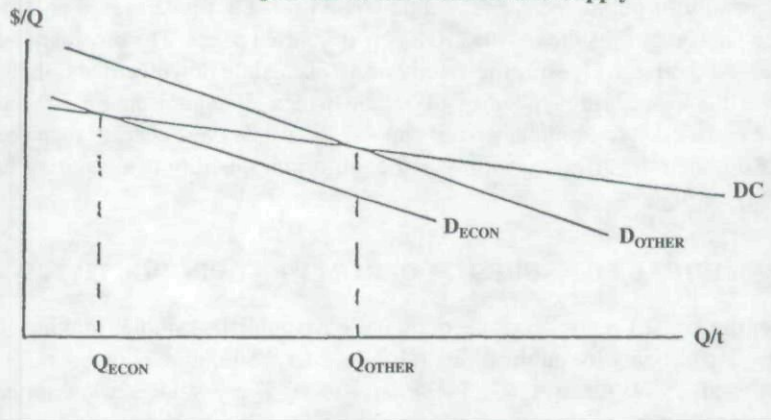
A MODEL FOR EVALUATING RESEARCH PRODUCTIVITY

In comprehensive universities, faculty are usually evaluated on the basis of their teaching, research, and service activities. To simplify the evaluation problem, we analyzed only the journal-publishing and grant-getting ability of faculties as surrogates for research output.[1]

Several quantitative indicators can be used to approximate research productivity or output. The most common measures are number of journal articles; number of books, monographs, or chapters; and research grant dollars.[2] These numerical indicators may be adjusted for qualitative factors such as journal quality, number of citations, and prestige of the granting institution (Taubes 1993). The emphasis or performance weight put on these indicators varies across disciplines. English and history departments, for example, may emphasize book publications, whereas science, engineering, and medical departments may put greater emphasis on external grants.[3] The research productivity of economics departments is frequently measured by journal article publication rates (Graves, Marchand, and Thompson 1992; Tschirhart 1989). To make more meaningful comparisons, we focused on disciplines (finance, psychology, chemistry, physics, oceanography, geophysics, and geology) that are reputed to emphasize journal article publication rates as important research productivity indicators. However, publications, grants, and citations are not the only measures of research output or the only factors considered by many when ranking departments or programs.

The number of journal articles published depends on the supply of and demand for such articles. In Figure 1, the number of standardized pages published in a discipline per time period, Q/t, is measured on the horizontal axis and cost per article or dollars of revenue, $\$/Q$, are measured on the vertical axis. The supply or marginal cost (MC) schedule is downward sloping.[4]

FIGURE 1
Journal Article Demand and Supply



The D_{ECON} and D_{OTHER} schedules reflect the demand for economics journal pages and the demand for journal pages by other disciplines, respectively. In this model, systematic differences in the number of pages for economics and other disciplines result from systematic differences in the demand for and supply of such pages.

Determinants of journal page demand may include the number of journal subscribers and article acceptance rates, whereas page supply may be influenced by external grant support for published research. The number of journal article subscribers was predicted to affect page demand directly: the greater the number of subscribers, ceteris paribus, the greater the effective demand for (and equilibrium quantity of) journal pages. Because individuals and institutions both subscribe to academic journals, the model suggests that disciplines with more practitioners and more institutional subscribers would tend to have more published pages. Economics journals may have fewer nonacademic subscribers than journals of other disciplines. University libraries may subscribe to both geology and economics journals, for example, but oil companies may subscribe only to geology journals.

Article acceptance rates were also predicted to affect journal page demand directly: the higher the acceptance rate, ceteris paribus, the greater the effective demand for (and equilibrium quantity of) published pages. The model suggests that higher article acceptance rates result in more published pages, just as stronger consumer "tastes" result in higher sales. Zivney and Bertin (1992) have asserted that science journal editors presume that the majority of submitted articles should be published because facts need to be reported. Humanities journal editors, in contrast, presume that only a minority of submitted articles should be published because few make significant contributions to knowledge within the discipline. Because economics is a social rather than a "hard" science, acceptance rates and effective demand may be lower for economics journal pages.

Finally, external research grant support and the equilibrium quantity of journal pages were predicted to vary directly: the higher the level of grant support, ceteris paribus, the lower the effective marginal cost and the higher the equilibrium quantity of published pages. Publicly and privately funded research grants may be viewed as subsidies to the producers of journal pages. The receipt of such grants would effectively shift the supply or *MC* schedule downward and thereby increase the equilibrium quantity of article pages. If chemists, for example, receive more grant (or company paid) support for article page charges than economists do, then the effective supply and equilibrium quantity of chemistry articles may be higher.

EMPIRICAL MEASURES OF DEPARTMENT PRODUCTIVITY

Over the past 20 years, several economists have published studies ranking economics departments by publications (Graves, Marchand, and Thompson 1982; Hirsch et al. 1984; Lucas 1993; Tschirhart 1989). These studies allow an economics department to document its ranking at the time of the study. Unfortu-

nately, none of these studies publish the raw, unadjusted data on publications per faculty. Nor do they contain information on average number of co-authors per article, pages per article, words per page, and so forth. Without these adjustment factors, a department chair or dean cannot compare any other year of departmental performance to the published rankings.

In addition, the absence of these adjustment factors or the raw ranking precludes comparisons with noneconomics disciplines because these rankings are invariably done on a raw, unadjusted basis. For example, a recent *Science* article (Staff 1993) ranked the top 12 chemistry departments by annual average publications per department over the previous five years. A few phone calls elicited the data on departmental faculty size and allowed calculation of unadjusted publications per chemistry faculty. No comparison with the top 12 economics departments could be made, however, because no raw rankings or adjustment factors are available. A month or two of effort produced the adjustment factors in Table 1 and allowed comparison. The top 12 chemistry departments averaged 6.4 annual publications per faculty, whereas the top 12 economics departments averaged 1.2—a ratio of 5.3 to 1.0.

The unadjusted and adjusted rankings of economic departments, based on a recent study by Tschirhart (1989), are shown in Table 2. The unadjusted rankings in this table can be compared with raw departmental data for the years after 1989, its year of publication. Economics department chairs or their deans could track annual publication progress and could make interdisciplinary comparisons until another published ranking appeared.

To make appropriate interdisciplinary comparisons, one needs to adjust publication rates in different disciplines for the number of co-authors, journal quality, and number of words per page. In Table 3 we present article publication rates and related information for eight journal-oriented disciplines. The five highest-rated

TABLE 1
Characteristics of Economic Publications, by Quality Level

Characteristic	Journal quality		
	Top 5	Top 24	Top 108
Acceptance rate	8.5%		
Co-author/article		1.6	
Paper/article		17.9	
Words/pages		556	
Total articles/year		1,000	4,500
Total annual articles/journal		42	

Note. Economic publication characteristics, based on authors' calculations; sources are summarized in Table 3.

journals in each noneconomic field were reviewed for 1992-93 acceptance rates, number of co-authors, and words per page.[5] The data in Table 3 show clear differences in publication patterns across disciplines. In general, faculty in the hard science disciplines (geology, chemistry, physics, oceanography, and geophysics) publish a greater number of shorter, multi-authored articles per year than do faculty in economics, finance, and psychology. Acceptance rates also vary significantly across disciplines. On average, approximately 62 percent of hard science articles submitted to the five highest ranked journals are accepted for publication, whereas only 14 percent of submitted social science articles are accepted. Finally, the average size of NSF grants in the three social sciences was $110,883, versus $287,349 for the five hard sciences (Table 3).[6]

The information in Table 3 can be interpreted with the model we developed. The model suggests that disciplines with more journal subscribers, higher article acceptance rates, and more research grant support would tend to have higher equilibrium quantities of published article pages. The data on acceptance rates and grant support are consistent with these conjectures but the data on number of subscribers are not.

These results suggest that university administrators should recognize that interdisciplinary differences in publication rates depend, in part, on journal acceptance rates as well as the availability of grant funds. Direct comparisons of performance indicators on articles per faculty or research dollars per faculty could result in resource misallocations among departments.

TABLE 2
Annual Publications per Faculty in the Top 108 Economics Journals: 1975–84

Rank of economics department by total number of publications	Annual publications per faculty	
	Adjusted for co-authors	Unadjusted for co-authors
1	1.126	1.802
10	0.651	1.042
20	0.543	0.869
30	0.476	0.762
40	0.378	0.605
50	0.327	0.523
60	0.288	0.461
70	0.255	0.408
80	0.299	0.366
90	0.202	0.323
100	0.182	0.291
110	0.161	0.258
120	0.144	0.230
130	0.112	0.179
140	0.079	0.126
150	0.025	0.040

Sources: Tschirhart (1989) and the authors' estimate of an average of 1.6 co-authors per economics publication from Table 1.
Note: Tschirhart attributed publications to the department the author was affliated with in 1984 (not necessarily the department of affliation when the article was published). Although the ranking of an individual department may be affected by this procedure, the publication level needed to achieve top 10 or top 50 status will not be.

TABLE 3
Journal Publication Rates and Related Information for Eight Disciplines

Discipline	Annual journal publications per faculty (USA)	Acceptance rates in top five journals (%)[a]	Number of authors per per article[b]	Equivalent pages per per article[c]	Equivalent pages per author per year[d]	Average size of NSF grant($)[i]	Number of subscribers per top five journals[a]
Economics	0.54[e]	9	1.6	8.8	2.97	98,885	8,868
Finance	0.26[f]	11	1.9	11.4	1.56	147,443	11,700
Geology	1.54[g]	51	2.6	13.3	7.87	99,052	12,108
Psychology	1.80[f]	22	2.2	10.6	8.67	86,321	3,028
Physics	2.10[f]	69	4.7	6.6	2.95	508,710	NA
Oceanography	2.11[g]	72	5.0	8.0	3.38	344,983	1,663
Chemistry	2.86[h]	55	4.3	7.2	4.79	375,802	5,877
Geophysics	3.65[g]	69	2.5	8.7	12.70	108,197	9,175

Notes and Sources:

[a]Our survey of the top 5 journals in each field except oceanography, where only 3 journals provided information.

The top five economics journals we selected were the *American Economic Review, Journal of Political Economy, Southern Economic Journal, Economic Inquiry,* and *Econometrica*. To select the top 5 journals in the other disciplines, we asked department chairs to rank the "best" journals in their respective disciplines. In finance, the journals were *Journal of Finance, Journal of Financial Economics, Journal of Financial and Quanitative Analysis, Review of Financial Studies,* and the *Journal of Banking and Finance*. The psychology journals were *Psychometrica, Journal of Experimental Psychology, Psychological Bulletin, Psychological Review,* and the *Journal of Applied Psychology*. The physics journals were *Physcial Review Letters,* and *The Physical Review A, B, C, and D*. The geology journals were Bulletin of the Geological Society of America, *Geology,* Bulletin of the American Association of Petroleum Geologists, *Journal of Geology,* and *American Journal of Science*. The oceanography journals were *Journal of Physical Oceanography, Journal of Geophysical Research (green),* and *Deep Sea Research*. The geophysics journals were *Journal of Geophysical Research (JGR-Red Solid Earth), Geophysics, Tectonophysics, Geophysical Journal International,* and *Geophysical Research Letters*. The chemistry journals were *Journal of the American Chemical Society, Journal of Biological Chemistry, Biochemistry, Journal of Medicinal Chemistry,* and the *Journal of Neurochemistry*.

[b]Based on 1992–93 data for the top 5 journals in each discipline, except for economics, where data on the top 24 journals were used.

[c]Equivalent page per article was estimated as average number of words per other discipline journal page divided by average number of words per *American Economic Review* page. Top 5 "other discipline" journals and top 24 economics journals were included in the sample. Estimates were adjusted for number of co-authors in Table 1.

[d]Estimated as (annual journal publications per faculty) × (equivalent pages per author) ÷ (number of authors per article).

[e]Tschirhart (1989).

[f]Zivney and Bertin (1992); adjusted upward for co-authorship in Table 1 to yield raw average.

[g]Levin and Stephen (1991)

[h]Estimated as 5.3 times economics rate of 0.54 articles per author, based on authors' calculations, Staff (1993), and Table 1.

[i]Source—NSF Grants Database of all NSF grants from 1989 to present. Average for each discipline computed from a random sample of 30 grants from each discipline.

NOTES

1. Fine arts departments may emphasize different measures, such as number of exhibits, performances, recitals, shows, and so forth.
2. For example, the National Research Council (NRC) ratings of research programs (Goldenberger, Maher, and Feattan, 1992) are based on the subjective evaluations of raters plus objective measures of the institution (number of grads and undergrads, year of first Ph.D., average annual R&D dollars); its library (number of volumes and serials, annual budget); the program being rated (number of Ph.D.'s awarded, median years to Ph.D., percentage of Ph.D. students receiving RA or TA support); and the program faculty (number and percentage of full professors and percentage with research report, honors/awards, publications and citations). The four objective measures of faculty research output used by the NRC are research support, honors/awards, publications, and citations.
3. This heavier emphasis on external funding may be explained by the physical capital requirements of these departments. State-of-the-art scientific, engineering, and medical research generally requires state-of-the-art facilities and equipment.
4. The assumption of decreasing costs does not affect the qualitative conclusions of the analysis. If article publishing costs are constant or increasing, the predicted differences between economics and the publication rates of other disciplines would be smaller. Based on the known economics of publishing, declining costs seem likely.
5. Annual article publication rates per faculty were obtained from information in Table 3, Zivney and Bertin (1992); Levin and Stephan (1992); and Tschirhart (1989).
6. Only three top journals in oceanography provided information. The distribution of NSF grants may differ sharply between social sciences and hard sciences. For example, Tremblay (1992) shows that NSF chemistry grants are fairly uniformly distributed over ranked chemistry departments (the top 50 chemistry departments had 59 percent of NSF grants), whereas NSF economic grants are highly concentrated (the top 50 economics departments had 88 percent of NSF grants).

REFERENCES

Goldenberger, M. L., B. A. Maher, and P. E. Flattau, Eds. 1995. *Research-Doctorate Programs in the United States*. Washington, D.C.: National Academy Press.

Graves, P. E., J. R. Marchand, and R. Thompson. 1982. Economics departmental rankings: Research incentives, constraints, and efficiency. *American Economic Review* 72 (December): 1131–41.

Hirsch, B. T., R. Austin, J. Brooks, and J. B. Moore. 1984. Economics departmental rankings: Comment. *American Economic Review* 74 (September): 822–26.

Levin, S. G. and P .E. Stephan. 1991. Research productivity over the life cycle: Evidence for academic scientists. *American Economic Review* 81 (March): 114–32.

Lucas, R. F. 1993. Research productivity in the Canadian economics profession: 1981–90, *University of Saskatchewan, Department of Economics Discussion Papers* (July):1–22.

Staff. 1993. Crimson alchemy. *Science* 261 (July 23): 423.

Taubes, G. 1993. News & comment: Measure for measure in science. *Science* 260 (May 14): 884–86.

Tremblay, C. H. 1992. National science funding in economics and chemistry. *Atlantic Economic Journal* 20 (June): 57–64.

Tschirhart, J. 1989. Ranking economics departments in areas of expertise. *Journal of Economic Education.* 20 (Spring): 199–222.

Webster, D. S., and S. W. Massey. 1992. Complete rankings from the *US News* 1992 survey of doctoral programs in six liberal arts disciplines. *Change* 24 (November/December): 20–45.

Zivney, T. L., and W. J. Bertin. 1992. Publish or perish: What the competition is really doing. *Journal of Finance* 47 (March): 295–329.