



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

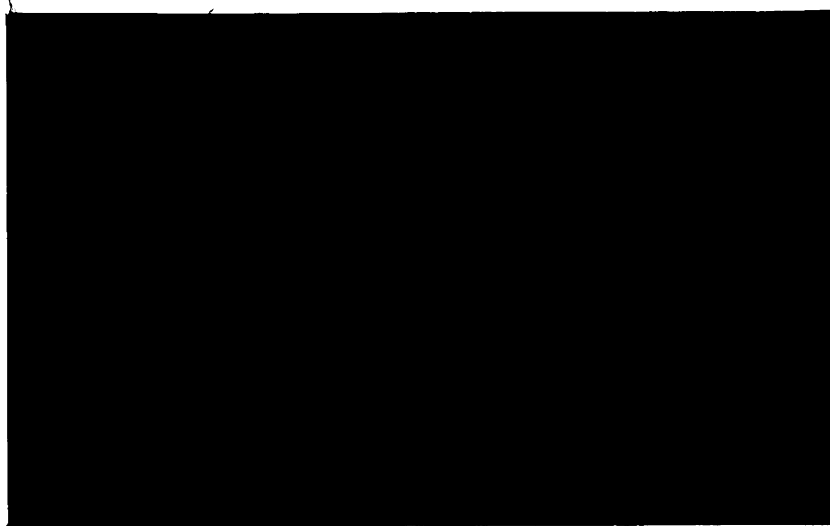
*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

378.752
D34
W-89-26



WAITE MEMORIAL BOOK COLLECTION
DEPT. OF AG. AND APPLIED ECONOMICS
1994 BUFORD AVE. - 232 COB
UNIVERSITY OF MINNESOTA
ST. PAUL, MN 55108 U.S.A.

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
SYMONS HALL
UNIVERSITY OF MARYLAND
COLLEGE PARK 20742



378.752
034
W-89-26

Professional Relationships and the Role of Increasing Sophistication:
Agricultural Economics and Economics

by

Richard E. Just
University of Maryland
College Park

and

Gordon C. Rausser
University of California
Berkeley

Working Paper 89-26

November, 1989

Professional Relationships and the Role of Increasing Sophistication:
Agricultural Economics and Economics

Richard E. Just and Gordon C. Rausser*

Introduction

The American Agricultural Economic Association (AAEA) is composed of various groups ranging from industry to government to academia with widely divergent values and interest. Some of these groups are closely related to the basic discipline of economics and others are only remotely related. This has lead to controversy in the agricultural economics profession as well as between economics and agricultural economics departments on the appropriate mode for graduate training and methodologies of research. Some agricultural economics departments have developed graduate programs that are highly technical and fit closely with graduate course offerings of economics departments while others have developed highly independent programs that are heavily oriented toward agribusiness.

Pressures for day to day decision making in industry have led to reliance on methodologies that are often characterized as unacceptable for journal publications. Similarly, the timeliness of analyses conducted in support of governmental policy making processes sometimes does not lend itself to the use of methodologies that are accepted by professional journals. In contrast to these interests, the research sophistication that has emerged in academic circles has reputedly widened the divergences among various groups within the agricultural economics profession as well as between the economics and agricultural economics professions.

In this setting a number of personalized views have been expressed. Many have expressed the view that a major historical strength of agricultural economics has been its tolerance for a range of methodological approaches. Early agricultural economists drew on production agriculture, accounting and business, classical, neoclassical, and institutional economics. Some have

even argued that the very parochialism and fragmentation of agricultural economics have been a major source of its strength and the basis for many of its most important contributions (Ruttan, 1970). In contrast, Bonnen (p. 1078) argues that:

"Since World War II agricultural economics has been drifting toward an anti-empirical and a disciplinary outlook, away from the great empirical tradition around which the profession was built and upon which its reputation still rests. Today we celebrate theory and statistical methods while ignoring the data collection and problem solving necessary to validate our theory and models. Any profession becomes what it celebrates and rewards."

While some have identified excessive fragmentation along geographic and some subdisciplinary lines as the major factor limiting the effectiveness of agricultural economics (Ruttan, 1970), many agricultural economists have taken refuge in the glowing account expressed by Leontief in his presidential address to the American Economic Association (AEA):

"An exceptional example of a healthy balance between theoretical and empirical analysis and of the readiness of professional economists who cooperate with experts in the neighboring disciplines is offered by agricultural economics as it developed in this country over the last fifty years. A unique combination of social and political forces has secured for this area unusually strong organizational and generous financial support. Official agricultural statistics are more complete, reliable and systematic than those pertaining to any other major sector of our economy. Close collaboration with the agronomists provides agricultural economists with direct access to information of a technological kind. ... They were also among the first economists to make use of the advanced methods of mathematical statistics. However, in their hands, statistical inference became a complement to, not a substitute for, empirical research."

Few would argue that the observations of Leontief which focus on the period of 1920 through 1970 still hold with equal force today. The applied groups within the agricultural economics profession now criticize the academic groups on the same basis as Leontief criticized the economics profession. Academicians in agricultural economics, particularly at the top schools, have faced increasing incentives to pursue the same goals as academicians in economics departments for promotion and tenure. It is not clear whether this has increased diversity within the agricultural economics profession, and whether this diversity has strengthened or weakened the agricultural economics profession. It is also not clear whether the increasing similarity of pursuits of academic agricultural economists and economists has weakened the ability of the agricultural economists to make a unique contribution to the economics literature and has tended to cut off the applied groups in the agricultural economics profession from academia.

The objective of this paper is to address the above issues. The impacts or results are represented in terms of the subjective values of the AAEA membership and the frontiers of usable and implementable knowledge. The major themes of the evaluation are the limitations imposed by the increasing technical level of both AAEA and AEA media and the solution-rich environment promoted and facilitated by the the media.

Some of the self imposed limitations include the dominance of historical data analysis and "falsification"; insistence on a false sense of objectivity, available technology for empirical research, the emphasis on linear logic and the presumption that economic understanding is a convergent process. The solution-rich environment depreciates the importance of problem articulation. In addition, the profession has not moved in the direction of producing institutional innovations in the same fashion as biological and physical scientists produce technological innovations (Rausser, 1982). Instead the

profession has largely tinkered at the margins rather than designing, reforming and promoting more effective institutions.

The paper begins with a brief review of the relationship between the economics and agricultural economics professions. Next, the importance of some of the linkages between the two professions is examined empirically based on a survey of agricultural economists conducted in the spring of 1989. Results of the survey are also used to assess desired changes in the technical level of training in graduate programs and characteristics of research that lead to professional success for applied groups in agricultural economics. Finally, some of the implications of these results are interpreted in the context of some anecdotal evidence on the current state of the agricultural economics profession.]

An Overview of the Professional Relationship

The disciplines of economics and agricultural economics have traditionally been very closely related with agricultural economics viewed as an applied subdiscipline of economics. Nevertheless, the technical level of theoretical and empirical applications has differed and the extent of these differences has changed over time. The agricultural economics profession has traditionally been highly data oriented while the economics profession has been relatively more theoretically oriented. This is perhaps to be expected with a more applied discipline and explains why development of some of the applied tools of econometrics and programming tended to originate in the agricultural economics profession (e.g., Rossi).

Organization. Most academic departments of agricultural economics are located at land grant universities where they enjoy the support of agricultural experiment station and cooperative extension funds. Only a few schools (e.g., Stanford University, University of Chicago, and Brigham Young University) have significant programs in agricultural economics that are not

supported by the land grant system. In most land grant universities, the department with responsibility for agricultural economics is separate from the economics department. However, in a few universities (e.g., University of Chicago, Iowa State University, North Carolina State University, Montana State University) both agricultural economics and economics are taught in the same department. In these departments which are at land grant institutions, some of the faculty are specifically tied to the agricultural experiment station or cooperative extension and others are not.

Cooperation versus Competition. In schools with both economics and agricultural economics departments, the extent of cooperation versus competition varies greatly. Most schools find limited interaction through service as outside members on graduate student committees. In some schools, however, the faculty have found productivity in the cross fertilization of ideas and interact extensively through seminars and, in some cases, joint research. Greater cooperation and interaction tends to occur where the academic strength and interests of the two departments are more nearly balanced. For example, an agricultural economics department that is strong in more basic research is likely to interact more with a competent but balanced economics department than is a weak highly applied agricultural economics department with a highly theoretical economics department. Somewhat ironically, more competition between the two departments tends to occur in the same situation as where more cooperation occurs. For example, when the strength and interests of the two departments are balanced, competition for graduate students can be intense and some disagreement can occur over where various courses are taught.

Economists in Agricultural Economics Departments. In the earliest stages (prior to 1940), agricultural economics departments were staffed with economists who were interested or induced to work on agricultural problems.

For a long period of time thereafter, however, agricultural economics departments typically did not hire individuals with terminal degrees from economics departments other than those with agricultural specializations. Beginning in the mid 1970s, several agricultural economics departments began to hire one or two individuals trained in economics departments without agricultural specializations.

Part of this movement was due to the increased interest in resource and environmental economics which are fields emphasized both in some economics departments and in some agricultural economics departments. Some of this was also due to the internationalization of the U.S. economy and the new importance of macroeconomics in agricultural trade. With the traditional interest in applied econometrics and resulting dilution of technical econometric talent in agricultural economics departments and the increasing sophistication of econometric techniques, some departments also felt a need to hire highly technical econometricians trained in economics departments. Accordingly, the economists hired by agricultural economics departments have typically taught specialty courses and done research in resource and environmental economics, macroeconomics of agriculture, and econometrics (econometricians generally do applied econometric analysis of agricultural markets). In many cases these individuals are also used to teach graduate level theory courses but, for the most part, they do not hold joint appointments or teach in economics departments.

Conditions of Employment. The conditions of employment are generally quite different in agricultural economics departments than in economics departments. Appointments are usually on an 11-month basis in agricultural economics departments while they are for a 9-month, academic-year basis in economics departments. Economics department appointments are usually on a 100 percent teaching basis while agricultural economics department appointments

are often for no more than 50 percent teaching with most teaching/research appointments in the neighborhood of 70 percent teaching and 30 percent research. Agricultural economics departments also have extension appointments that range from 100 percent extension to various shares that often include 50 percent research or 50 percent teaching.

These appointments result in members of agricultural economics departments most often teaching about 2 courses per year compared with members of economics departments usually teaching around 4 courses per year (courses measured by preparations). Tenure and promotion also tend to require somewhat less in terms of publication numbers and quality of outlet (but somewhat more in terms of service to the state clientele). Aside from a possible prestige factor, these conditions tend to make employment in agricultural economics departments relatively more attractive. These differences are due to the support of Agricultural Experiment Stations and Cooperative Extension Services that receive substantial federal and state support at land grant institutions.

On the other hand, salaries in agricultural economics departments are somewhat lower than in economics departments after adjusting to a common academic year basis. For example, average salaries in agricultural economics departments averaged \$43,766 across all ranks in 1988-89 compared to \$48,754 in economics departments. This qualitative difference applies across all ranks and is apparently widening over time. For example, the averages were \$23,031 and \$24,137, respectively, ten years earlier. To some extent, the widening gap is explained by the weak economies and associated university funding of state universities of heavy agricultural states in the 1980s but the qualitative difference applies across all regions as well (see the 1988-89 and 1978-79 Faculty Salary Survey of Institutions Belonging to National Association of State Universities and Land-Grant Colleges, Office of Institutional Research, Oklahoma State University).

Graduate Program Relationships. The similarity of graduate programs between agricultural economics and economics departments varies widely among schools depending on the technical versus applied orientation of the two departments. In the best agricultural economics departments, the requirements for graduate degrees is similar to some of the best economics departments. In most agricultural economics graduate programs, there is considerable overlap of coursework with graduate programs in economics. In many cases, one-third to two-thirds of the first year coursework is the same. Often, the same basic graduate economic theory courses are required. In most schools, the econometrics courses of economics programs are also required for agricultural economics programs. In fact, in many cases, more econometrics courses are required for agricultural economics programs than for economics programs. In addition to first year theory and econometrics courses, many agricultural economics graduate programs draw on field courses from economics programs in addition to those offered in agricultural economics programs. Thus, as much as half of the coursework in many agricultural economics graduate programs comes from the basic discipline of economics. Thus, with respect to choice between a good agricultural economics department and a good economics department for a prospective graduate student, the choice is largely one of specialization rather than technical level, rigor, etc.

Professional Media. In addition to the sharing of coursework, the agricultural economics profession uses the media of the economics profession (e.g., the basic economics journals and the professional meetings) both as an input in conceptual thinking and as an outlet for completed research. In fact, publication in the basic journals of economics (e.g., the *American Economic Review*, *Econometrica*, and the *Journal of Political Economy*) is more highly rewarded in some departments of agricultural economics than is publication in the premier journals of agricultural economics (e.g., the

American Journal of Agricultural Economics). As is the case with other subdisciplines of economics, publication in the basic journals of economics is viewed in these departments as a sign of broader and deeper significance than is publication in a subdisciplinary journal. However, in other departments of agricultural economics, publication in the leading basic economics journals is looked on with disfavor because of the level of sophistication it tends to induce.

Summary. In summary, it suffices to say that the education, research tools, and professional pursuit of academicians is closely related between the economics and agricultural economics professions. This has lead to a considerable influence of the economics profession on the agricultural economics profession. The academic groups in the agricultural economics profession have tended to follow the economics profession in its pursuit of technical sophistication and have tended to revise graduate programs accordingly. This leads to the concern that the increasing technical level of the economics profession is drawing the agricultural economics profession away from its applied focus resulting in a fragmented and overly diverse agricultural profession.

Empirical Questions and Hypotheses

These concerns lead to a number of hypotheses relating to the linkages among academic, extension, industry, and government components of the agricultural economics profession. Do the applied components of the AAEA find different approaches effective than are emphasized by academic components and the media? Are basic economics journals of use to the applied components of the agricultural economics profession? How does the importance of formal models and econometric analysis versus heuristic application of economic principles and intuition differ among the various components of the agricultural economics profession? Are the channels of communication among

these various groups highly integrative and interactive, or are they channeled and separate? How well are the problems faced in the applied components of the profession communicated to the academic community and how well do the products of the academic community serve the applied components? How well are the theoretical tools developed in the economics profession communicated to the applied groups in agricultural economics and how well are the basic problems in agricultural economics needing theoretical research communicated to the economics profession? In acquiring human capital, what is the best relative emphasis of training on various types of techniques, conceptual frameworks, and case studies and how does that compare with the training that has been received?

Many other questions naturally arise. What empirical evidence is used in the analyses conducted by agricultural economists? Are the frameworks of analysis used by the various components of the agricultural economics profession formal or informal? How helpful are the various products that are offered by the AEA and AAEA to agricultural economists in performing their responsibilities? Do the types of analyses conducted, the frameworks utilized, and the usefulness of various products change with professional maturity?

The Survey -- A Description

The design of the questionnaire used to address these questions attempts to identify professional needs of members of the AAEA. The vast majority of questions elicit quantitative rather than qualitative responses (of 24 questions, 19 requested quantitative responses). In terms of an investment and production process for members' activities, the questions attempt to determine the nature and type of graduate training during the human capital investment process, the inputs used (including time spent in the generation of products), and in what forums the products or results are reported. In some

instances, the questions attempt to determine how activities change over the course of professional careers.

After choosing the initial set of questions, the survey was pretested among a nonrandom sample of respondents. Some had difficulties with the initial set of questions which were then revised slightly. As with all surveys, the trade-off between simplicity and accuracy naturally arose. An attempt was made to remove ambiguities; but as a result of the questions being short and concise, it was impossible to remove all ambiguities. The questions are outlined in Appendix A.

Once the questionnaire was finalized, it was mailed to the complete population of all domestic, nonstudent, nonfamily members of the AAEA as recorded in the AAEA business office. This population was composed of 2,623 potential respondents. The anonymity of each respondent was assured. Initially, 963 questionnaires were returned; thus the response rate was 36.7 percent. This initial response rate was quite acceptable, and we wish to thank all those who took the time to respond to the survey.

To correct for possible sample selection biases, a follow-up survey was mailed to 6.5 percent of nonrespondents. Of these, 12 percent responded to the second request. Conventional Chow tests of differences in the follow-up from the original sample revealed significance at the 5 percent level for only a bit over 5 percent of the questions. Significance for 5 percent of the questions should be expected if there was no statistical difference. Accordingly, all results that are reported here are based on the original 963 returned questionnaires.

Of course, the response rates on individual questions were not always 100 percent. Specifically, for Question 1, there were 943 responses; Questions 2, through 8 had 100 percent response rates; Question 9, 943 responses; Question 10, 811; Question 11, 816; Question 12, 820; Question 13, 806; Question 14,

732; Question 15, 806; Question 16, 806; Question 17, 900; Question 18, 801; Question 19, 711; and Question 20 (the last quantitative question), 662.

Structure of the Profession

The linkages among the various professional groups in the agricultural economics profession and between the agricultural economics and economics professions are reported in Table 1 in terms of the sources of conceptual thinking, sources of reports and forecasts and outlets for completed analyses. The results in Table 1 were derived by regressing the responses for the most recent period of each respondents professional career on the response to question 1 which identifies the respondents professional group (e.g., teaching, research, extension, industry, government) and multiplying by 100. Thus, the results in Table 1 give the percentage on which a hypothetical individual 100 percent in one of the professional groups listed in the left hand margin relies on the various media listed across the top for inputs into professional work and for dissemination of results. The results of this Table show that the relationship between the economics profession and the various groups in the agricultural economics profession are not as remote as is sometimes claimed. To the extent that results reflect reality rather than desire, the degree of interaction is suggestive of a useful professional relationship.

For sources of conceptual thinking, professional meetings (AAEA and ASSA) are a primary input media for all professional groups (except ASSA meetings for extension research). The ASSA meetings held jointly with the AEA are a particularly strong part of this input. Although academic researchers rely most heavily on basic economic journals, all professional groups make substantial use of them. Academic researchers also rely substantially on trade journals and lay interchange -- almost as much as any other group except extension. Except for academic researchers, *Choices* -- a lay-oriented

publication of the AAEA -- has also become one of the most important input media. Within a very short period of time, *Choices* has gained a significant position in the media of agricultural economists. This is likely reflective of a strong demand and need for less technical literature as opposed to the *American Journal of Agricultural Economics* (AJAE) and other economics journals. The results for sources of reports and forecasts reflect similar implications.

The results for outlets for completed analysis are similarly reflective of a closer tie between the economics professions and the applied groups of agricultural economics than expected. Basic economic journals serve as a major outlet for industry and government groups. This outcome, however, may reflect desire rather than actual experience. It is also surprising that trade journals serve as an outlet for academic research. The AJAE serves as a major outlet for all professional groups in agricultural economics except industry. The professional ASSA meetings are used highly by teaching and by academic, extension, and government research. This is in sharp contrast to rather weak use by these groups of their own professional AAEA meetings. Other professional groups do not view either set of professional meetings as a forum for reporting the results of their efforts even though they use them as a major input. In the case of extension, most results are reported to their colleagues and to other lay individuals.

In Table 2, the changes in professional linkages with maturity are reported; specifically, the changes in the percentage of activity associated with each form of media per year are reported. Professional maturity is measured by years since the Ph.D. degree. For sources of conceptual thinking, the most striking results here are that almost all professional groups increase their reliance on trade journals and ASSA meetings as they become more mature. On the other hand, almost all professional groups decrease their

reliance on basic economic journals and on lay interchange. The latter results are highly significant and a sad indictment of the profession. The former are reflective of the increasing depreciation of human capital as the level of sophistication of basic economics journals has increased. Note also that there is a tendency to replace reliance on the AJAE with reliance on regional agricultural economics journals and activities, especially for extension, industry, and government groups. In general, this suggests that agricultural economists tend to migrate away from the economics profession and the technical level of its journals over time.

For completed analyses outlets, all groups reduce their publication rate in basic economic journals and increase publication in the AJAE. With few exceptions, most groups reduce discussion with colleagues and increase their presentations to lay groups. The latter exceptions are, however, mostly insignificant. With professional maturity, the publication rate in trade journals increases for all groups except academic research but remarkably so for teaching. Most of these results are not surprising. Again, however, these results are reflective of an increasing division between the economics and agricultural economics professions over the course of professional careers. This division is consistent with a move away from relatively more technical material and towards more practical and applied material.

Other Quantitative Survey Results

A number of other analyses were conducted for the purpose of drawing implications for research, graduate curricula, professional media, and scientific exchange within the agricultural economics profession and between the agricultural economics and economics professions. The results of these analyses are reported in Tables 3 through 5.

Again, answers to each question were regressed against the response to Question 1 which identifies the extent to which each members job

responsibilities are academic research, extension research, other extension, teaching, industry, government research, and other government activities. These estimated coefficients (multiplied by 100 to convert to percent) are reported in the rows or columns of Tables 3 through 5 so named. The estimated coefficients give the average response for a hypothetical individual whose appointment is 100 percent in the area identified. The other label, "All Respondents," refers to the average response across the entire sample.

Table 3 reports how agricultural economists' type and basis of analysis as well as the perceived quality of the various types of analyses change with professional maturity. In terms of the basis for analysis, all professional groups migrate away from using published secondary data toward relying on understanding and experience over the course of their professional career. This result is taken to be a reflection of what individuals do over their professional careers but it could also reflect differences among educational cohorts. The latter explanation could result from recent graduates being more highly trained in econometrics, statistics and data analysis and, as a result, using these methods with greater frequency throughout their professional careers. We attach the former interpretation. Thus, these results imply that problem identification and the case study approach receive greater emphasis with professional maturity.

For the types of analyses that are conducted, formal original frameworks tend to receive decreased emphasis with professional maturity. This may be due either to increasing reliance on experience and intuition or to increasing obsolescence of human capital. This trend is the strongest for academic researchers. Note that industry relies increasingly on formal frameworks developed by others. This change, however, balances with a decline in the reliance on original formal frameworks. Heuristic application of principles increases with maturity, particularly for academic researchers and teachers.

The use of "gut" intuition declines, especially for teachers and industry members. Importance of problem definition increases significantly for all respondents, especially teachers, industry, and government research members.

Aside from the increasing importance of heuristic application of basic economic principles in government research work and the use of gut intuition in industry, there is very little significance among the potential sources of effectiveness with professional maturity. The results are generally consistent. One curious outcome, however, is the increased importance with industry professional maturity of gut intuition as a source of effectiveness but its decreasing role with this same professional group as a type of analysis. In any event, the collective results of Table 3 show that professional maturity leads to declining formal analysis with secondary data and increasing reliance on problem definition and heuristic application of economic principles. Moreover, with professional maturity the type of analysis is increasingly based on personal understanding and experience, particularly for applied professional groups such as teaching, industry, and government research. Again, increased emphasis on problem definition and case studies is suggested.

Table 4 presents the ideal course work emphasis in graduate training desired for new recruits. In addition, the percentage differences of these desired levels from respondents' actual course work percentages are reported. As the results clearly indicate, all respondents would prefer less economic theory, less econometrics and statistics, less applications, and more case studies. The results are surprisingly uniform across all professional groups in the agricultural economics profession. The greatest changes are desired by industry and government followed closely by extension professionals. These results too are consistent with the hypothesis that the major problems faced by the agricultural economics profession require customized rather than

standardized or generic solution frameworks.

Determinants of power and influence in both industry and government was evaluated by linking the number of employees supervised or the level of influence in the organization to coursework, basis for analysis, type of analysis and years since the last degree. In the results reported in Table 5, the intercept includes the effect of econometrics and statistics coursework, use of published secondary data, and use of formal original framework on the number supervised and the level of influence. For industry, all types of course work are superior to econometrics and statistics and significantly so for the level of influence. Almost the opposite results are obtained for government but without significance. These results support the view that different types of skills get rewarded in government relative to industry. Replacement of economic theory and econometrics and statistics with case studies as suggested by Table 4 is supported also by the results for the level of influence in both government and industry.

Analysis undertaken with secondary data obtains the least reward in both industry and government. Understanding and experience obtains the highest reward in three of the four cases with greatest significance in all instances. These results also support the hypothesis regarding the importance of customized rather than standardized or generic solution frameworks which, in turn, emphasizes the importance of problem definition and case studies. One surprising result with respect to the determinants of power and influence is the effect of professional maturity. Years since the last degree has only one positive effect; however, none of the measured effects are significant.

For the types of analysis, industry professionals give the highest weight to "gut" intuition while government professionals are rewarded most for descriptive analysis geared toward problem definition followed by the use of secondary formal frameworks (formal frameworks developed by others). This

outcome is consistent with the positive significance of gut intuition as a source of effectiveness with professional maturity for industry professionals. These results can perhaps be best explained by the relative emphasis in government research on ex post deductive evaluation. In contrast, industry professionals are frequently posed with futuristic questions which require ex ante, inductive analysis. In contrast, many government professionals (e.g., in the Economic Research Service of the U.S. Department of Agriculture) spend relatively more time explaining what has happened.

The general implications of Tables 3 through 5 is that agricultural economists are receiving training that is too technical and that this training and the associated technical sophistication of basic economics journals tends to be discarded over the course of professional careers. Greater rewards in the applied groups of the agricultural economics profession go to those who focus more on the use of understanding and experience.

Qualitative Survey Results

In addition to the quantitative survey results, some additional results were also generated for the *AJAE*, *Choices* and *AAEA* meetings. For each of these media the respondents were asked to list those problems they thought should be but are not addressed. While these questions were specifically directed toward the media products of the *AAEA*, the responses for the *AJAE* apparently apply to basic economics journals as well and the responses for *AAEA* meetings apparently apply to *ASSA* and *AEA* meetings. As expected, a few respondents were not constructive but for the most part the responses were meaningful. In general, the qualitative responses to problems that should be addressed support the view that the profession has become too technique oriented, too solution rich, and too risk averse in analyzing possible future scenarios. Moreover, there is too little problem solving knowledge generation for which there is value added, and there are a host of specific issues for

which problems have not been well articulated.

The common thread that runs through many of these responses is that there are too few conceptual and empirical pieces that address important problems that exist currently or may emerge at some future date. Instead most of the conceptual and empirical pieces focus on some construct in the literature or are dictated by the standardized solution frameworks that have been previously developed. The call seems to be for more creative, unstructured publications that can be the basis for valuable professional exchange. Many of the responses cover a broad range of concerns that focus on opportunities for innovations in institutional design and collective group policy analysis.

In the case of the *AJAE*, the membership as represented by our sample of respondents want more emphasis on defining problems, more futuristic analysis, e.g., what is the future of the land grant system, less emphasis on methodology and formal rigor, more interdisciplinary treatment of social behavior, more socioeconomic and political analysis in agriculture, more research on ethics and values, more research on broad seminal issues such as the ability of agriculture to adjust to disequilibria, more political economic analysis of all shapes, forms and types, more applications of neoinstitutional economics to agriculture, less focus on trivial modifications of existing theory, more "new" industrial organization research, more studies on value added of any economic analysis that might have been conducted for users of that analysis, more collective organizational analyses on administrative structures and policies in agricultural colleges, development of criteria for assessing institutional performance, development of methods for evaluating efficiencies of institutions and implications for informal markets, etc. The analysis of institutions and the political economy of agricultural policies, and the supply of nonprivate goods emerges again and again in the responses to the problems that ought to be addressed by *AJAE* articles.

The gap between what is currently published in the *AJAE* and what would best serve the membership is obviously not only due to the policies that are implemented by the editor, the association or the peer review process. As one thoughtful respondent argued: "After over thirty years of observing the academic process it appears that most scholarly societies have become agents to establish professional credentials for tenure, promotion or a job offer. This is probably as much the fault of the administrators looking for someone else to make their decisions as anything."

Other respondents have suggested that the way of dealing with this problem is to revise the academic rewards system so as to encourage more problem solving and applied analysis. Positive rewards should be given for well articulated problems and useful results and insights with penalties imposed for just another technical, standardized application. The institutional changes that are required for such a reward and penalty policy structure to naturally emerge is itself a serious area of social science inquiry.

Turning to *Choices*, the qualitative responses are overwhelmingly favorable. These comments praise *Choices* for its readability and lack of unnecessary sophistication. Among the vast array of favorable comments, however, there are some constructive suggestions. Since the subject matter and problem solving knowledge of the profession is multidisciplinary, *Choices* should expand its disciplinary base beyond agricultural economics and political science. The articulation of important problems has been one of the most positive features of *Choices* but too much space is given to personal opinions without supporting analysis or empirical justification. *Choices* does not devote sufficient space to the large payoff areas of analysis, namely, the design of new institutions or the reform of existing institutions. More lay articulation of market failures as well as government failures would

dramatically improve the societal contributions of the magazine.

For the AAEA meetings, both summer and winter, the same desires that emerge for the AJAE and *Choices* appear once again. However, there is less (more) dissatisfaction with the professional meetings than with the AJAE (*Choices*). The responses suggest that the membership would prefer more sessions on feedback from users of economic analysis conducted by members of the profession. This could help structure and focus future analysis where the largest payoffs might exist.

More case studies are strongly recommended. Correspondingly many of the suggestions for problems that should be addressed at professional meetings include the use of "event analysis." The view was frequently expressed that more sessions should be devoted to problem articulation with little if any discussion about solution methods and techniques. Sessions which focus on the design of new institutions or the reform of existing institutions are strongly encouraged. For those areas of inquiry where the payoffs are potentially very large but limited time series and cross section data exist, why has more experimental economic analysis not been conducted by members of the profession and reported in meetings? In fact "brainstorming" sessions on the design of experimental economic analysis as well as other types of analysis that might be conducted would be a welcome addition to the professional meetings.

As one respondent noted "some good controversial sessions need to be put together, ones that raise ideas and blood pressures." Less ex post analysis sessions which cast each and every problem into the neoclassical microeconomic framework are needed. More visionary sessions requiring ex ante analysis are desired. Specifically, sessions need to identify what major problems are likely to emerge down the road that will require fundamental economic analysis? What institutional innovations could be made that likely will improve the performance of the agricultural and natural resource sector. Many

of the recommendations of the membership focus on the need for serious institutional analysis in lieu of continued tinkering at the margins.

Anecdotal Evidence

The results of the survey that tend to call for less ex post neoclassical sophistication and more focus on problem definition and forward looking analysis are consistent with the major experiences of the agricultural economics profession over the last 20 years. The agricultural economics profession has witnessed a number of major shocks in both U.S. and World agriculture over the last few decades. None of these shocks or their impacts were anticipated by publications of the profession. For example, the huge commodity price explosion of the early 1970s surprised all interested observers. No ex ante analysis was conducted prior to 1971 that even weakly suggested that such a price explosion was realistic possibility. Many ex post analyses have now been conducted that isolate the Soviet grain deal, the deregulation of the overvalued dollar, trade barriers, and world wide economic growth as some of the explanations for the events of the early 1970s. In fact, not until three years after the first devaluation of the dollar and two years after its deregulation did anyone in the profession attempt to evaluate its implications for U.S. agriculture (Schuh). It is important to note that this study was based on personal understanding and experience and involved the heuristic application of basic economic principles. The study did not formally analyze any secondary or primary data. Furthermore, if secondary time series data had been utilized at that time, no significant effect would have been isolated between the exchange rate and any performance measures for the U.S. agricultural sector because of limited data availability following the devaluation.

In the early 1980s those concerned with U.S. and world agriculture were again surprised. Although there were studies in the late 1970s of the

relationship between the macroeconomic environment and U.S. agriculture, few if any serious ex ante analyses were reported in the literature. Perhaps more importantly after the Volcker Federal Reserve Policy Announcement of 1979, no ex ante analysis was reported by the profession on the potential effect of real interest rate increases on U.S. agriculture. It was not until commodity markets plummeted in 1981 that the potential effects of monetary and fiscal policy on U.S. agriculture were seriously evaluated. Since the macroeconomic environment had been reasonably stable over much of the 1960s and 1970s, ex post historical analysis could not identify a significant relationship between nominal or real interest rates and various performance measures of the U.S. agricultural sector.

To address this difficulty, Freebairn, et al developed a simulation model with some empirically estimated and some hypothetical parameters to explain the events of 1981. Similarly, Just demonstrated that an extended capitalization formula calibrated to pre-Volcker events could have predicted the land price decline beginning in 1982 in terms of interest rate and inflation phenomena. But these types of approaches could have been undertaken as early as late 1979 or early 1980. Given the vulnerability of U.S. agriculture in 1980 to excessively optimistic expectations, huge governmental subsidies and the potential for excess capacity, why did the agricultural economics profession not provide some crisp but qualified warning signals? Conventional wisdom today is that U.S. macroeconomic policy in the early 1980s helped destroy U.S. agricultural export potential while escalating its costs and leaving it in the deepest financial crisis since the great depression. Why was this possible outcome not even remotely entertained in the forums of the profession in the early 1980s? Again, it is important to note that the early studies which began to sort out the role of new phenomena affecting agriculture were based on personal understanding and experience and involved

the heuristic application of basic economic principle.

The lesson of these war stories is that when undue weight is placed on ex post data analysis, future events will always present surprises. These same points arise in a number of current topical problems. For example, with respect to the General Agreement on Tariffs and Trade (GATT) negotiations, there have been no serious evaluations of the dynamic path that might result from any proposals that have been tabled by the U.S. Trade Representative.

The agricultural economics profession, largely in following the economics and statistics professions, has imposed a number of limitations on what constitutes acceptable research. The emphasis has been on empirical analysis of historical phenomena. The philosophical base for much of this focus is provided by Popper. Popper emphasizes explanation of observable phenomena and introduces the notion of falsification as the rigorous standard for scientific procedure. Kuhn, in his study of scientific progress, found no support for Popper's idealization for science -- falsifying instances seldom lead to the revocation of theory. A few economists such as McCloskey have advanced the view that economic research is basically essays in persuasion.

One of the dominant characteristics of all of these professions is their insistence on objectivity. Objectivity is much like motherhood and apple pie; if it could be achieved we would all warmly welcome its presence. The difficulty, however, is that in principle an infinite number of hypotheses are capable of explaining a given finite body of non-experimental data. Accordingly, the only objectivity that exists emanates from the clash of individual subjectivities. As Keynes argued long ago "it is astonishing what foolish things one can temporarily believe if one thinks too long alone..." Discussion and debate with colleagues provides a useful defense against one's own subjective foolish beliefs.

In the context of falsification and the explanation of observable

phenomenon, a number of solution techniques have been developed from mathematical statistics, econometrics, operations research, etc. This technology has been utilized sometimes wisely and sometimes unwisely. In general, the technology imposes a logic which leaves little if any room for intuition. Little if any value has been placed by the profession on the role of intuition. In contrast, it is interesting to observe how many members of the profession that trade in futures markets do so on the basis of formal econometric models as opposed to intuition and heuristic application of economic principles.

The technology that has been embraced by the profession is largely computer based. In many research applications, this technology has been used as a substitute for creativity and serious thought. In fact, the available technology along with the standardized solutions that have been developed over the years often leads to a "have model will travel" mentality. For some years now, the journals and professional meetings have been dominated by solution-oriented or technique approaches. This professional behavior has severely limited some types of originality. Many of our recent graduates spend most of their time wondering about the applications they can make of standardized solution frameworks rather than finding interesting problems that require the development of customized frameworks. Given the small weight placed on case studies and induction, this outcome is not surprising.

The solution frameworks that have been utilized by the profession also operate under the false presumption that the progress of economic understanding is a convergent process. Since it is not a convergent process, "the progress of economics makes it difficult for political leaders to know when to listen to us, even if they are inclined to do so" (Aaron, p. 12).

Concluding Remarks

After reviewing the survey responses, we cannot help but think that the

Leontief observations made in 1970 for the agricultural economics profession no longer hold. The respondents to the survey discussed here focus mostly on the last two decades and express a collective view that is more consistent with Leontief's observation on general economics as of 1970 (Leontief p. 3):

"In no other field of empirical inquiry has so massive and sophisticated statistical machinery been used with such indifferent results. Nevertheless, theorists continue to turn out model after model and mathematical statisticians to devise complicated procedures one after another. Most of these are relegated to the stockpile with out any practical application or after only a perfunctory demonstration exercise."

This suggests validity of the general concern that the agricultural economics profession is following too much the increasing trend toward sophistication in the economics profession. This trend is of particular concern with respect to emphasis on objectivity and complex techniques in empirical work. Results for applied groups in the agricultural economics profession show that more down-to-earth applications of intuition, understanding and experience such as are associated with the case study approach are more effective. Graduate training as well as the formats of journals and meetings need to be revised accordingly. If not, then the usefulness of graduate training and research in agricultural economics will decline and tend to be replaced by other disciplines. If so, then either graduate training and professional activities in the agricultural economics profession must depart from the economics profession or similar changes must be made in the economics profession.

Appendix A

Professional Needs Survey

1. What percentage of your time is devoted to each of the following: basic research in academia; applied research in academia; applied research in direct support of an extension program; all other extension activities; teaching; industry, banking, agribusiness; applied research in/for government or international organizations; and other government activities?
2. Are you currently a member of the AAEA?
3. How many people do you directly supervise?
4. How many individuals or organizational levels are between you and the head of your organization?
5. On a scale from 0 to 100 (100 highest), what is your level of influence in your organization relative to all other individuals?
6. What is your last degree?
7. From which institution?
8. How many years since your last degree?
9. In course work for your last degree, what percentage of your time did you spend on each of the following: economic theory; econometrics and statistics; operations research and linear programming; application of the above (e.g., in production, marketing, trade, policy, development); case studies; and other?
10. In working on various issues during your professional career, what percentage of your analyses was based on each of the following: published secondary data sources, collected and internal primary data sources, and personal understanding and experience during the first 5 years of your professional career, the next 5 years (if applicable) and beyond 10 years (if applicable)?

11. In working on various issues during your professional career, what percentage of your analyses consisted of: a formal framework you or your colleagues developed, a formal framework developed otherwise, heuristic application of basic economic principles, "seat of the pants" reasoning and "gut" intuition, and descriptive analysis geared toward problem definition during the first 5 years of your professional career, the next 5 years, and beyond 10 years?
12. In working on various issues during your professional career, what percentage of your analyses was based on: no more than 2 hours to complete an analysis, 2 hours to 2 days, 2 days to 2 weeks, 2 weeks to 2 months, more than 2 months during the first 5 years of your professional career, the next 5 years, and beyond 10 years?
13. For sources of conceptual thinking in your work, in what percentage have you relied on: trade journals, the Wall Street Journal, and trade association meetings: *Choices*; AAEA meetings; ASSA meetings; the American Journal of Agricultural Economics; basic economics journals; other agricultural economics and agribusiness journals, reports and meetings; personal experience and discussion with colleagues; meetings and discussions with farmers and other lay individuals; and other during the first 5 years of your professional career, the next 5 years, and beyond 10 years?
14. For reports and forecasts of current and future economic events, in what percentage have you relied on: trade journals, the Wall Street Journal, and trade association meetings; *Choices*; AAEA meetings; ASSA meetings; the American Journal of Agricultural Economics; basic economics journals; other agricultural economics and agribusiness journals, reports, and meetings; personal experience and discussion with colleagues; meetings and discussions with farmers and other lay individuals; and other during

the first 5 years of your professional career, the next 5 years, and beyond 10 years?

15. What percentage of your completed analyses have been reported in/to the following trade journals, the Wall Street Journal, and trade association meetings, *Choices*; AAEA meetings; ASSA meetings; the American Journal of Agricultural Economics; basic economics journals; other agricultural economics and agribusiness journals, reports, and meetings; personal experience and discussion with colleagues; meetings and discussions with farmers and other lay individuals; and other during the first 5 years of your professional career, the next 5 years, and beyond 10 years?
16. In your recruitment activities, what is the ideal percentage weighting on formal preparation in the following subject matter areas: Economic Theory; Econometrics and Statistics; Operations Research and Linear Programming; Applications of the above (e.g., Production, Marketing, Trade, Policy, Development); Case Studies (descriptive analyses geared toward problem definition); and others?
17. In carrying out your professional responsibilities, what percentage of your effectiveness is: use of a formal framework you or your colleagues developed; use of a formal framework developed otherwise; heuristic application of basic economic principles; use of "seat of the pants" and "gut" intuition; your ability to define the actual problem; and other?
18. What do you perceive to be the current allocation of emphasis by the AJAE and what would be the ideal distribution among the following topics, given your professional responsibilities: application of an existing model; development of a new model; definition of a problem; discussion and assessment of current events; descriptive analyses of problems; individuals viewpoint; and other?

19. What do you perceive to be the current allocation of emphasis by *Choices* and what would be the ideal distribution among the following topics, given your professional responsibilities: application of an existing model; development of a new model; definition of a problem; discussion and assessment of current events; descriptive analyses of problems; individual viewpoint; and others?
20. What do you perceive to be the current allocation of emphasis by the AAEA meetings and what would be the ideal distribution among the following topics, given your professional responsibilities: application of an existing model; development of a new model; definition of a problem; discussion and assessment of current events; descriptive analyses of problems; individual viewpoint; and other?
21. What are some problems you think should be addressed in the *AJAE* that are not being addressed?
22. What are some problems you think should be addressed in *Choices* that are not being addresses?
23. What are some problems you think should be addresses in the AAEA meetings that are not being addresses?
24. If you have terminated your membership in the AAEA, why have you done so?

Footnotes

* Some material in this paper was adapted from a paper prepared for the Annual Meetings of the American Agricultural Economics Association to be published in the *American Journal of Agricultural Economics*, December, 1989. Richard E. Just is Professor, University of Maryland, and Gordon C. Rausser is the Robert Gordon Sproul Distinguished Professor, University of California, Berkeley.

References

- Aaron, Henry J. "Politics and the Professors Revisited." Richard T, Elie
Lecture to the American Economic Association, December, 1989; published
in the American Economic Review Proceedings (May, 1989):1-15.
- Bonnen, James T. "A Century of Science in Agriculture: lessons for Science
Policy." American Journal of Agricultural Economics 68 (December,
1986):1065-1080.
- Freebairn, John W., Gordon C. Rausser and Harry deGorter. "Food and
Agricultural Sector Linkages to the International and Domestic
Macroeconomies" New Directions in Econometric Modeling and Forecasting in
U.S. Agriculture, Gordon C. Rausser (ed.), New York Elsevier, North
Holland Inc., 1982, Chapter 17.
- Just, Richard E. "The Role of Monetary, Fiscal, and Agricultural Variables in
Farmland Prices," Working Paper, University of Maryland, 1988.
- Keynes, John Maynard. The General Theory of Employment Interest in Money.
London: McMillan and Company 1936.
- Kuhn, T, The Structure of Scientific Revolutions. 2nd ed. Chicago: The
University of Chicago Press, 1970.
- Leontief, Vassily. "Theoretical Assumptions and Nonobserved Facts."
Presidential Address delivered at the 83rd meeting of the American
Economic Association, Detroit, Michigan, December 29, 1970; published in
the American Economic Review Proceedings (May, 1971):1-7.
- McCloskey, P. The Rhetoric of Economics. The University of Wisconsin,
Madison. 1985.
- Popper, K.R. The Logic of Scientific Discovery. New York: Basic Book, 1959.
- Rausser, G.C. "Political Economic Markets: PESTs and PERTs in Food and
Agriculture," American Journal of Agricultural Economics 64
(1982):821-833.

Rossi, Peter E. "The Econometric Theory Interview: Professor Arnold Zellner," *Econometric Theory*, 5 (1989):287-317.

Ruttan, Vernon W. "Agriculture Economics," in *Economics*, edited by Nancy D. Ruggles. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970:144-151.

Schuh, G. Edward. "The Exchange Rate and U.S. Agriculture" *American Journal of Agricultural Economics* 56 (February 1974):1-13.

Table 1. Linkages Among Professional Groups Through Professional Media (Percentage of Activity Associated with Each Form of Media).

| Group | P U B L I C A T I O N S | | | | | D I R E C T C O N T A C T | | | | |
|--------------------------------|-------------------------|----------|-------------------------------|---|------------------|-----------------------------|---|---|--------------------|--|
| | AJAE | Choices | Basic Economic Journals | Other Ag. Econ. Journals, Meetings | AAEA Meetings | ASSA Meetings | Trade Journals, Association Meetings | Personal Experience and Discussion with Colleagues | Lay Interchange | |
| Sources of Conceptual Thinking | | | | | | | | | | |
| Academic Research | 3.0 ** | 13.4 *** | 17.6 *** | 8.7 *** | 21.7 *** | 11.5 *** | 7.4 *** | 3.4 *** | 10.3 ** | |
| Extension Research | 9.4 *** | 17.2 *** | 9.9 * | 5.7 * | 15.4 *** | 6.1 | 11.9 ** | 3.1 | 11.9 ** | |
| Other Extension | 10.6 *** | 17.0 *** | 10.0 *** | 11.5 *** | 15.1 *** | 17.4 *** | 11.6 *** | 2.4 | 2.1 | |
| Teaching | 7.2 *** | 13.6 *** | 11.9 *** | 7.8 *** | 15.7 *** | 13.2 *** | 7.3 *** | 8.7 *** | 8.6 *** | |
| Industry | 8.9 *** | 20.2 *** | 9.0 *** | 7.2 *** | 17.9 *** | 17.9 *** | 6.3 *** | 3.1 *** | 5.6 ** | |
| Government Research | 6.5 *** | 18.6 *** | 12.8 *** | 6.3 *** | 18.1 *** | 12.6 *** | 8.1 *** | 5.3 *** | 8.2 *** | |
| Other Government | 8.5 *** | 22.0 *** | 6.9 *** | 6.5 *** | 20.0 *** | 17.1 *** | 7.9 *** | 3.3 *** | 5.0 ** | |
| Sources of Reports, Forecasts | | | | | | | | | | |
| Academic Research | 4.6 *** | 16.2 *** | 8.7 *** | 4.1 *** | 17.4 *** | 10.3 *** | 14.7 *** | 7.7 *** | 11.0 *** | |
| Extension Research | 11.7 *** | 23.4 *** | 10.7 *** | 5.5 * | 22.9 *** | 9.6 ** | 11.4 | 3.3 | 0.1 | |
| Other Extension | 8.8 *** | 18.9 *** | 9.5 *** | 7.6 *** | 16.0 *** | 13.8 *** | 13.4 *** | 2.5 | 4.5 * | |
| Teaching | 6.2 *** | 18.4 *** | 4.0 ** | 6.2 *** | 13.4 *** | 16.6 *** | 27.7 *** | 2.1 | 1.8 | |
| Industry | 8.9 *** | 16.5 *** | 8.0 *** | 6.5 *** | 16.0 *** | 13.5 *** | 11.9 *** | 6.4 *** | 7.5 ** | |
| Government Research | 4.3 *** | 20.2 *** | 5.5 *** | 4.2 *** | 15.4 *** | 11.1 *** | 16.7 *** | 9.6 *** | 9.6 *** | |
| Other Government | 7.0 *** | 21.7 *** | 6.8 *** | 5.2 *** | 20.6 *** | 14.4 *** | 12.3 *** | 3.6 ** | 4.2 ** | |
| Outlets for Completed Analyses | | | | | | | | | | |
| Academic Research | 28.4 *** | 10.2 *** | 6.0 ** | 5.0 ** | 8.9 *** | 25.3 *** | 10.5 *** | 2.5 | 3.3 ** | |
| Extension Research | 20.8 *** | -0.2 | 10.3 | 7.7 | -3.7 | 24.0 *** | 2.7 | 21.7 *** | 16.7 ** | |
| Other Extension | 16.4 *** | -1.2 | 7.6 ** | 9.5 *** | -0.3 | 9.9 *** | 0.3 | 29.3 *** | 28.6 ** | |
| Teaching | 20.4 *** | 7.6 *** | 7.8 ** | 8.8 *** | 7.3 *** | 26.4 *** | 1.4 | 9.9 *** | 10.3 ** | |
| Industry | 8.7 *** | 0.6 | 32.3 *** | 23.1 *** | 0.2 | 5.9 *** | 0.2 | 14.6 *** | 14.3 ** | |
| Government Research | 24.0 *** | 3.0 *** | 19.5 *** | 12.5 *** | 2.6 *** | 24.9 *** | 1.3 *** | 6.1 *** | 6.0 ** | |
| Other Government | 12.1 *** | 1.2 | 32.0 *** | 19.4 *** | 2.5 * | 10.9 *** | 0.9 | 11.6 *** | 9.3 ** | |

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Table 2. Changes in Professional Linkages with Professional Maturity (Changes in Percentage of Activity Associated with Each Form of Media per Year).

| Group | P U B L I C A T I O N S | | | | D I R E C T C O N T A C T | | | | |
|--------------------------------|-------------------------|-----------|-------------------------------|---|-----------------------------|------------------|---|---|--------------------|
| | AJAE | Choices | Basic Economic Journals | Other Ag. Econ. Journals, Meetings | AAEA Meetings | ASSA Meetings | Trade Journals, Association Meetings | Personal Experience and Discussion with Colleagues | Lay Interchang- |
| Sources of Conceptual Thinking | | | | | | | | | |
| Academic Research | 0.01 | 0.26 | -1.06 *** | -0.05 | -0.27 | 0.63 *** | 0.72 *** | 0.16 | -0.63 * |
| Extension Research | -0.20 | -0.36 | 0.37 | 1.25 *** | -0.40 | 0.15 | 1.98 *** | -0.41 | -1.50 * |
| Other Extension | -0.35 | -0.73 | -0.20 | 0.08 | 0.02 | 0.67 ** | -0.58 * | 0.40 | 0.23 |
| Teaching | 0.41 ** | 0.20 | -0.94 *** | 0.13 | -0.21 | 0.63 *** | 0.52 ** | 0.06 | -0.58 * |
| Industry | -0.05 | -0.58 *** | 0.07 | 0.32 *** | -0.08 | 0.59 *** | 0.41 *** | -0.15 | -0.33 * |
| Government Research | 0.01 | -0.23 * | -0.45 *** | 0.15 ** | -0.08 | 0.35 *** | 0.19 ** | 0.11 | -0.09 |
| Other Government | -0.20 * | -0.51 ** | -0.05 | 0.19 | -0.01 | 0.70 *** | 0.48 *** | -0.20 | -0.35 * |
| Sources of Reports, Forecasts | | | | | | | | | |
| Academic Research | -0.04 | 0.12 | -0.26 * | 0.05 | 0.26 | 0.68 *** | -0.33 | -0.17 | -0.41 * |
| Extension Research | -0.55 | -0.72 | -0.59 | 0.88 ** | -1.00 | 0.62 | 2.79 ** | -0.40 | -0.68 |
| Other Extension | -0.42 * | -0.94 ** | -0.01 | 0.26 | 0.20 | 0.38 | -0.27 | 0.03 | 0.34 |
| Teaching | 0.32 ** | -0.08 | 0.21 | 0.18 | 0.28 | 0.56 ** | -0.95 ** | -0.22 | -0.08 |
| Industry | -0.25 *** | -0.23 | -0.10 | 0.24 *** | 0.03 | 0.76 *** | 0.04 | -0.15 | -0.27 * |
| Government Research | 0.06 | -0.09 | -0.04 | 0.07 | 0.09 | 0.35 *** | 0.27 | -0.39 *** | -0.37 * |
| Other Government | -0.08 | -0.32 | -0.01 | 0.24 ** | 0.11 | 0.67 *** | 0.28 | -0.38 ** | -0.37 * |
| Outlets for Completed Analyses | | | | | | | | | |
| Academic Research | 0.54 ** | -0.42 *** | -0.15 | -0.07 | 0.15 | 0.13 | -0.17 ** | -0.06 | 0.04 |
| Extension Research | 0.86 | -0.06 | -0.24 | 0.45 | 0.26 | -0.93 | 0.19 | -0.52 | -0.00 |
| Other Extension | 0.13 | 0.13 | -0.04 | 0.12 | -0.10 | 0.06 | 0.05 | -0.70 ** | 0.35 |
| Teaching | 0.58 * | -0.65 *** | -0.15 | -0.04 | -0.43 ** | 0.25 | 0.37 *** | 0.03 | 0.05 |
| Industry | 0.34 | -0.05 | -0.84 *** | 0.05 | 0.01 | 0.09 | 0.03 | -0.09 | 0.45 * |
| Government Research | 0.29 ** | -0.09 | -0.32 ** | -0.01 | -0.06 | -0.05 | 0.02 | 0.10 | 0.12 |
| Other Government | 0.11 | -0.07 | -0.24 | 0.10 | -0.12 | -0.07 | 0.12 | -0.04 | 0.23 |

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Table 3. Changing Approaches with Professional Maturity (Effects of Years Since Last Degree on Percentages of Effort and Emphasis).

| Dependent Variable | Academic Research | Extension Research | Other Extension | Teaching | Industry | Government Research | Other Government | All Respondents |
|---------------------------------|-------------------|--------------------|-----------------|-----------|-----------|---------------------|------------------|-----------------|
| Basis for Analyses | | | | | | | | |
| Published Data | -2.28 *** | -0.79 | -1.57 *** | -1.69 *** | -1.01 *** | -0.92 *** | -0.52 | -1.24 *** |
| Collected and Internal Data | 0.93 *** | -0.44 | -0.22 | 0.09 | -0.26 * | 0.35 *** | -0.58 *** | 0.16 *** |
| Understanding and Experience | 1.36 *** | 1.22 | 1.80 *** | 1.60 *** | 1.27 *** | 0.57 *** | 1.10 *** | 1.08 *** |
| Type of Analyses | | | | | | | | |
| Formal Original Framework | -1.67 *** | 0.44 | -0.42 | -0.85 ** | -0.52 ** | -0.48 *** | 0.05 | -0.68 *** |
| Formal Other Framework | 0.02 | 0.15 | 0.44 | 0.40 | 0.64 *** | -0.13 | 0.35 | 0.15 ** |
| Heuristic Economic Principle | 1.09 *** | -0.19 | 0.21 | 0.60 ** | -0.05 | 0.21 * | 0.02 | 0.35 *** |
| Gut Intuition | 0.26 | 0.17 | -0.51 | -0.72 ** | -0.46 *** | 0.00 | -0.27 | -0.13 ** |
| Descriptive Problem Definition | 0.30 | -0.57 | 0.28 | 0.58 ** | 0.38 *** | 0.40 *** | -0.15 | 0.31 *** |
| Sources of Effectiveness | | | | | | | | |
| Formal Original Framework | 0.02 | 1.35 | -0.09 | -0.32 | -0.17 | -0.25 * | 0.14 | -0.15 ** |
| Formal Other Framework | 0.22 | 0.25 | -0.02 | 0.03 | -0.14 | -0.12 | 0.04 | -0.02 |
| Heuristic Economic Principle | -0.33 | 0.28 | 0.61 | -0.09 | 0.12 | 0.44 *** | -0.39 ** | 0.08 |
| Gut Intuition | -0.03 | -0.96 | -0.35 | 0.25 | 0.33 *** | 0.03 | 0.01 | 0.07 |
| Descriptive Problem Definition | 0.28 | -1.17 | 0.32 | -0.13 | -0.17 | -0.07 | -0.03 | 0.01 |

* Significant at 10%

** Significant at 5%

*** Significant at 1%

a/

Table 4. Ideal Coursework Emphasis for New Recruits (Percentages).

| Professional Group | Economic Theory | Econometrics Statistics | Operations Research, LP | Applications of These | Case Studies |
|--|-----------------|-------------------------|-------------------------|-----------------------|--------------|
| All Respondents | 28.3 *** | 19.9 *** | 8.8 *** | 29.4 *** | 8.9 *** |
| Academic Research | 34.0 *** | 25.9 *** | 10.4 *** | 27.2 *** | 2.8 * |
| Extension Research | 27.8 *** | 18.2 *** | 6.8 ** | 41.4 *** | 5.8 |
| Other Extension | 26.0 *** | 14.1 *** | 10.3 *** | 33.6 *** | 9.6 *** |
| Teaching | 34.5 *** | 20.3 *** | 8.9 *** | 26.6 *** | 6.2 *** |
| Industry | 19.8 *** | 15.4 *** | 8.8 *** | 31.1 *** | 15.2 *** |
| Government Research | 28.3 *** | 21.4 *** | 8.6 *** | 29.2 *** | 9.6 *** |
| Other Government | 22.8 *** | 16.5 *** | 6.1 *** | 29.6 *** | 14.7 *** |
| ----- Difference from Coursework Emphasis of Respondents ----- | | | | | |
| All Respondents | -2.0 *** | -1.0 *** | -0.3 | -1.6 ** | 3.9 *** |
| Academic Research | -0.3 | 1.7 | 0.9 | -3.1 | 2.0 |
| Extension Research | -0.3 | -1.6 | -6.1 | 6.8 | 4.0 |
| Other Extension | -2.8 | -1.7 | 2.6 | -3.0 | 4.0 * |
| Teaching | 5.7 ** | 0.8 | 2.4 | -8.2 ** | 1.0 |
| Industry | -7.8 *** | -3.9 *** | -3.2 *** | -0.2 | 9.1 *** |
| Government Research | -2.8 ** | -2.3 ** | -0.6 | 0.5 | 4.2 *** |
| Other Government | -6.9 *** | -1.6 | -1.6 | 1.2 | 5.3 *** |

a/ Note that the rows of Table 4 do not add to 100% because the response category "others" is not reported.

* Significant at 10%

** Significant at 5%

*** Significant at 1%

Table 5. Determinants of Power and Influence in Industry and Government.

| Independent Variable | a/ Dependent Variable | | | |
|--------------------------------|--------------------------|--------------------|-------------------|--------------------|
| | ----- | | | |
| | Industry | | Government | |
| | ----- | ----- | ----- | ----- |
| | Number Supervised | Level of Influence | Number Supervised | Level of Influence |
| Percentage of Course Work | | | | |
| ----- | | | | |
| Economic Theory | -0.64 | 0.84 * | -0.57 | 0.02 |
| Econometrics/Statistics | - | - | - | - |
| Operations Research, LP | 3.38 | 1.06 ** | -1.03 | -0.11 |
| Applications of the Above | 2.53 | 1.07 *** | -0.11 | -0.14 |
| Case Studies | 0.84 | 0.94 ** | -0.36 | 0.17 |
| Other | 0.46 | 1.00 ** | -0.56 | 0.14 |
| Basis for Analyses | | | | |
| ----- | | | | |
| Published Data | - | - | - | - |
| Collected and Internal Data | 0.49 | 0.41 * | 0.10 | 0.34 ** |
| Understanding and Experience | 1.17 | 0.37 ** | 0.33 | 0.38 *** |
| Type of Analyses | | | | |
| ----- | | | | |
| Formal Original Framework | - | - | - | - |
| Formal Other Framework | 0.20 | -0.06 | 0.03 | 0.15 |
| Heuristic Economic Principle | -0.37 | -0.48 * | -0.13 | 0.01 |
| Gut Intuition | 0.21 | 0.38 | -0.22 | 0.03 |
| Descriptive Problem Definition | -0.11 | 0.01 | -0.03 | 0.21 |
| Years Since Last Degree | | | | |
| | -1.20 | 0.38 | -0.05 | -0.42 |
| Intercept | -91.04 | -41.26 | 42.16 | 24.17 |

a/ Note that "Number Supervised" is the actual number of employees supervised reported by the respondents. The "Level of Influence" is the level of influence on a scale of 0 to 100 (100 highest) in the respondents organization reported by the respondent.

* Significant at 10%

** Significant at 5%

*** Significant at 1%