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Theory versus Empiricism in Academic Economics: Update and Comparisons

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Six years ago last summer, Wassily Leontief, a past president of the American Economic Association and Nobel Laureate, analyzed the kinds of articles published in the *American Economic Review*. He focussed on the proportion of articles devoted to theory as compared to empirical analysis. His findings illustrated his disapproval of the state of academic economics. Leontief (1982, pp. 104–107) wrote:

> Not having been subjected from the outset to the harsh discipline of systematic fact finding, traditionally imposed on and accepted by their colleagues in the natural and historical sciences, economists developed a nearly irresistible predilection for deductive reasoning... The aversion of the great majority of the present-day academic economists for systematic empirical inquiry [is best revealed by] the methodological devices they employ to avoid or cut short the use of concrete factual information. The primary information, however detailed, is packaged in a relatively small number of bundles labeled "capital," "labor," "raw materials," "intermediate goods," "general price level," and so on... Masses of concrete detailed information contained in technical journals, reports of engineering firms, and private marketing organizations, are neglected.

Leontief (p. 107) anticipated that as the profession "lags intellectually," research people in adjoining fields (demography, sociology, political science; ecology, biology, health sciences, engineering, other applied physical sciences) will eventually be vocal in their dismay at the "stable, stationary equilibrium and the splendid isolation" of academic economics.

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Table 1
Articles published in the *American Economic Review*

	Leontief data		*new data*
	Mar. 1972 to Dec. '76	*Mar. 1977 to Dec. '81*	*Mar. 1982 to Dec. '86*
Theory—models, analysis, methodology	%	%	%
Mathematical models without any data	50	54	42
Analysis without any mathematical formulation and without data	21	12	7
Statistical methodology	1	1	1
Subtotal	72	66	50
Empirical analysis			
Based on data generated by author's initiative	1	1	5
Based on data published or generated elsewhere	21	23	39
Not using statistical inference	5	7	1
Based on artificial simulations and experiments	1	2	6
Subtotal	28	34	51
Total	100.0	100.0	100.0

The 13 or 14 "articles" in each issue were tabulated, not the "shorter papers." There were Procrustean problems: I tried hard to put each article into one class; but in rare cases, I failed and they were divided between two classes, and in a few cases three. If Presidential addresses, pretty much fixed by the occasion, were omitted, the second subclass would be 1.5 percent smaller. Sometimes I wanted another subclass, "Theories, plus a test of them," but stayed with the Leontief divisions. Two small Leontief divisions are combined into the next-to-last subclass above. All data are rounded to the nearest percent.
Sources: For 1972–76 and 1977–81, Leontief (1982, p. 107). See also *The Economist*, July 17, 1982, p. 67. For 1982–86, my own count, details on request.

In Table 1, I reproduce Leontief's tabulation of *American Economic Review* articles for 1972–76 and 1977–81, and then add new data covering the most recent five years, 1982–86. The question is: what changes are occurring in the proportions of theoretical articles and empirical articles?

From the critics' point of view, there has been improvement. Theory, with its subdivisions, has declined from 72 percent to 66 percent, then to 50 percent. "Mathematical models without data," the form of theory that the critics might grade lowest, rose to a height of 54 percent in the middle five years, and then fell to 42 percent.

Conversely, empirical analysis rose from 28 percent to 34 percent to 51 percent. But this generally "good" news has its soft spots. Most of the increase in empirical papers comes from more papers that use "data published or generated elsewhere."

Table 2
Articles published in the *Economic Journal*

	Mar. 1972 to Dec. 76	*Mar. 1977 to Dec. 81*	*Mar. 1982 to Dec. 86*
Theory—models, analysis, methodology	%	%	%
Mathematical models without any data	34	50	52
Analysis without any mathematical formulation and without data	24	8	7
Statistical methodology	1	0	0
Subtotal	59	57	58
Empirical analysis			
Based on data generated by author's initiative	1	3	2
Based on data published or generated elsewhere	39	37	38
Not using statistical inference	0	1	1
Based on artificial simulations and experiments	1	1	2
Subtotal	41	43	42
Total	100	100	100

As with the *AER* tabulation, only "articles"—fewer in the *EJ*, 4 to 14 in each issue—are counted. "Notes and memoranda," etc., are omitted. There were occasional Procrustean problems, solved as with the *AER*. All percents are rounded.

Leontief complained that the government statistics mainly relied on in these papers were compiled for administrative or business use, not for scientific purposes. The Leontief-style critics would like to see more papers in the star class, "Empirical analysis based on data generated by the author's initiative." That class has risen from (less than) 1 percent in the first ten years to 5 percent in the most recent data; the critics would mutter that is still only one in twenty.

Abroad, The *Economic Journal* in Britain presents the most notable standard available to lay against the levels and trends of the *AER*. The *EJ* is very hospitable to economists in other countries (one article came from a foreign prison); still the decisions are made by its own board of editors. The data of Table 2 cover the same five-year periods.

The *EJ*'s emphasis on theory, all kinds, has stayed remarkably constant at 57 percent to 59 percent. Empirical analysis is equally constant at 41 percent to 43 percent.

Within the theory group there is dramatic change. "Mathematical models without any data" have risen from 34 percent to 52 percent, while "analysis without mathematics or data" fell from 24 percent to 7 percent. Nearly all the change

occurred between the first and second five-year periods. Omitting presidential addresses lowers the "analysis, etc." class by 3 percent.

The *EJ* during the past five years has published much more math-without-data, about 23 percent more, than has the *AER*.

Four Other Social and Physical Sciences

Table 3 compares academic economics, from the above data for 1982–86, with two other U.S. social sciences and two U.S. physical sciences. The articles tabulated for the social and physical sciences are those appearing in the official journals of their associations.

For chemistry and physics it was appropriate to group together the first two subclasses under "empirical analysis." These subclasses had a very large share of papers with mathematical, graphic, or tabular constructions closely tied to data.

Academic economics is unique among these five disciplines in the share of attention given to "mathematical models without any data," with the *EJ*'s 52 percent surpassing even the *AER*'s 42 percent. The nearest competitors lag far behind: in political science 18 percent of the papers are mathematical models without data; in physics 12 percent. Sociology and chemistry are at or near zero.

Political science and sociology do have more of "analysis without any mathematical formulation and without data" than does economics (23 percent and 18 percent versus 7 percent, respectively). Chemistry and physics have no papers in this class at all.

In the totals overall for theory papers without evidence, economics remains far ahead (50 percent or 58 percent); with political science behind at 42 percent and the other fields not even in the running.

As to the empirical papers: chemistry is by far the most empirical of these disciplines (rounding gives it 100 percent of all papers!), nearly always relying on the author's experiments and simulations or on the author's other work. Political science and sociology share with economics the pattern of often relying on "data published or generated elsewhere." But those disciplines have two to twelve times the proportion of papers "based on data generated by the author's initiative." (In the numbers of main papers published, there is a sharp difference between the journals of the three social sciences—with each recently between 36 and 55 a year; and those of the two physical sciences—increasing by 1986 to 1100 papers a year (chemistry), or around 13,400 (physics). There are various possible explanations. The contrast remains remarkable.)

In summary: Among these five disciplines, economics and chemistry are extremes. Economics has half or more of papers devoted to theory-without-data; chemistry has none. Economics devotes half or less of its papers to empirical analysis; all the chemistry papers are empirical. The other disciplines string out along the way between these extremes: in order from economics come political science, sociology, and then physics.

Table 3

Main papers published in the official journals of five academic disciplines, 1982–86

	Economics					
	AER	*EJ*	*Political Sci.*	*Sociology*	*Chemistry*	*Physics*
Theory—models, analysis, methodology	%		%	%	%	%
Mathematical models without any data	42	52	18	1	0	12
Analysis without any mathematical formulation and without data	7	7	23	18	0	0
Statistical methodology	1	0	0	3	0	0
Subtotal	50	58	42	22	0	12
Empirical analysis						
Based on data generated by author's initiative	5	2	10	23		
Based on data published or generated elsewhere	39	38	41	51	17	41
Not using statistical inference	1	1	2	1	0	0
Based on experiments and simulations	6	2	6	3	83	48
Subtotal	51	42	58	78	100	88
Total	100	100	100	100	100	100

The economics data are from Tables 1 and 2. Political science data are from the *American Political Science Review*, published by the American Political Science Association. It is a quarterly, printing 226 articles 1982 through 1986. "Communications," book reviews, and "Controversy" are excluded from the count. Sociology data are from the *American Sociological Review*, published in six issues a year, with 255 articles 1982 through 1986. The *Review* is the official journal of the American Sociological Association. "Comments" and "Research Notes" are excluded from tabulation. The *Journal of the American Chemical Society* is published in 26 issues each year, without separate series for sub-fields. There were about 4920 main papers printed in the five years 1982–86 (estimated from the average of the papers in 1982 and 1986). The papers classified were a random sample: 9% in 1985, 5% in 1986, and 2% in each of the earlier three years—a total of 239 papers. The *Physical Review* is published by the American Physical Society, in four series: General Physics, Condensed Matter, Nuclear Physics, and Particles and Fields. The tabulation above is from a stratified random sample. About 58,740 papers (shorter contributions excluded) were published 1982 through 1986 (estimate based on the average for 1982 and 1986). In 1986 80 papers were sampled (20 in each of the four series); and in 1982–85, 20 were randomly chosen in each year, with a different one of the four fields chosen in each of the four years. Hence a total of 160 papers were classified. All data are rounded to the nearest whole percent.

Conclusions

These are the data. What can we make of them?

It is helpful to try to stand back, try for perspective, much as one might muse over the kind of lectures given and papers written at the University of Paris in 1400. In each discipline, is the most socially useful kind of product being created—I take for granted this is the right objective, as Leontief did also—in view of the problems extant

and the information and tools available? There are, in academic fields as elsewhere, much of conventional approval and hence much of continued inertial work, along lines that were initially thought fruitful.

In economics specifically, is there significant market failure? The relative decline of economic history and other empirical fields, and the high prominance of non-empiricism, are notable. One editor wrote me, a bit defensively, that he was limited in what he could publish by the kind of papers submitted. But of course the topics worked on, and the papers sent in, reflect what is publishable, what will attract research support and what will elicit appointment, promotion, and honor from collegues and seniors, in addition to personal predilections.

Fine points of logic are apt to win approval within the guild. Is enough attention being given to the most pressing economic problems, and to their—often interdisciplinary and concretely factual—solutions? Are economists tempted to sit overmuch in offices and think, supported by basic principles, rather than trudge the often privately unrewarding empirical highways and byways?

The conspicuous relative and absolute state of academic economics suggests to me that it is falling short of the social performance it can reasonably achieve.

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