CHANGING PATTERNS OF SUBFIELD SPECIALIZATION AMONG COHORTS OF ECONOMISTS FROM 1927-1988

Arthur M. Diamond, Jr. and Donald R. Haurin

I. INTRODUCTION

Historians of economic thought have focused relatively little energy on tracing the histories of the subfields of economics. Cochrane's remark in 1979 (p. 6) remains true that "the general lack of detailed histories of sub-disciplines seems to be one of the major weaknesses in the history of economics as it stands today." Nevertheless, some important first steps have been taken. The prestige ranking of subfields has been described satirically by Leijonhufvud (1973) and has been frequently discussed by those making methodological points. McCloskey, for instance, criticizes "theory-spinners" for believing that their hypotheses should be tested by the "... dolts who work the libraries instead of the bright lads at the blackboards" (1980, p. 213).

Research in the History of Economic Thought and Methodology,
Volume 13, pages 103-123.
Copyright © 1995 by JAI Press Inc.
All rights of reproduction in any form reserved.
ISBN: 1-55938-095-0

The ranking of subfields within economics according to prestige, quality of output, quantity of output, and number of practitioners varies over time. Although such variations are a frequent topic of casual conversation among economists, little analysis of a systematic nature has been written to document and explain them.

Some have casually emphasized demand forces in their explanations. One example would be Stigler's emphasis on U.S. antitrust policy in explaining the greater importance of industrial organization in the United States than in Britain. Others have casually emphasized supply forces. A subfield becomes important because the development of tools of analysis or data has reached the point where the time is ripe for advance in the subfield. Medawar, for instance, has emphasized that the good scientist will be attracted to the field where important problems are currently soluble.

Systematic analysis of the market for economists has so far mainly been limited to the supply and demand for economists without regard to subfields of specialization (see, e.g, Brook and Marshall, 1974; Johnson and Stafford, 1974; Reagan, 1979; Scott, 1979). We seek here first to provide additional evidence on how the importance of subfields has fluctuated and then to give a preliminary analysis of the fluctuations in terms of the supply and demand for knowledge in the subfields. We begin by reviewing some of the relevant literature.

Stigler (1965, pp. 49-50), for instance, may have been the first to document the changes in importance of subfields within economics. Using articles listed in the *Index of Economic Journals* from the 1880s through the 1950s, he found a doubling of the articles on theory from 8 percent in the first period to 16 percent in the late 1950's.[1] He also documented the increasing importance of mathematical and statistical tools of analysis. The only other trend emphasized by Stigler was "the virtual disappearance" of monetary economics from the 1930s through the 1950s.

Following Stigler's lead in exploiting the data of the AEA's *Index of Economic Journals*, Bronfenbrenner (1966) and Coats (1971) examined how the distribution of articles by subfield changed over time. Bronfenbrenner looks at changes over six time periods in the percentage of articles that appeared in the 23 subject categories used in the *Index*. Coats focuses more narrowly on the percentage of articles over six periods that appeared in five general economics journals in seven of the subject categories used in the *Index*. The periods used in the two studies differ slightly in that Bronfenbrenner includes the period 1960-63, while Coats does not. Also, Coats subdivides the *Index's* long first period into a pre-*AER* period and a post-*AER* period. A disadvantage of both studies is that the *Index's* time periods are arbitrary and vastly different in length—the first period covered 1886-1924, while the last period (as of the time of Bronfenbrenner's study) was 1960-1963.

In a more recent article, Stigler and Friedland (1982, p. 181) compared the subfields of AEA presidents with a random sample of other economists. The most important difference is that the presidents have a higher percentage of articles in theory and methodology than the other economists who have higher percentages in industrial organization, agriculture, and labor economics.

In an unpublished work, McDowell (1984) notes the differences in the durability of knowledge in eight subfields of economics. Specifically, he looks at the year of publication of articles being referenced in various subfields. The higher the percentage of cited articles that were written in the last five years, the less durable the knowledge in that subfield.

Elsewhere (Diamond and Haurin, 1993) we test the hypothesis that changes in subfield popularity among the elite lead changes in subfield popularity among the rank-and-file. Although the results differ among subfields, in general we find that subfield changes occur simultaneously in the elite and the rank-and-file.

Using the 1942, 1956, 1969, 1981, and 1989 directories of the American Economics Association (AEA), we document changes in the distribution of economists among subfields. Two populations are compared: the "elite," which includes all of those who received their Ph.Ds at Harvard, Yale, or Chicago, and the "rank-and-file," which includes all those who received their Ph.Ds at universities ranked below the top 16. Both series show changes over time that are broadly consistent with the casual impressions of historians of economic thought.

II. THE DETERMINANTS OF SUPPLY AND DEMAND FOR ECONOMIC SUBFIELDS

We assume that economics Ph.D students maximize the present value of their lifetime income. Then the subfield of specialization chosen would depend on the subfield's impact on: the probability of getting a good job, the probability of writing a good dissertation, the probability of getting the dissertation published, current funding in an area, the technical difficulty of an area, the student's technical human capital, the student's knowledge of the reward structure of the profession (dependent, in part, on how well-informed the student's advisors are on which subfields are prospering).

Salary differences across subfields might persist in the long run if the subfields differ in their psychic costs and returns, or if economists differ in their ability to succeed at differing subfields. Psychic costs might exist, for instance, if a subfield required contemplation of the unpleasant (poverty or war?) or involved drudgery (data collection). Psychic benefits might exist, for instance, if a subfield produced positive utility for the economist. Such utility might take the form of a feeling of having contributed to a better world or

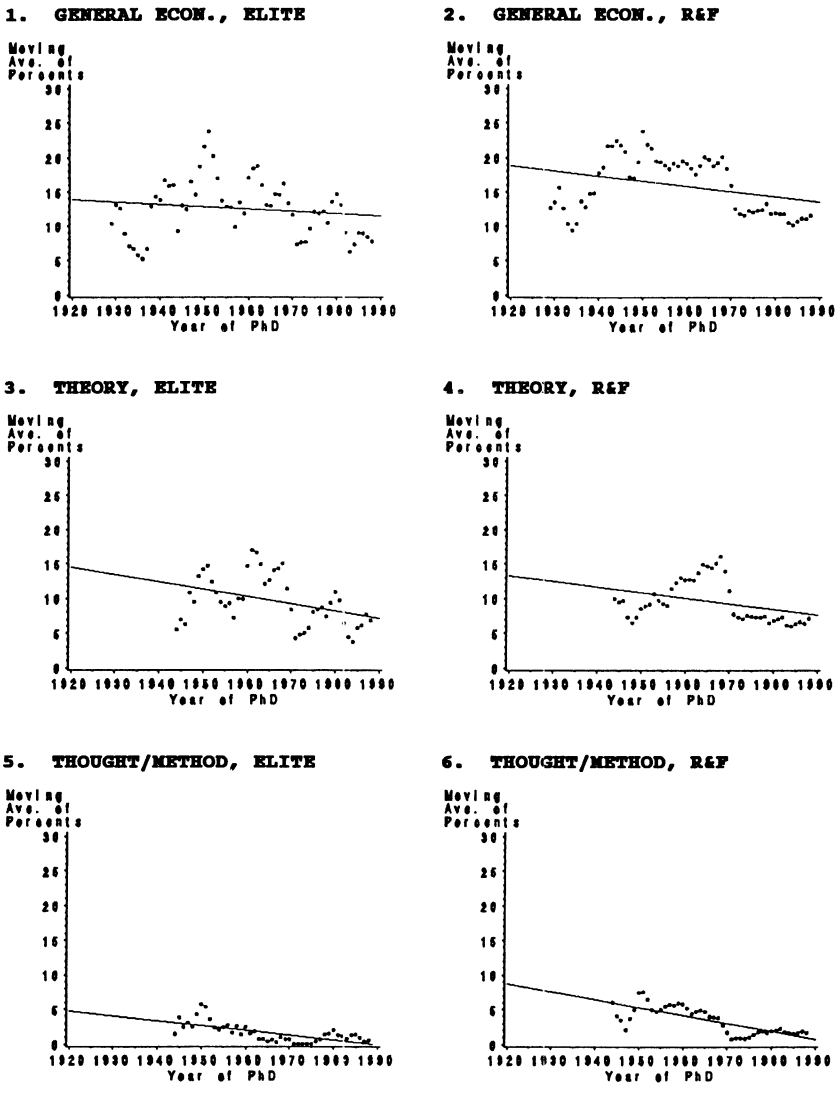
1. GENERAL ECON., ELITE
2. GENERAL ECON., R&F
3. THEORY, ELITE
4. THEORY, R&F
5. THOUGHT/METHOD, ELITE
6. THOUGHT/METHOD, R&F
Moving Ave. of Percents
Year of PhD

Figure 1.

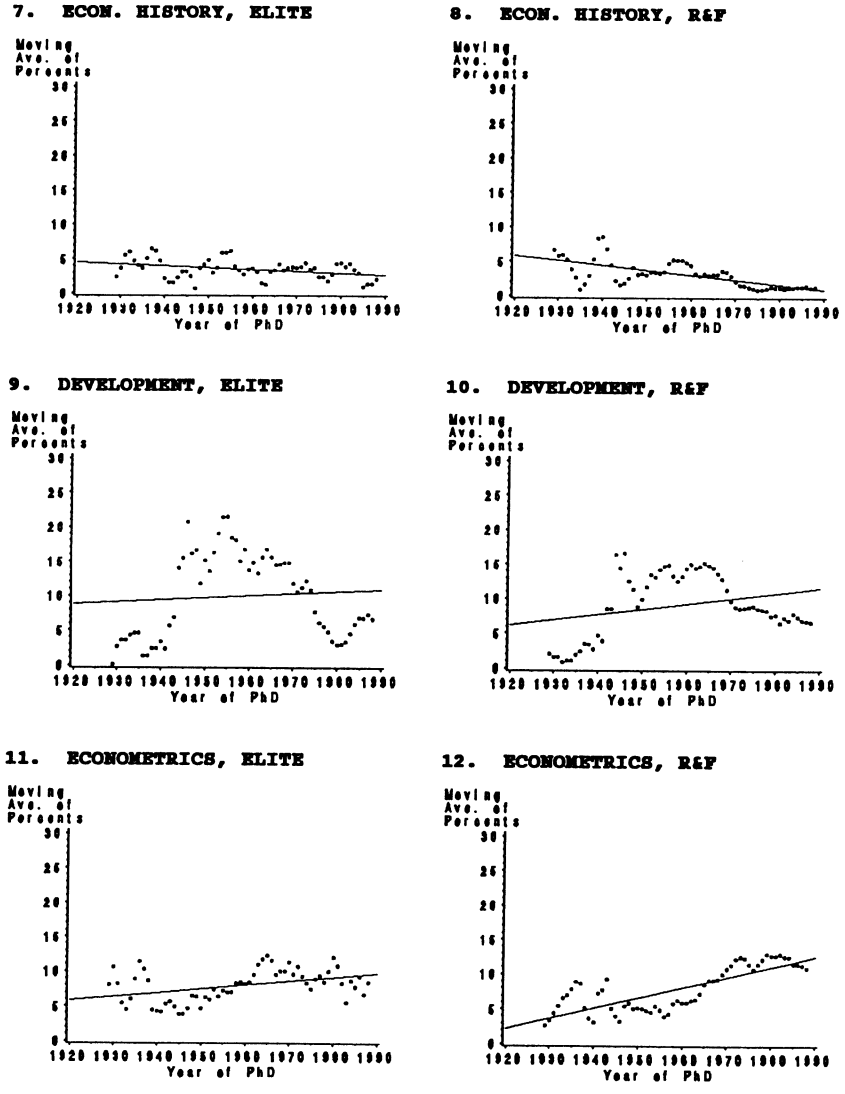

Figure 1. (*Continued*)

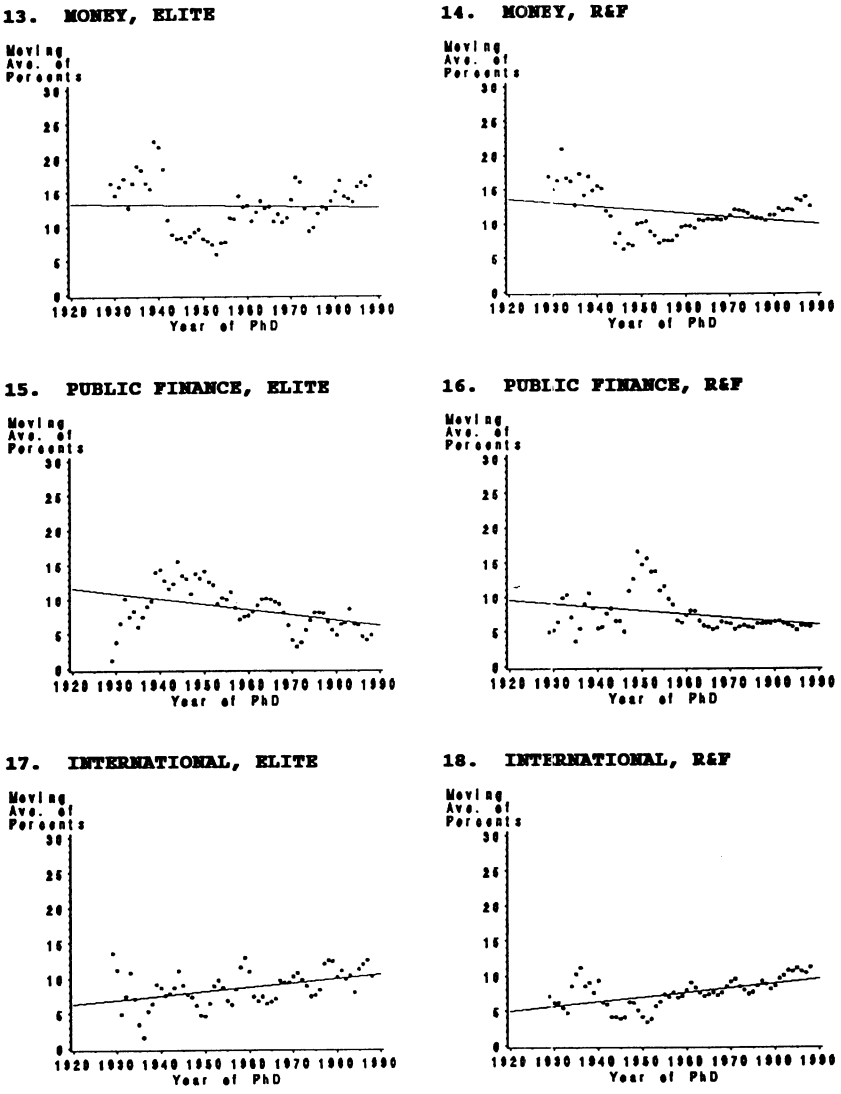

Figure 1. (*Continued*)

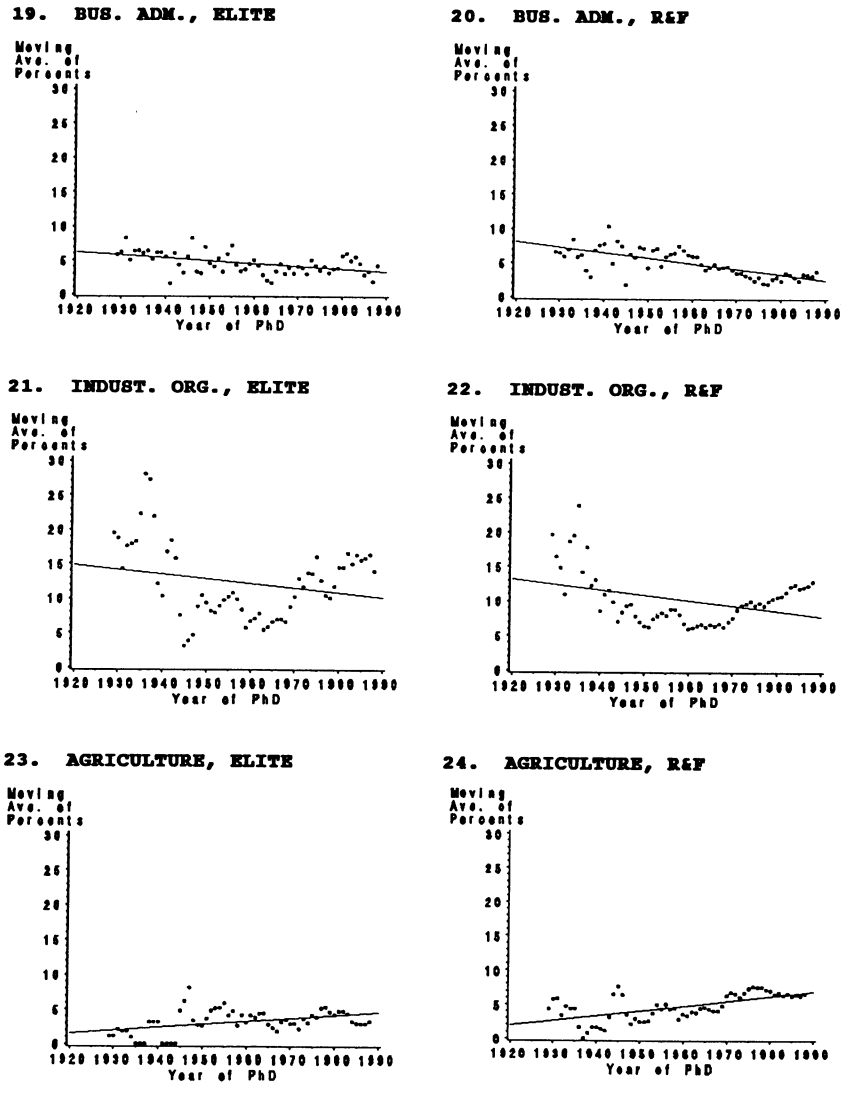

Figure 1. (*Continued*)

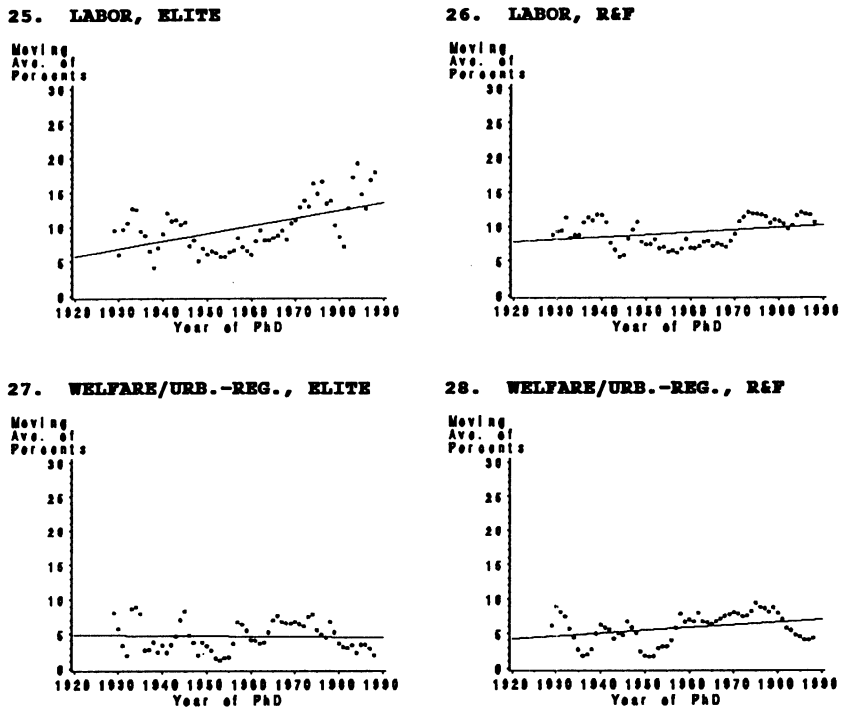

Figure 1. (*Continued*)

of the intellectual satisfaction of having advanced knowledge. Also, salaries might differ across subfields if economists differ in their ability to succeed in a given subfield. Those with abilities that were scarcer or more in demand might command economic rents. Unfortunately, little data is available on salary differences across subfields. The only exceptions are two reports sponsored by the NSF and published by the AEA (Tolles, Jones, and Clague, 1965; Tolles, and Melichar, 1968). We reproduce as Table 1 the results of those studies on salary differences among economists by subfield. It is interesting to note that the combined economic history and history of economic thought subfields were the worst paid in each year. More surprising may be the relatively low salary for the economic statistics subfield. The explanation may be that this subfield has changed substantially in the last 30 years. In the 1960s "economic statistics" involved more collection and presentation of data and less sophisticated econometric analysis than it does today. Although the salary data are intriguing, we would need more than two observations before such data would be of much use in the study of the longer time series movements among subfields.

Table 1. Salaries by Subfield in 1964 and 1966

Subfield	*Median Salary ($000's)* 1964	1966
Economic history; history of thought	9.8	10.5
General economic theory	10.6	11.5
Economic statistics	11.0	12.2
Land economics	11.3	12.5
Monetary	11.4	12.3
Labor economics	12.0	13.8
Welfare, population, etc.	12.0	13.8
Economic systems, development and planning	12.1	12.8
International economics	12.5	12.9
Business finance and administration; marketing; accounting	13.0	14.5
Industrial organization, government and business; industry studies	13.0	14.0
Economics, other	13.0	14.0
Total	12.0	13.1

Source: Tolles et al, 1965, p. 58; Tolles and Melichar, 1968, p. 121

Note: The salary figures are in nominal dollars.

The major demanders of Ph.D economists are institutions of higher education. Business and government also employ significant numbers of Ph.D economists. Because academic economists often supplement their income with foundation grants and professional consulting fees, the demands of philanthropists (Stigler, 1967; Craver, 1986), business, and government (Friedman, 1981; Lucas, 1981) may be more important determinants of economists' subfield choice than might be inferred from the percentage of economists working directly for business and government. Doti (1976, 1978, p. 623), for instance, found a close relationship between the rate of increase in military spending and the number of articles on defense economics. Although data on funding by agency is available 1967-1990, it is nearly impossible to map that data to subfields.[2]

One measure of changes in demand for subfields might be the listings of *Job Openings for Economists* published several times a year by the American Economic Association. Unfortunately, the publication only goes back to 1975. Our review of the data suggests that over the last 15 years, demand for econometricians and macroeconomists has remained strong while the demand for welfare and urban economists has declined.[3] Demand for economists in the business and finance subfield has fallen, perhaps due to an increase in the production of bona fide finance Ph.Ds. Demand in most other subfields seems to have shown no dramatic long-run trend.

III. THE DATA: VARIATIONS IN THE NUMBER OF NEW ECONOMISTS IN THE SUBFIELDS OF ECONOMICS

Some information on the areas of specialization of economists can be found in the American Economic Association directories of members published in the years 1905, 1938, 1942, 1948, 1956, 1964, 1969, 1974, 1978, 1981, 1985 and 1989 as part of the Association's *Handbook* series.[4] Data on the size and the response rate for the various directories are reported in Table 2. For the current research we have categorized into three groups all Ph.D economists listed in the AEA directories for 1942, 1956, 1969, 1981, and 1989. A cohort consists of all economists who received their Ph.Ds in a particular year. In the 1942 directory we collected subfield codes for all Ph.D economists who received their Ph.Ds from 1927-1941. In the 1956 directory we collected subfield codes for all Ph.D economists who received their Ph.Ds from 1942-1955. In the 1969 directory we collected subfield codes for all Ph.D economists who received their Ph.Ds from 1956-1968. From the data tape for the 1981 directory, we extracted subfield codes for all Ph.D economists who received their Ph.Ds from 1969-1980. Finally, from the data tape for the 1989 directory, we extracted subfield codes for all Ph.D economists who received their Ph.Ds from 1981-1988.

Operationally, we define "elite" economists as those who received their Ph.Ds from three of the most distinguished economics departments in the country.[5] Chicago, Harvard, and Yale were chosen because they, alone among distinguished economics departments, were consistently ranked among the top five departments for the entire period covered in our study (1927-1988). The first sample consists of economists who graduated from institutions that were highly ranked throughout the period of study; the second sample consists of new Ph.D economists who graduated from schools ranked below the top sixteen.[6]

One issue that must be addressed is the extent to which the directories are representative of the economics profession. One positive note is the high response rate for the AEA surveys, as reported in Table 2. Also, AEA membership is more valuable to those who are likely to reenter the job market, this group including young economists. Membership is also a way for young economists to advertise their location and areas of interest. On the other hand, some economists never join the association and some allow their AEA membership to lapse.[7] One could hypothesize that non-AEA economists will be more common among some groups than others. Stigler, for instance, suggested that "as specialist journals emerged, perhaps more and more specialists have dropped out of the AEA" (letter dated November 1, 1985).

Table 2. Size and Response Rates for Editions of the AEA Directory

Year	*Pages*	*Members*	*Returns*	*Percentage*
1938	112	2,800	2,400	85
1942	208	3,645	2,557	73
1948	345	5,700	3,232	57
1956	650	8,387	6,227	73
1964	480	11,285	9,308	83
1969	620	18,576	12,744	69
1981	566	19,310	15,310	79
1985	688	20,935	15,299	73
1989	680	21,692	15,130	70

Notes: The source for the years 1938-1969 was the *1969 Handbook*, p. iii. Conversations with Mary Winer, Administrative Director, American Economic Association, on July 29, 1985; March 12, 1987; and February 25, 1991 were the sources, respectively, for the information on the 1981, 1985, and 1989 directories.

The coding of subfields changed in a major way between 1942 and 1956, in a minor way between 1956 and 1969, and again in a major way between 1969 and 1981. No change occurred in the coding between 1981 and 1989. In order to make comparisons over time we first aggregated the 48 codes that were used in the 1981 (and 1989) directories into 14 combined codes. We then recoded the subfield codes for 1942, 1956, and 1969 so that they corresponded to the codes used in 1981 and 1989. The details of the aggregation and recoding may be found in an appendix available from the authors.

In 1981 (and again in 1989) the American Economic Association surveyed its members for information to be included in the "Biographical Listing of Members" that was published in the December issue of the *American Economic Review*. The survey asked members to "... list fields with which you currently identify." Members were to choose two subfield codes from among a list provided. In the 1956 and 1969 directories the members had been asked to "indicate, in order of interest, your three general fields ... and check subdivisions representing your specialized fields ..." (1956, p. xiv; 1970, p. vii). In the 1942 directory the members had been asked for their "fields of major interest" which were printed "in order of expressed preference" (1942, p. 1). For each member, we made use of the first two subfield codes (but not the third) in the 1956 and 1969 directories, in order to assure comparability with the 1942, 1981, and 1989 directories (in which only two codes had been listed). The 1956 and 1969 coding did not always map uniquely into the 1981/1989 coding; thus, the two retained subfield codes for economists in the 1956 or 1969 directories might be recoded into more than two codes expressed in the 1981/1989 coding.

Because we make use of two subfield codes for each economist, the percentages that we report would not sum to 100 percent if they represented

percentages of economists reporting a given code. Instead, the percentages reported in the rest of the paper are the percentages of the reported codes for each cohort that belong to each of the aggregated subfields.

Because we measure several years' cohorts from a given directory, some noise would enter our data if a young economist changed her subfields from the year of completion of her Ph.D to the year of publication of the directory we use as a source to locate her. For example, the greatest potential for a problem would seem to be an economist who received her Ph.D in 1927, but for whom we obtained subfield data in the 1942 directory. In order to gauge the potential magnitude of this problem, we compared the subfields of the cohort of economists who received their Ph.Ds in 1978-1980 as reported in the 1981 directory with the subfields reported by those same economists in the 1989 directory. We found that 67.8 percent of the economists reported the same two subfields in both years, 28.8 percent reported one subfield the same, and 3.4 percent reported neither subfield the same. Thus, subfield choice is relatively stable, but some measurement error is likely for data between the dates of issue of the directories. Clearly, a promising topic for future research would be to examine life-cycle changes in subfield choice among economists.[8]

In order to reduce the noise, we calculated three-year moving averages for the percentages. Plots of the moving averages of the percentage of reported codes in each subfield are presented in graphs 1-28. The odd-numbered graphs (on the left-hand side of each page) are for subfield codes of economists who received their Ph.D's from rank-and-file schools. Similarly, the even numbered graphs (on the right-hand side of each page) are for subfield codes of economists who received their Ph.D's from elite schools. Most of the graphs span the years 1922-1988. Graphs 3 through 6, however, only span the years 1940-1988. The reason is that in the 1942 handbook, which is the source for the early cohorts, the theory subfield and the history of thought/methodology subfield were not differentiated from the general economics subfield. In order to consistently represent the general economics subfield in graphs 1 and 2, the percentages for the theory subfield and the history of thought subfield were added to the percentages for the general economics subfield.

The fluctuations in the data are also revealed in a table of multiple-year averages (Table 3). We present the subfield distribution percentages for the graduates of both the rank-and-file and the elite schools. Most of the subfields span the years 1927-1988; however, theory and history of thought/methodology only span the years 1942-1988, for the reason described above.

In order to detect important broader trends, Table 4 reports the raw subfield percentages (*not* the multiple-year averages) regressed on time, and sometimes time-squared. We report the quadratic specification when both the coefficients on time and on time-squared are statistically significant. We report the linear specification in all other cases. The "year at extreme" columns report the year

Table 3A. Percentage New Economists in Each Subfield from 1927-1988*

Subfield	*1* *27-33*	*2* *34-41*	*3* *42-47*	*4* *48-55*	*5* *56-62*	*6* *63-68*	*7* *69-74*	*8* *75-80*	*9* *81-84*	*10* *85-88*
General Economics	11.6 (9.6)	15.6 (11.9)	19.8 (12.8)	20.7 (16.9)	18.6 (15.6)	19.8 (14.4)	12.4 (8.3)	12.1 (13.4)	10.8 (7.0)	11.3 (8.3)
Theory**	— —	— —	8.6 (8.1)	9.0 (11.1)	12.6 (13.2)	15.3 (13.7)	7.6 (4.9)	7.0 (9.8)	6.5 (4.1)	6.9 (7.3)
Thought & Methodol.**	— —	— —	4.0 (2.2)	5.9 (3.6)	5.2 (1.8)	4.2 (0.6)	0.8 (0.0)	1.8 (1.3)	1.7 (1.0)	1.7 (0.7)
Economic History	5.0 (3.5)	4.7 (4.2)	2.8 (1.8)	3.6 (4.9)	4.0 (2.6)	3.2 (3.4)	1.2 (3.7)	1.0 (3.0)	1.2 (3.0)	1.2 (1.8)
Development	1.5 (2.9)	3.0 (2.2)	14.3 (14.9)	12.4 (17.5)	13.8 (15.2)	13.7 (15.1)	8.7 (10.6)	7.9 (4.2)	7.0 (4.9)	6.5 (6.6)
E-metrics	4.2 (6.4)	6.8 (7.4)	5.1 (4.8)	4.6 (6.0)	5.7 (8.8)	8.8 (11.0)	11.7 (8.8)	11.9 (10.6)	12.3 (7.2)	10.9 (7.4)
Money	17.4 (15.7)	15.7 (18.4)	6.9 (8.3)	8.7 (7.9)	8.9 (12.3)	10.4 (11.6)	11.5 (13.1)	10.7 (13.8)	11.8 (14.3)	13.2 (17.1)

Table 3B. Percentage New Economists in Each Subfield from 1927-1988

Subfield	*1* *27-33*	*2* *34-41*	*3* *42-47*	*4* *48-55*	*5* *56-62*	*6* *63-68*	*7* *69-74*	*8* *75-80*	*9* *81-84*	*10* *85-88*
Public Finance	7.1 (4.8)	6.6 (10.6)	8.6 (13.1)	13.4 (12.1)	7.0 (7.9)	5.9 (9.0)	5.4 (4.9)	6.2 (6.3)	5.7 (7.2)	5.4 (4.6)
Int'l.	6.5 (10.4)	8.4 (5.2)	5.1 (9.1)	5.2 (6.8)	7.6 (9.2)	7.3 (7.9)	8.4 (9.0)	8.8 (10.9)	10.4 (8.8)	10.9 (12.1)
Business Admin.	9.1 (9.6)	10.1 (7.8)	11.6 (10.5)	11.7 (6.1)	9.4 (5.2)	6.4 (3.2)	5.7 (3.8)	5.2 (5.9)	6.7 (7.8)	7.2 (6.7)
Industrial Organ.	17.8 (18.7)	13.4 (20.2)	8.2 (6.1)	7.4 (9.4)	6.8 (7.3)	6.3 (6.5)	9.2 (13.2)	9.8 (12.4)	12.1 (15.9)	12.3 (14.7)
Agriculture	4.5 (1.3)	1.4 (1.2)	5.0 (4.1)	3.3 (4.3)	3.9 (3.6)	4.3 (2.9)	6.7 (3.0)	7.2 (4.7)	6.5 (4.0)	6.4 (3.0)

Notes: * The top numbers are means for the rank-and-file sample; bottom numbers (in parentheses) are means for the elite sample.

Columns 1 and 2 are based on the 1942 Directory, columns 3 and 4 are based on the 1956 Directory, columns 5 and 6 are based on the 1969 Directory, columns 7 and 8 are based on the 1981 Directory, and columns 9 and 10 base on the 1989 Directory. We believe comparisons between columns 1 and 2 are valid as are comparisons among columns 3 through 10; however, conclusions based on comparing columns 2 and 3 should be drawn with caution.

** Theory and thought were not distinguished from general economics until after the 1942 cohort. The general economics data consistently includes these subfields, thus begining in 1942 column totals sum to 100% only if the values for theory and thought/methodology are excluded.

Table 3.B (Continued)

Labor	9.4	10.5	7.4	7.0	7.2	6.9	11.2	11.0	10.6	10.7
	(10.0)	(8.2)	(9.1)	(6.0)	(7.7)	(8.2)	(14.5)	(10.9)	(16.7)	(15.4)
Welfare	6.1	3.8	5.3	2.2	7.2	6.8	7.9	8.2	5.2	4.2
Urb-Region	(7.1)	(2.7)	(5.3)	(2.0)	(4.8)	(6.6)	(7.0)	(3.9)	(3.2)	(2.5)

of highest percentage when the squared term is negative and the year of lowest percentage when the squared term is positive. Most of the subfields span the years 1927-1988; however, theory and history of thought/methodology only span the years 1942-1988, for the reason described above.

Our evidence generally supports Stigler's (1965) claim that monetary economics declined in the 1930s and remained at a low level through the 1950s (although it may be an exaggeration to write of a "virtual disappearance").

The comparability of our results with those of Bronfenbrenner (1966) and Coats (1977) is limited because our subfields are defined differently and are more highly aggregated. Also, the time coverage only partially overlaps and the subperiods differ. Some rough comparisons can be made, however. Like Bronfenbrenner and Coats, we find an increase in economic theory up to the early 1960s, although we record a decline in more recent years. Also, like Bronfenbrenner and Coats, we find a decrease in money and banking from the late 1920s through the early 1960s, although we record a slight rebound in the years that follow. For the years and subfields of overlap, the other evidence in the Bronfenbrenner and Coats papers appears to be broadly consistent with our findings here.

We can compare the elite to the rank-and-file samples for the industrial organization, agriculture and labor economics subfields in order to see whether Stigler and Friedland's findings carry over to a more inclusive definition of the top members of the profession. A comparison of the means of the ten subperiods yields the following conclusions. In each period, the percentage of new economists identifying with the theory subfield has been roughly the same in the elite and rank-and-file samples. In contrast with Stigler and Friedland, we find that in all periods the percentage selecting history of thought/methodology was higher for the rank-and-file sample than for the elite sample. Also, the percentage has been higher in the elite sample than in the rank-and-file sample in industrial organization in all but the 1942-1947 period. In labor, the percentages have been quite similar between groups, except that in the last two subperiods (1981-1988) the percentage has been higher in the elite sample than in the rank-and-file sample. The percentage of new economists

Table 4. Descriptive Regressions of Percentages on Time[a]

Subfield	*Elite Regressions*				*Rank-and-File Regressions*			
	Constant	*Time*	*Time-Squared*	*Year at Extreme*	*Constant*	*Time*	*Time-Squared*	*Year at Extreme*
General Economics	8.025*	0.492*	-0.009*	1954	11.100*	0.590*	-0.011*	1954
Theory**	1.683	0.596*	-0.009*	1960	-0.098	0.673*	-0.010*	1961
Thought/ Methodology**	3.854*	-0.061	—	—	7.616*	-0.110*	—	—
Economic History	3.898*	-0.019	—	—	5.194*	-0.071*	—	—
Development	-1.896	1.085*	-0.017*	1959	-1.313	0.866*	-0.013*	1960
Econo-metrics	6.059*	0.055*	—	—	3.731*	0.147*	—	—
Money	18.924*	-0.555*	0.009*	1958	18.873*	-0.598*	0.009*	1960
Public Finance	6.426*	0.322*	-0.006*	1954	8.900*	-0.049	—	—
International	7.246*	0.047	—	—	7.833*	-0.153*	0.004*	1965
Business Admin.	11.571*	-0.339*	0.004*	1969	11.481*	-0.095*	—	—
Industrial Organ.	23.166*	-0.913*	0.014*	1960	19.349*	-0.740*	0.011*	1961
Agriculture	1.804*	0.043*	—	—	2.418*	0.072*	—	—
Labor	10.451*	-0.276*	0.006*	1950	10.566*	-0.214*	0.004*	1954
Welfare/ Urban-Regional	4.990*	-0.015	—	—	4.425*	0.039*	—	—

Notes: [a] Time was defined as the year of the cohort minus 1927. (1927 was the year of the first cohort in the study.)

* Statistically significant at the .05 level.

** Theory and thought-methology were not distinguished from general economics until after the 1942 cohort. The general economics data consistently includes these subfields, thus beginning in 1942 the column totals sum to 100% only if the values for theory and thought are excluded.

entering agriculture has been larger among the rank-and-file (except for 1948-1955). Our results differ substantially from Stigler and Friedland's, suggesting that our sample of the population of elite economists differs significantly from the more distinguished sample of elite economists that consists of AEA presidents. A few other comparisons between the elite and the rank-and-file are noteworthy. The number of new Ph.Ds who selected money as a subfield

has generally been higher among the elite sample, this observation also holding for development (except for 1934-1941 and 1975-1984) and international. The rank-and-file have selected both the business category (except for 1981-1984) and welfare/urban-regional with greater frequency than the elite. The percentages for the rank-and-file and elite are similar for public finance. The pattern in econometrics changed over time. From 1927-1955 the percentages were similar; from 1956-1968 the elite percentages were greater; from 1969-1988 the rank-and-file percentages were greater.

Table 4 permits broader comparisons between the elite and the rank-and-file percentages. In cases where change is monotonic, it is usually monotonic in the same direction for both elite and rank-and-file. For the subfields where the field has gained in popularity, then peaked, and then lost in popularity, this too is usually similar for both the elite and the rank-and-file. There is also usually a similarity when a subfield has lost popularity, bottomed out, and then gained. One interesting "stylized fact" is that for the consistently non-monotonic subfields the year of the elite's turning point precedes (or in one case, is equal to) the year of the rank-and-file's turning point.

In terms of overall fluctuations in the interest among subfields, we note an increased selection of theory in 1956-1968, but a subsequent decline (except interest picked up among the elite in 1975-1980). Interest in the history of thought declines fairly continuously from 1955 through the 1969-1974 period, but has made a minuscule rebound to stagnate at a low level for the remaining periods. This verifies the decline discussed in de Marchi and Lodewyks (1983) and in Anderson and Tollison (1986). The development subfield declined overall in the period from 1968 to 1985, verifying Lewis' 1983 observation (p. 1) that after prospering in the 1950s and 1960s "... the subject has been deserted by American Ph.D. students." However, interest in development picked up slightly in the elite schools after 1980, and more substantially after 1984. Among the rank-and-file, economic history suffered a decline in interest by new Ph.Ds after 1962; among the elite interest in the subfield declined less and more slowly. The percentage of new Ph.Ds selecting money, econometrics, international, and industrial organization generally increased in both groups after 1942.

We should emphasize that not all important secular trends in the economics profession will be captured by the changes in the distribution of economists among subfields. Grubel and Boland (1986), as well as others, have noted an increasing mathematization of the discipline. Because the phenomenon is occurring in all subfields to some extent, we would not expect to see it fully reflected in changes in the percentage of economists choosing mathematical economics as a subfield.

IV. EXPLAINING THE CHANGES

Earlier in the paper, we suggested that changes in the popularity of subfields were due partly to demand factors and partly to supply factors. The prospect

of measuring the importance of various factors is daunting mainly because of the difficulty of measuring changes in the demand for a subfield from outside of academe and in the psychic appeal of a subfield to economists. Most of this effort we leave to future work. As a first attempt to consider these issues, we make use of data on job openings in economics from 1974-1988 from *Job Openings for Economists* (*JOE*). Starting in 1975, data on jobs by subfield have been reported in the proceedings issue of the *AER*. For the purposes of the analysis, we used our data on elite and rank-and-file subfield distributions for the 10 subfields that are listed in the *JOE* reports.[9] We have 14 years of data from the *JOE*, implying that we have 140 observations for each regression. The dependent variables are the raw percentages, not the three-year moving averages used in some of the analysis. The regression for the elite percentages regressed on the *JOE* percentages (*t*-statistics in parentheses) is:

$$\underset{}{\text{elite\%}} = \underset{(6.9)}{6.79} + \underset{(3.8)}{0.33}\text{*job\%} \quad \text{adjusted } R^2 = 0.08.$$

The regression for the rank-and-file percentages regressed on the *JOE* percentages is:

$$\underset{}{\text{r\&f\%}} = \underset{(13.4)}{7.14} + \underset{(6.2)}{0.29}\text{*job\%} \quad \text{adjusted } R^2 = 0.20.$$

We interpret these results as indicating that choice of subfields is influenced by the availability of jobs in the subfield.[10] The higher t-statistics and R^2 for the rank-and-file regression indicate that the relationship appears to be stronger for those who received their Ph.Ds at rank-and-file schools than for those who received their Ph.Ds at elite schools. This finding is consistent with the hypothesis that supply side considerations (such as the intellectual promise of a subfield) matter more for those from the elite schools. Conversely, subfield choice in the rank-and-file appears to be determined more by the number of jobs in the respective subfields.

V. CONCLUSIONS AND FUTURE WORK

We have used the 1942, 1956, 1969, 1981, and 1989 directories of the AEA to document changes in the distribution of economists among subfields. Two samples were compared: a sample including all of those who received their Ph.Ds at Harvard, Yale or Chicago and a sample including all those who received their Ph.Ds at universities ranked below the top 16. The popularity of most subfields of economics has varied substantially in the last 61 years in both samples. The characteristics of the variation are often consistent with

the casual observations of historians of economic thought. Over the last couple of decades of our analysis (1969-1988) we find increased popularity compared with the previous 20 years for: international, industrial organization, labor, and money. Over the same period, we find a decreased popularity for: theory, methodology/history of economic thought, development, and public finance. For new Ph.Ds graduating from schools ranked below the top 16, an increase in popularity occurred in agricultural economics and econometrics, while economic history declined.

In the future, we hope that the robustness of the results reported here will be tested in various ways. One test would be to trace the relative popularity of subfields by looking at the changing subfield distribution of published articles. Such a test would provide evidence on one referee's speculation that monetary economics continued to be marked down as a subfield in the directories out of "inertia" rather than an active interest in the subfield. Another test of the robustness of our results would be to see if similar trends were reflected in the subfield distribution of dissertations listed annually by the American Economic Association (originally in the *AER*, now in the *Journal of Economic Perspectives*). In the future, we also hope to continue to seek good measures of the supply and demand for particular subfields. If sufficient good measures can be obtained, we might hope eventually to be able to estimate a general equilibrium model of market for subfields.

A promising path for further study might also be to study the supply and demand for particular subfields in greater detail. One might ask, for instance, whether the rise and fall of the development subfield is due to rising, and then falling, funding levels from government agencies. Or, one might investigate whether part of the decline in the general economics subfield has been due to the increasing specialization of the profession.

ACKNOWLEDGMENTS

We are grateful to the late George J. Stigler and A. W. Coats for several useful comments. We also appreciate comments from Aloysius Siow, Pok-Sang Lam, John M. McDowell, Stephen Pressman, David C. Colander, R. Jean Haurin, William J. Barber and Warren Samuels. Mary Winer, Violet Sikes and C. Elton Hinshaw of the AEA were helpful in providing AEA publication information. We have received able research assistance from Peter Gatsch, Darren Johnson, Kathryn Williams, Joseph Buckley,/James Thomas, Di Cao, Monica Densmore, and Fran Mallory. An earlier draft of this paper was presented at the meetings of the History of Economics Society. Funding for the 1981 AEA directory data tape was provided by the Department of Economics at the Ohio State University. The 1981 and 1989 data tapes from the AEA were made available on the condition that confidentiality be maintained for individuals' answers on the unpublished race, sex, ethnicity, and nationality responses. Neither the AEA nor any official of the AEA is in any way responsible for the data analysis reported

in this paper. Diamond is grateful for support from the University Committee on Research at the University of Nebraska at Omaha.

NOTES

1. After 1965 it has been called the *Index Economic Articles.*

2. Data on federal funding by agency for the years 1967 through 1990 (which were extracted from National Science Foundation publications) are available from the authors.

3. A table summarizing the *Job Openings for Economists* data is available from the authors upon request.

4. The 1905 edition contains a sample of the economic writings to the respondents from which subfields of specialization might be inferred. Frank A. Fetter, the editor, noted that the "... uneven execution of this first attempt is due, for the most part, to the failure of the members to return answers to the schedules of inquiry" (as quoted in 1956 *Handbook*, p. iii). In 1938, members of the association were asked to report their fields, but the fields were not coded. In the 1942 edition, fields were coded for the first time. Skeels and Fairbanks, in their study of mobility (1968-1969), may have been the first to make use of the AEA directories to answer a research question about the economics profession.

5. Harry Johnson (1975, p. 131) defined "... the elite of the profession ..." in two ways. One was "those who have been to a top-notch graduate school in the United States, or a school there or elsewhere good enough for them to have acquired the research techniques and orientation, and who have stuck with them in a research-and-publication-oriented career, wherever they may be teaching." The other definition was "those who communicate with each other by exchanging papers before publication and by attending international conferences, rather than by reading each other's work with a long lag in journals and still longer lag in books." Our definition is close to the first although not coextensive with it. Most notably, we haven't excluded those graduates of a top university who later abandoned a "research-and-publication-oriented career." The term "rank-and file" was also used by Crane to indicate the members of a research group who are not "the most active and influential members of the area" (see Crane, 1970, p. 314).

6. The sources for the various year's ratings were: Cartter for 1925, 1957, and 1966; Roose and Andersen (sic) for 1970; *The Chronicle of Higher Education* for 1979; unpublished survey by F.M. Boddy of University of Minnesota for 1981. The 1925-1981 rankings are based on survey results. The 1989 report is by Tremblay, Tremblay, and Lee (1989) for total publications in the period 1980-1986. Besides the top three schools, the top 16 include: MIT, Berkeley, Stanford, Princeton, Michigan, Columbia, Wisconsin, Minnesota, Northwestern, Carnegie Tech (a.k.a Carnegie Mellon), Pennsylvania, Johns Hopkins, and UCLA. Only two rankings of institutions by economic subfields have been performed, both recently (Baumann et al., 1987; Tremblay, et al., 1990). Since rankings for earlier periods were not disaggregated by subfield, we are constrained to assume that departments identified as elite are elite in all subfields. The appropriateness of this assumption when applied to particular subfields will be discussed later.

7. Preliminary tests indicated that we could not reliably use solely the 1981 survey to obtain data on subfield choices for the 1940s or 1950s. The problems resulted from non-random attrition and individuals changing subfields over long time periods.

8. We also examined the distribution of subfields among all economists who received their Ph.D in 1978-1980 as reported in the 1981 directory and the distribution of all economists who received their Ph.D in 1978-1980 as reported in the 1989 directory. (In this examination, we thus include those who appeared in either the 1981 directory, the 1989 directory, or both.) Although a casual visual inspection reveals a similar distribution in both years, a systematic chi-squared test (5 percent level) rejects the null hypothesis that both distributions were drawn from the same underlying population.

9. If the category "related disciplines" is counted as a subfield, then the *JOE* lists 11 subfields.

10. We also estimated regressions that substituted for the current *JOE* percents either one-year lagged values or two-year lagged values. Such specifications result in lower R^2's and t-statistics, but similar (and still significant) values for the coefficients. We conclude that even in this framework, the choice of subfields is influenced by the availability of jobs in the subfield.

REFERENCES

American Economic Association. 1961. *Index of Economic Journals*, Vol. 1, Homewood, IL: Richard D. Irwin, Inc.

American Economic Association. 1942. "The 1942 Directory of the American Economic Association." *The American Economic Review* 32(3).

_____ . 1957. "Handbook of the American Economic Association." *The American Economic Review* 47(4).

_____ . 1970. "1969 Handbook of the American Economic Association." *The American Economic Review* 59(6).

_____ . 1981. "Biographical Listing of Members." *The American Economic Review* 71(6).

_____ . 1989. "Biographical Listing of Members." *The American Economic Review* 79(6).

Anderson, Gary M. and Robert D. Tollison. 1986. "Dead Men Tell No Tales." *The History of Economics Society Bulletin* 8: 59-68.

Baumann, Michael G., Gregory J. Werden, and Michael A. Williams. 1987. "Rankings of Economics Departments by Field." *The American Economist* 31: 56-61.

Brook, Kathleen and F. Ray Marshall. 1974. "Report of the Committee on Hiring Practices, The Labor Market for Economists." *American Economic Review* 64: 488-511.

Bronfenbrenner, Martin. 1966. "Trends, Cycles, and Fads in Economic Writing." *American Economic Review* 56: 538-558.

Cartter, Allan M. 1966. *An Assessment of Quality in Graduate Education.* Washington, D.C: American Council on Education.

Coats, A. W. 1971. "The Role of Scholarly Journals in the History of Economics: An Essay." *Journal of Economic Literature* 9: 29-44.

Cochrane, James L. 1979. *Industrialism and Industrial Man in Retrospect: A Critical Review of the Ford Foundation's Support for the Inter-University Study of Labor.* New York: The Ford Foundation, (produced and distributed by University Microfilms International, Ann Arbor Michigan).

Crane, Diana. 1970. "Social Structure in a Group of Scientists: A Test of the 'Invisible College' Hypothesis." Pp. 295-323, in *The Sociology of Sociology*, edited by L. Reynolds and J. Reynolds. New York: David McKay Co.

Craver, Earlene. 1986. "Patronage and the Directions of Research in Economics: The Rockefeller Foundation in Europe, 1924-1938." *Minerva* 24: 205-222.

de Marchi, Neil and John Lodewyks. 1983. "HOPE and the Journal Literature in the History of Economic Thought." *History of Political Economy* 15: 321-343.

Diamond, Arthur M., Jr. and Donald R. Haurin. 1993. "The Dissemination of Research Agendas Among Young Economists." *Journal of Economic Education* 24(1): 53-61.

Doti, James. 1978. "The Response of Economic Literature to Wars." *Economic Inquiry* 16: 616-626.

Doti, James. 1976. *The Response of Economics to Environmental Influences.* University of Chicago, Department of Economics, Ph.D Thesis.

Friedman, Milton. 1981. "An Open Letter on Grants." *Newsweek* (May 18, p. 99).

Grubel, Herbert G. and Lawrence A. Boland. 1986. "On the Efficient Use of Mathematics in Economics." *Kyklos* 39: 419-442.

Hinshaw, C. Elton. 1975-1990. "Report of the Director, *Job Openings for Economists.*" *American Economic Review* Vols. 65-80, various pages depending on year.

"How Professors Rated Faculties in 19 Fields." 1979. *The Chronicle of Higher Education* (January 15, p. 6).

Johnson, George E. and Frank P. Stafford. 1974. "Lifetime Earnings in a Professional Labor Market: Academic Economists." *Journal of Political Economy* 82: 549-569.

Johnson, Harry G. 1975. "National Styles in Economic Research: The United States, the United Kingdom, and Various European Countries." Pp. 129-139 in *On Economics and Society.* Chicago: The University of Chicago Press.

Leijonhufvud, Axel. 1973. "Life Among the Econ." *Western Economic Journal* 11(3): 327-337.

Lewis, W. Arthur. 1984. "The State of Development Theory." *American Economic Review* 74: 1-10.

Lucas, Robert E., Jr. 1981. "Incentives for Ideas" p. 23 in *New York Times* (April 13).

McCloskey, Donald N. 1980. "Scattering in Open Fields: A Comment." *The Journal of European Economic History* 9: 209-213.

McDowell, John M. 1984. "An Analysis of the Durability of Economic Knowledge" (unpublished). Arizona State University.

Reagan, Barbara B. 1979. "Stocks and Flows of Academic Economists." *American Economic Review* 69: 143-147.

Roose, Kenneth D. and Charles J. Andersen. 1970. *A Rating of Graduate Programs.* Washington, D.C.: American Council on Education.

Scott, Charles E. 1979. "The Market for Ph.D. Economists: The Academic Sector." *American Economic Review* 69: 137-142.

Skeels, Jack W. and Robert P. Fairbanks. 1968. "Publish or Perish: An Analysis of the Mobility of Publishing and Nonpublishing Economists." *The Southern Economic Journal* 35(1-4): 17-25.

Stigler, George J. 1967. "Economics." In *U.S. Philanthropic Foundations*, edited by Warren W. Faver. New York: Harper and Row.

Stigler, George J. 1965. "Statistical Studies in the History of Economic Thought." Pp. 31-50 in *Essays in the History of Economics* Chicago: The University of Chicago Press.

Stingler, George J. and Claire Friedland. 1982. "The Pattern of Citation Practices in Economics." P. 173-192, in *The Economist as Preacher and Other Essays.* Chicago: University of Chicago Press.

Tolles, N. Arnold, Alice Hanson Jones and Ewan Clague. 1965. "The Structure of Economists' Employment and Salaries, 1964." *American Economic Review* 55: 1-98.

Tolles, N. Arnold, and Emanuel Melichar. 1968. "Studies of the Structure of Economists' Salaries and Income." *American Economic Review* 58(2): i-xxxv and 1-153.

Tremblay, Carol Horton, Victor J. Tremblay, and Byunglak Lee. 1990. "Field Publishing Performance of U.S. Economics Departments." *Atlantic Economic Journal* 18: 37-48.